CHAPTER-VIII

SUMMARY OF THE RESULTS AND CONCLUDING REMARKS

Having analysed the growth, productivity and production function of Paper Industry in India for the period from 1979-80 to 1997-98, the researcher enters into the stage of conclusion of the study.

The growth history of Paper Industry is related with the Industrialisation of the Indian economy. The demand for cultural and industrial paper was 9.80 thousands tonnes by 1977-78. In 1987-88 it has increased to 12.25 thousand tonnes. In 1997-98 it has further increased to 34.45 thousand tonnes. On the basis of forecasting the estimated demand for cultural and industrial paper around 2007-08 will be 56,78,000 tonnes. Development of computer applications and information technology has no impact on the consumption of paper and paper products.

The Paper industry in India is highly fragmented with the capacity of mills ranging from less than 10 tonnes to 600 tonnes a day. The total number unit exceeds 1000 at present.

The industry has been growing at the rate of five percent per annum. The installed Capacity is about 44 lakh tonnes while the production is 32.5 lakh tonnes comprising 29 lakh tonnes of paper and boards and 3.5 tonnes of newsprint.
The major raw materials used for paper production in India are wood, bamboo bagasse and wastepaper. The share of forest based raw materials is 37 percent, agro residues 31 percent and waste paper 32 percent.

From 1979-80 to 1997-98 the installed capacity of the Paper Industry showed an increasing trend. Production also showed an increasing trend from 1979-80 to 1993-94. In 1994-95 it declined but from 1995-96 onwards it showed an increasing trend. Similarly demand also showed an increasing trend from 1979-80 to 1993-94. In 1994-95 it declined but from 1995-96 onwards it showed an increasing trend.

Labour productivity RGVO/L had registered an annual compound rate of 6.32 percentage. Over the study period the average percentage rate of increase in labour productivity (RGVO/L) is 5.72 for all India. The Compound Growth rate of Labour Productivity RGVO/MH is 6.04. The annual average percentage rate of change in labour productivity measured from RGVO/MH is 5.95. The Compound Growth rate of Labour Productivity RGVO/MD is 5.12. The annual average percentage rate of change in labour productivity measured from RGVO/MD is 4.8. From the above information it can be understood that RGVO/L and RGVO/MH are greater than RGVO/MD.

Labour productivity measured from the ratio of real value added and labour (RVA/L) had registered an annual compound rate of growth of 5.61. The annual average percentage rate of change measured from RVA/L is 4.5. The compound rate of growth of Labour Productivity measured in terms of RVA/MH is 5.6. The annual average percentage rate of change measured from RVA/MH is 3.76. The compound
rate of growth of Labour Productivity measured in terms of RVA/MD is 5.42. The annual average percentage rate of change measured from RVA/MD is 3.33.

The compound rate of growth of labour productivity measured in terms of Q/L is 8.5. Annual average percentage rate of change in labour productivity, Q/L, is 13.8. The compound rate of growth measured in terms of Q/MH is 8.35. The annual average percentage rate of change, Q/MH, is 13.11. Over the study period the compound rate of growth measured in terms of Q/MD is 8.82. The annual average percentage rate of change in Labour Productivity measured in terms of Q/MD is 12.8.

Compound rate of growth of capital productivity measured in terms of RGVO/RCS is 5.47, the capital productivity measured in terms of RVA/RCS is 5.24 and the capital productivity in terms of Q/RCS is 8.02.

Over the study period compound rate of growth of material productivity indices (RGVO/RRM) is 4.42. Annual average percentage rate of change in material productivity is 0.33. Total factor productivity has registered an annual compound rate of growth of 4.41. The annual average percentage rate of change in total factor productivity is 1.32.

Regression Function for Total Factor Productivity shows the value of the coefficient of determination \( R^2 \) is 0.95. The Durbin-Watson statistics indicates the absence of the first degree of auto correlation for the function corresponding to All India. The co-efficient of real value added is negative and the co-efficient of time is also negative. This indicates that various institutional factors such as labour
management relations and neutral technical progress etc., have been adversely affecting total factor productivity.

Regression Function for labour Productivity shows the value of the co-efficient of determination $R^2$ is 0.9. The Durbin-Watson statistics indicates that the absence of the first degree of auto correlation for the function corresponding to All India. The co-efficient of real value added is positive i.e. 0.044 and highly significant for the function corresponding to All India. Thus expansion in scale of production has been generating growth in total factor productivity. Co-efficient of time, on the other hand is negative i.e. -0.0012. This indicates that various institutional factors such as labour management relations and neutral technical progress etc., have been adversely affecting total factor productivity.

The VES production function with and without time variable is estimated by using the ordinary least squares method. The elasticities of substitution between capital and labour is either zero or constant. Thus the findings clearly rule out the possibility of variable elasticity of factor substitution in the Indian Paper Industry at national level. Further, there is no evidence for neutral technological progress under the study period.

The estimates of the elasticity of substitution between capital and labour based on logarithmic regressions of value added per labour on the wage rate and time for Paper Industry corresponding to All India covering the period 1979-80 to 1997-98 elasticity of substitution between capital and labour is unity. Thus from the findings one may infer that there is an evidence of Cobb-Douglas production function for the
Paper Industry at All India. The variation in the estimates of elasticity of substitution between capital and labour may be due to the differences in period covered and data used. From the time trend coefficients one may infer that Paper Industry as a whole has not benefited much from technological change during the study period.

The elasticity of substitution between capital and labour is unity which implies that the relevant form of production function for Paper Industry is the Cobb-Douglas. From other findings, the labour elasticity of output is found to be a more important factor than capital in terms of 'factor elasticity', 'marginal productivity' and 'relative contribution' to the output growth at All India level for Paper Industry. Further increase in labour productivity is attributed to capital deepening.

Finally, the estimated value of the degree of returns to scale parameter, as obtained by the sum of the coefficients of labour and capital turns out to be an increasing return to scale for Paper Industry in India.

**Contribution from this Study**

The study provides a comprehensive empirical analysis of growth, productivity and production function in Paper Industry in India. Considering the importance of Paper Industry this study is focused to analyze the pattern and growth of Paper Industry in India, taking into account input, output, and other related variables.
In the present study an attempt has been made to estimate the relative efficiency of different inputs by using partial factor productivity of labour, capital and raw material at All India level for the period from 1979-80 to 1997-98. Further an attempt has been made to estimate the influence of output and technology on factor productivity with the help of multiple regressing frame work. The study also aims to examine and analyze production function in Paper industry at All India during 1979-80 to 1997-98.

Limitations of the Study

This study is subject to certain limitations. This study covers the period from 1979-80 to 1997-98. The basic data source for this study ASI. The data of ASI relates only to those units submitting returns. This study is connected with Paper Industry only. The study has been done through production function analysis. This study may also be done with the cost function analysis. Cost function analysis relating to productivity could form an interesting topic for future research.