Findings, Suggestions and Conclusion
Chapter VI

Findings, suggestions and conclusion

The term 'performance Appraisal' refers to a critical assessment of efficiency and effectiveness of various activities in different areas of operation of an organization. Areas of performance appraisal are mainly, production, marketing, profitability, working capital, fixed assets, social contribution etc., in which performance appraisal is generally applied to assess and measure the efficiency of the business in that particular area. The performance appraisal enables the management to operate the control system of the business organization more effectively. Further, the success of the country and its economy to a larger extent depends on the performance of its corporate industry.

The study in general aims at making performance appraisal of Indian chemical industry after liberalization in the areas of production, cost, sales, profitability, financial and productivity. This macro level study covers six industry viz., Drug, Organic, Inorganic, Fertilizer, Paints and Pesticides. These six industries augment more than 60 per cent of the total investment made in Indian chemical industry. The period covered under the study extends over 11 years from 1991-92 to 2001-02. The data for the study were taken from ‘PROWESS’ database of CMIE. The study used a variety of financial ratios to accomplish the objectives. It employed various statistical tools such as mean, co-efficient of variation, range, regression analysis, analysis of variance and F test etc. Graphs and charts are also prepared and made use of.

This chapter epitomizes the major findings of the study and offers a few suggestions for efficient management of chemical industry in India.
Production Trend

The analysis of production indices of the selected industries indicated that the production performances of the industries were improved during the period under review. The mean value of production was the highest in fertilizer followed by pesticides, paints, drug, inorganic and organic industry. With a view to making an inter-industry comparison of the overall production performance, production trend should be taken under consideration. On the whole, it can be said that during the period of study from 1991-92 to 2001-02, all the selected industries show an increasing trend in their production except pesticides industry, which shows fluctuating trend. The time series analysis of production and application of ‘F’ test revealed that the production in the selected industries did not increase as per expectation.

Sales Trend

The analysis of sales indices of the selected industries indicated that the sales performances of the industries were improved during the period under review. The mean values of sales were the highest in fertilizer followed by paint, pesticides, drug, organic and inorganic industries. With a view to making an inter-industry comparison of the overall sales performance, sales trend should be taken under consideration. On the whole, it can be said that during the period under study from 1991-92 to 2001-02, all the selected industries show an increasing trend in their sales except inorganic and pesticides industries, which show fluctuating trend. The time series analysis of sales and application of ‘F’ test revealed that sales in the selected industries did not increase as per expectations.

Cost Trend

The various elements of total cost have been analysed and interpreted separately. The main conclusions drawn are as under:
Fertilizer industry showed the highest average ratio of raw materials to total cost of production followed by pesticides, organic, paints, drug and inorganic industries. On the basis of results obtained from ‘F’ test it may be concluded that the differences between the percentage of raw material to total cost between the industries were significant while the differences were not significant between the years. The differences in between the industries were significant owing to technology adopted, plant location, extent of physical loss of raw material, changing product mix among the industries, inflationary trend in the prices of raw materials etc. The proportion of excise duty to total cost was the highest in inorganic followed by paints, drug, organic, pesticides and fertilizer industries, it may be noted that the percentage of excise duty has shown wide fluctuations during all the years of the study as it is an administered elements of cost. The observations made from ‘F’ test clarifies that the variances in percentages of excise duty to total cost were significant between the industries and between the years during the study period.

The percentage of the wage-cost to the total cost was the highest in drug industry, followed by the pesticides, fertilizer, paints, inorganic and organic industries. On the basis of results obtained from ‘F’ test, it is can be said that the differences between the percentages of the wage-cost to the total cost in between the industries and between the years were significant. The differences in between the industries were significant owing to a high percentage of the wage-cost in drug and pesticides industries compared to the other industries and also revision of pay scales, allowances and bonus by the different industries. The percentage of manufacturing expenses to total cost of production was the highest in inorganic followed by paints, organic, fertilizer, pesticides and drug industries. The application of the ‘F’ test makes it clear that the differences in the percentages of manufacturing expenses to total cost were significant between the industries. This was due to capacity utilization of each unit and the amount of depreciation charged to profit and loss account each of unit.
The proportion of stores and spares to total cost of production was the highest in drug, followed by paints, fertilizer, organic, pesticides and inorganic industries. Further, the proportion of repairs and maintenance to total cost of production was the highest in fertilizer, followed by inorganic, pesticides, paints, organic and drug industries. The observations made from the 'F' test clarifies that the variances in these costs were significant between the industries. However they were not significant between the years.

The percentage of administrative expenses to total cost of production were observed the highest in drug, followed by pesticides, paints, inorganic, organic and fertilizer industries. The results depicted by 'F' test makes it evident that the differences in the percentages of administration expenses to the total cost were significant between the industries, as the percentage of the same was high in drug and pesticides industries in comparison to other industries. However, the differences were not significant were not significant between the years. The proportion of selling and distribution expenses to total cost were found to be the highest in fertilizer followed by paints, drugs, organic, inorganic and pesticides industries. The results shown by 'F' test reveals that the differences in percentage of selling and distribution expenses to the total cost were significant between the industries and between the years. The difference in between the industries were significant because the percentage of selling and distribution expenses to total cost of production were the highest in fertilizer and paint industries compared to the other industries under the study.

**Profitability Performance**

The profitability performance of the Indian chemical industry under review has been studied by computing various ratios relating to profitability. The profitability ratios can be determined on the basis of sales and
investment. A study of profitability ratios revealed the following observations.

**Analysis of Profit Margin**

The analysis of operating profit margin ratio reveals that operating profit margin of the selected industries of the chemical industry should be adequate to cover the fixed charges, dividend and reserves during the study period. The average operating profit margin ratio was the highest in inorganic industries, followed by the organic, drug, pesticides, fertilizers and paints industries during the study period. The overall fluctuating trend of this ratio can be attributed to the factors like market conditions, planned product mix and efficient use of machinery. The analysis of net profit margin ratio reveals that the selected industries of chemical industry should be in a position to pay off debts and give a satisfactory return to its shareholders during the study period. However, high fluctuation in the net profit margin ratio is noticed which can be attributed to the factors like market condition, change in product mix and pricing policy.

The results depicted by ‘F’ test makes it evident that there was significant difference between the operating profit margin among the selected industries during the study period. But no such significant difference was noticed among the years. Further, there was a significant difference between the net profit margin among the selected industries and between the years during the study period. This shows that the ability of controlling non-operating expenditures were different among the selected industries of the chemical industry. The overall analysis of profit margin shows that selected industries are able to withstand competition and adverse conditions.

**Analysis of Return of Investment**

When profitability is also measured in relation to assets, the results seem to be encouraging in the sense that the resources of the selected industries were being utilized in a profitable manner. The analysis of return
on assets depicts that the operating assets were effectively utilized in a profitable manner by the selected industries of the chemical industry during the study period. The average return on assets was the highest in drug, followed by fertilizer, paints, inorganic, pesticides and organic industries during the study period. The overall fluctuating trend of this ratio can be influenced by the ability of the industries to utilize the assets in the profitable way. The analysis of return on net worth ratio also reveals that owner's equity was utilized profitably in all the selected industries during the study period. The average return on investment on net worth in inorganic industry at 46.22 per cent was the highest while that of organic industry was the lowest among all the selected industries. The overall analysis of return on capital employed ratio reveals that the ratio has been improved significantly during the study period which was on account of considerable increase in profit margin as well as assets turnover. The average return on capital employed of drug industry was 33.98 per cent, which was the highest as compared to other industries during the period under study.

The observations made from 'F' test clarifies that there were significant difference in the return on assets, return on net worth and return on capital employed ratio among the industries during the study period. However, no such differences were noticed in return on assets and return on net worth ratios between the years. On this basis, it can be asserted that these industries will be able to sustain their average rate of profitability in future.

It is significant to note that the position regarding earnings per share was good in all the selected industries of the chemical industry during the period under review highlighting their better performance and prospects from the viewpoint of shareholders. However, fluctuating trend of these ratios can be attributed to the factors like profitability position, fluctuations in the market prices and board dividend policy. The test of hypothesis reveals that there were significant differences in earnings per share among the selected
industries and between the years during the study. A significant inference which can be drawn on the basis of above analysis is that due to satisfactory degree of profitability of these industries would be able to generate funds internally for financing expansion and growth.

**Profitability Trend**

The analysis of profitability trend reveals that the linear model of time trend of profitability has proved to be good fit in all the selected industries except fertilizer industries. The four industries viz., drug, fertilizer, paints and pesticides experienced a declining trend in profitability over the study period. Only in case of organic and inorganic industries, the time trend co-efficient is positive which indicates increasing trend in profitability over the study period. The falling tendency of profit rate of these industries is a proof of adverse effect of various controls on prices, output, expansion, investment, distribution, etc., exerted by government on these industries over time. Further, variation in the value of $R^2$ implies that time explains profitability variations of different industries in different degree over the time.

**Determinants of Profitability**

Determinants of profitability are analysed using the technique of ordinary least square. In drug industry, model explains 99 per cent of variation in profitability of firms included in this industry. The analysis reveals that growth rate of assets is the strongest determinant of profitability followed by size, inventory turnover ratio, liquidity, vertical integration and past profitability in the drug industry. In organic industry, model explains 87 per cent of variations in profitability of firms included in this industry. Among the variables, size is the strongest determinant of profitability, followed by liquidity, growth rate of assets, inventory turnover ratio, past profitability and vertical integration. The selected variables explain 99 per cent of variations in profitability of firms included in the inorganic industry. It is evident from the results that size is the stronger determinant of profitability.
followed by growth rate of assets, liquidity, vertical integration, past profitability and inventory turnover ratio in this industry.

In fertilizer industry, the selected variables explain 99 per cent of the variations in profitability of firms included in this industry. Among the variables size is the strongest variable in explaining the profitability of fertilizer industry, followed by growth rate of assets, past profitability, inventory turnover, liquidity and vertical integration. In paint industry, the selected variables explain 92 per cent of variations in profitability of firms included in this industry. Among the selected variables, growth rate of asset is the strongest determinant of profitability in paints industry. In pesticides industry also, selected variables explain 99 per cent of variations on profitability of firms included in this industry. Among the variables, size is the stronger determinant of profitability followed by liquidity, growth rate of assets, past profitability, inventory turnover ratio and vertical integration.

The overall analyses of determinants of profitability reveals that size and growth rate of assets significantly explain the profitability of all the selected industries except pesticides industry during the study period. Among the selected variables size is the strongest determinant of profitability in organic, inorganic and pesticides industries, whereas growth rate of assets is the strongest determinant of profitability in drug, fertilizer and paint industries. The overall explanatory power of regression appears to be good in all the selected industries of chemical industry. This may be inferred from the co-efficient of determination ($R^2$), which is the measure of the extent of movement in the dependent variable that is explained by the independent variables.

**Analysis of Short-term Financial Strength**

In order to judge the financial strength of the selected industries of Indian chemical industry, ratios relating to short-term financial strength has
been computed and analysed. By analyzing the current ratio and liquid ratio, it has been found that all the selected industries have maintained adequate current and liquid ratio during the study period. Accepting current ratio of 2:1 as optimum, it was found that none of the selected industries average current ratio was more than 2:1. Considering liquidity ratio 1:1 as the measure of standard, it was found that none of the selected industries average liquid ratio was more than 1:1. Moreover, current and liquid ratios have increased slowly and steadily over a period of time in the selected industries. On the basis of analysis of variance in current ratio, it has been found that the differences in the current ratio between industries are significant at 5 per cent level. However, the differences in the current ratio between the years are not significant. Similarly, the differences in the liquid ratio between the industries and between the years are significant at 5 per cent level. The analysis of interest coverage ratio also reveals that all the selected industries have the ability to meet fixed interest charges during the study period.

The overall analysis of short-term financial strength reveals that all the selected industries are able to meet its current obligations as and when they become due for payment. Although the ratio was less than the standard norms, even then the liquidity position of the selected industries may be considered satisfactory as it remained close to the standard norm except fertilizer industry.

**Assessment of Liquidity**

The liquidity position of the selected industries of chemical industry has also been assessed by employing the discriminant analysis based on current and liquid ratios. The construction of discriminant function suggests that current ratios appeared to be stronger than liquid ratios during the study period except very few years. Analyzing the discriminant Z score, the liquidity position of the selected industries has been assessed. The good risk and poor risk units may also be identified by computing the cut-off values.

**Analysis of Long-term Financial Strength**

To judge the long-term financial strength of selected industries of chemical industry, both debt - equity ratio and fixed assets to net worth ratio has been computed and analysed. The analysis of debt equity ratio reveals that the long-term financial position of the selected industries of chemical industry considered satisfactory during the study period. The average debt to equity ratio varied from industry to industry, the highest average was 1.64 times in organic and fertilizer followed by inorganic (1.36 times), paints (1.18 times), pesticides (1.08 times) and drug (0.94 times). The overall fluctuating trend of this ratio can be caused by the changes in the capital structure of the selected industries. The analysis of fixed assets to net worth ratio reveals that the selected industries have been utilized small portion of its long-term funds in investing its fixed assets during the study period. Major portions of the long-term funds are to be used as working capital by all the selected industries of chemical industry during the study period.

**Analysis of Assets Turnover**

Turnover ratios reflected how efficiently the company is managing its resources. Turnover ratios affect the overall profitability of a company to a large extent. A study of turnover of various assets revealed the following observations.
The total assets turnover ratio, which indicates the effectiveness of the utilization of assets, registered a fluctuating trend in almost all the industries under study. The average ratio was always more than one time in drug and paints industries throughout the study period whereas it was nearing one time in the remaining industries throughout the study period. Thus, the addition to investment in various assets could result in proportionate increase in sales. The fixed assets turnover ratio indicates a mixed trend in almost all the selected industries under study during the period under review. The analysis of fixed assets turnover ratio suggests that all the selected industries were able to utilize their fixed assets properly in generating sales. The working capital turnover ratio also witnessed a fluctuating trend in all the selected industries during the study period. The analysis of working capital turnover ratio reveals that all the industries were able to handle the working capital management properly.

The inventory turnover ratio represented a fluctuating trend during the study period and it ranged between 9.65 times in pesticides industry and 41.69 times in inorganic industry. On the whole, it can be concluded that the inventory management was proper and satisfactory in all the selected industry under the study. Liberal credit and collection policy of a firm can be judged by debtor’s turnover ratio which was the highest (8.06 times) in fertilizer and was the lowest (6.55 times) in paint industry. The high debtor turnover ratio of all the industries suggests that the credit and collection policy was restrictive in all the selected industries of chemical industry during the period under review. The overall analysis of assets turnover ratios reveals the different assets were utilized effectively by the selected industries of chemical industry during the study period.
Analysis of Productivity

Analysis of productivity trends at the group level marked inter-industrial differences in productivity growth. Estimates of TFP for all the selected industries of chemical industry show a rising trend in all the three direct measures of TFP. Labour productivity and capital productivity for all the selected industries also show a rising trend during the study period. Estimates of the Cobb-Douglas production function reveal constant returns to scale for drug industry during the study period. But in the other groups organic, inorganic, fertilizer, paints and pesticides industries, returns to scale is not constant. Estimates of CES production function also show that returns to scale is constant for drug industry. But for other industries, returns to scale is not constant. Further, elasticity of substitution is less than unity for all the selected industries during the study period.

Annual variations in factor productivities have been explained with the help of regression functions. A significant positive relationship is observed with value added for almost all the selected industries of Indian chemical industry. This shows that expansion in scale of production has been generating growth in total factor productivity. On the other hand with time, a significant negative relationship is observed for drug industry, organic industry and inorganic industry. Again in case of drug industry though the relationship with time is negative but significant only in Solow index. In case of organic industry also the relationship with time is negative but significant only in respect of Kendrick index. For inorganic industry also, the relationship with time is negative but significant only in respect of Kendrick and Divisia index. This indicates that deteriorating institutional environment as reflected in labour management relations have been adversely affecting total factor productivity. Further, there is a positive significant relationship with time observed for fertilizer industry, paint industry and pesticides industry. This indicates that total factor productivity is generated by labour management relations in these industries during the study period. It is
concluded that growth in factor productivities would have been much higher if labour management relations would have been better.

Suggestions

Keeping in view the above observations relating to the study, the following measures are suggested which would go a long way to improve the performance of Indian chemical industry.

1. It has been suggested that the government should take measures for providing of infrastructural facilities to the industry, which in turn will increase the production performance of the industry. An effective and integrated policy of the government as regards restriction on the import and export of chemicals, lower excise duties on the chemical products and regular supply of raw materials may further enhance the production performance of the industry. Application of latest technology, which make the industrial relations cordial, congenial to increase the capacity utilization ratio, move fast in research and development are suggested for further improvement in the production performance.

2. It is suggested that still there is need for chemical industry to adopt producing and selling wide range of products, to adopt better market strategy, by reducing costs and revising selling prices to enhance the volume of turnover so as to go ahead in the era of competitions.

3. It is suggested that all the selected industries should under take cost control measures further so that increased profit margin of the company may enhance the earning power ratio. The standards for each component of cost of production should be fixed by the industry. It should make inter-firm comparison study and each unit should try to stick to the standards. An analysis of deviations, if any, should be made periodically. Material management plays an effective role in controlling the cost of production and its reduction. A special emphasis and attention therefore should be
given to sound and efficient materials management. Cost reduction and control techniques like budgetary control, standard costing, control ratios and value analysis should be adopted. Further, efforts should be made by the chemical industry to control and reduce the administration, selling and distribution overheads.

4. It has been found that profitability trend of drug, fertilizer, paints and pesticides industries were declining during the study period. In this regard, reduction of excise duty, tariff and surcharge of sales tax, steps to control the operating expenses and maintain cordial industrial relations are the measures suggested for the improvement of profitability trend. It is also suggested that the chemical industry should adopt performance budgeting in a systematic manner, alongside of co-ordination of performance budgeting, with profit planning, follow-up and monitoring system.

5. It is essential to have objective performance appraisal criteria for every undertaking. For this purpose, the best way will be to introduce performance audit and revise the performance indicators. Commercial performance must take care of all the objectives and goals. For this purpose, a suitable system of financial and non-financial objectives must be developed. Policymaking should be an realistic assessment of cost.

6. Employment cost should be controlled through improvement in efficiency and productivity of employees. Extra staff should be diverted to other works. All our efforts should be made to tune up the efficiency and ensure effectiveness in this regard.

7. The financial information system, internal and external, should be improved in order to strengthen decision making on one hand and effective financial stability of the undertakings on the other.
8. Expansion of production should be encouraged for the selected industries. It would be possible to improve productivity by generation of economies of scale. Also, adoption of more efficient technologies would be feasible. Further, it is also necessary to improve management – labour relations to harness productivity potential.

9. A systematic, prompt and regular flow of information and its analysis is important for improving productivity, efficiency and profitability. A suitable management information system needs to be evolved which will take care of the data requirement of administrative offices as well as other units like factory etc., for internal management and control. Appropriate organizational arrangements should be made for the successful implementation of management information system in Indian chemical industry.

10. At present, in India, the financial statements are presented on historical cost basis. As such these statements do not exhibit the correct realizable value of the assets on the date of the balance sheet. Thus, the true profitability can’t be ascertained on the basis of the figures given in the balance sheet on historical cost basis. It is, therefore, suggested that a supplementary statement should be included in the annual reports showing the figures of assets and liabilities on the basis of current values.

11. At present, the profit and loss account of multi-product concerns is disclosed in a consolidated form which can’t measure and judge the performance and profitability of each activity. Hence, the profit and loss account should be prepared on departmental / activity basis by such multi-product concerns.

12. Cost accounting and cost audit should be made mandatory in chemical industry and they should be called to prepare cost-sheet along with their annual financial statements.
Scope for Further Research

Any research study can explore only a limited field of knowledge. There are many aspects, which need to be researched further. In the present case also, there is considerable scope for further research. Industry-wise firm distribution studies can be undertaken on various aspects of performance. Diversification itself can provide ample scope for research. As it is, there does not seem to be consistent and rational behaviour in the pattern of diversification in the Indian corporate industry. An interesting area for further research is to analyse the factors leading to profitability through diversification. An analysis of social profitability of the corporate industry with the help of value added and other techniques can provide an ample scope for research. Other interesting areas to explore are the performance of Indian chemical industry before and after liberalization periods. A considerable scope for further research also exists in the areas of mergers, takeovers etc., One can also make a study on the rationale behind the government’s disinvestment programme on the Indian chemical industry. Another interesting theme would be to identify sick and healthy units separately in the chemical industry and find out the discriminating characteristics of each group with respect to profitability. A study can also be undertaken in the area of performance appraisal, comparing private industry and public industry.

Every attempt has been made to make the study intensive but due to lack of time and resources there exists certain gaps in the present study. Hence, further work may be undertaken to bridge the gap so as to enhance the scope of the analysis. The coverage of this study is limited to only six industries of Indian chemical industry. This can further be extended. Data for this purpose of analysis have been collected chiefly from secondary sources, which have their own limitations. A more useful study can be done by collecting data from primary sources. Further, research work in above-mentioned areas would be of great practical significance and would throw more light on the operation of chemical industry in our country.
Conclusion

To conclude the study, it may be said that the adoption of liberalization measures and above suggestions will doubtlessly help the Indian chemical industry to improve their performance individually and of the industry as a whole. This study also suggests that the policy of liberalization should further be strengthened. Thus, the dreams of our planners to accelerate the economic growth in the country are still possible to be translated into reality.