CHAPTER-8
CONCLUSIONS AND SUGGESTIVE MEASURES

From the analysis undertaken in earlier chapters it appears that IPCL has performed very well. It has absorbed the high technology from different collaborators within the span of two decades, it has also contributed remarkably in the field of innovation and product diversification. It has helped the national economy by widespread development of small scale industries in the form of plastic processors. The corporation has successfully achieved the target of 90% capacity utilization in each of the new projects within three years of their installations and above all it has remained profitable and become a revenue earner for the central exchequer. Its financial performance is excellent not only as public sector enterprise but also in comparison with private sector units. The comparison of IPCL in relation to petrochemical group of India reveals the following.

In Chapter five the Cobb Douglas production function model estimated for IPCL shows statistically significant results. In the model incorporating neutral technical progress the related coefficient of technical change is found to be significant. The elasticity of labour is positive while that of capital has been found to be negative. This could be due to excessive capital
installation. The technical coefficient is productively found to be positive which indicates that the high technology is used in this corporation. It is, however, a positive sign for the corporation under study.

In the case of Cobb Douglas production function estimated for petrochemical group at all India level, it is observed that there is highly significant positive relation between labour productivity and capital intensity. The value of the coefficient of labour is found to be negative and insignificant and the results conform to a tendency of decreasing returns to scale in the petrochemical industry at all India level. From the model involving neutral technical progress it is indicated that technological progress is not significant and there are decreasing return to scale.

If we compare the results for IPCL with the industry one can clearly see that IPCL has saturated in its existing technical framework and not much of effect is being created by adding more technology to it whereas Indian petrochemical industry needs extensive doses of technological upgrading since it is operating under decreasing returns to scale. It has also been observed that IPCL is a highly capital intensive corporation and labour proportion in it is lesser as compared to Indian petrochemical industry. Hence for an economy like India it should be seen that overall Indian petrochemical industry should be technologically upgraded so that down stream units will develop and ultimately there
would be more employment generation.

The results of the model for employment reveal that in case of IPCL the elasticity of employment with respect to real wage rate is positive but less than unity, which means that with an increase in real wage rate by 1% employment also increases but by less than 1%. A positive relation implies corporation's achievement towards its socio-economic commitments since real wage rate here has increased during the period under study. The petrochemical group at all India level reveals a negative impact of real wage rate on employment but the elasticity of employment with respect to wage rate is much lower than unity, which is also statistically insignificant.

From Chapter six which is about investment behaviour, it is observed that in both the models (where dependent variables are investment in plant and machinery and investment in fixed assets) for IPCL and petrochemical group in India, the impact of independent variables on dependent variable varies (Tables 6.1, 6.2, 6.3, and 6.4). For example, in the case of IPCL the inventories have created a positive influence on plant and machinery whereas in case of industry as a whole net debt has played a significant influence on dependent variable. It has also been observed that there is a relation between inventories and investment in plant and machinery, since as stated before, larger inventories creates disincentive to invest and vice-versa.
and hence curtails profit margin. This is due to the irregular supply of feed stock from ONGC and in order to avoid the possible bottlenecks they have a policy of holding higher inventories. This can be removed by having proper coordination between ONGC and IPCL. They should go for a policy wherein proper supply line can be maintained. It is for the benefit of the government and other petrochemical companies also that make use of those inventories that is held back by IPCL.

It is also observed that only inventories have significant impact on investment on plant and machinery whereas the influence of rest of the variables on plant and machinery are negligible. If we do not include inventories then the flow of net debt is found significant. The analysis for petrochemical groups at all India level reveals a positive and significant impact created by net debt and retained cash flow on investment in plant and machinery and negative impact created by investment and depreciation on investment in plant and machinery. What is further required in this industry is to increase the provision of external finance enabling the industry to increase its cash flow and reduce depreciation so as to increase investment in plant and machinery as this industry is short of capital.

The results of Chapter seven which is relating to profitability reveal that there is a very significant and positive relation between sales/fixed assets and net
profits/fixed capital which is a healthy and a positive sign for the corporation. It indicates high margin of profits and full utilization of existing capacity. But in case of petrochemical group at all India level a positive but not very significant impact of sales/fixed assets and net profits/fixed capital is indicated. This shows that this industry has a high turnover and very low margin of profits. Further, it is more labour intensive and fixed assets do not contribute much to its profits and as stated earlier the industry is operating under decreasing returns to scale. Hence various measures should be taken to increase its productivity and to attain fuller utilization of existing capacity so that margin of profits could be increased. Rest of the variables postulated have failed to create any impact on net profits/fixed assets.

Coming to the rate of return of capital discussed in Chapter four the rate of return on capital employed is 0.19 in case of IPCL whereas in case of Indian petrochemical industry it is 0.34. The rate of turnover of assets employed is 1.61 in case of IPCL and 2.38 in the case of petrochemical group at all India level. Looking towards rate of return on sales it is observed that it is 0.11 in case of IPCL and 0.14 in case of petrochemical groups of India. The consistently lower values of these performance indicators can be due to the fact that IPCL is a public sector corporation and therefore may not be aiming always at
profit maximisation as its primary objective.

In case of financial structure it is seen that IPCL has incurred maximum expenditure on capital work in progress which is rising at a speed of 25.95% per annum. Next is current liability which is growing at an annual rate of 16.59%. The expenditure on current assets and total assets is rising at the rates of 7.65% and 7.02% respectively whereas working capital is increasing marginally at the rate of 3.24% per annum. It clearly indicates that IPCL is busy expanding its horizons far and wide. As the corporation is growing from a single location multiproduct firm to a multi-location multi-product firm this would place a greater pressure on management to maintain a strict vigil over the different plants to ensure efficient working.

The large scale expansion programme embarked upon by IPCL requires competent executives and supervisory staff to manage it. The shortage for trained personnel is likely to be acutely felt by the corporation when petrochemical industry in India has started undertaking more and more expenditure on current assets followed by the expenditure on working capital. This industry at all India level mainly consists of labour oriented units where expansion process is quite less and maximum returns are earned with whatever capital is installed. Hence a point needs to be highlighted that as IPCL is already in the continuous process of expansion enough of resources should be spared by the
government for other Indian units in order to have a more equitable distribution of scarce resources which will in turn make more balanced development of the industry in terms of the size of the units.

So far as case of cost of production is concerned, it has been observed that a substantially large amount is incurred on wage bill followed by administration which amount to 9.39% and 8.23% respectively. The explanation provided by IPCL for such a high cost of production is that they have to bear a heavy burden on account of the administered prices of feed stock and power. National priorities currently favour fertilizer industry among other naphtha users. Therefore, the burden of naphtha subsidy to fertilizer is partly borne by IPCL. The petrochemical sector is charged over Rs.3000 per ton as against just Rs.1800 per ton for fertilizer. Besides, there is a high cost incurred in infrastructural facilities, transport etc pertaining to naphtha. As a result the corporation in the year 1988-89 shows about 25% of expenditure made on naphtha in its total turnover of Rs.1336 crores net of excise. A price concession comparable to the fertilizer sector would have meant a saving of a bulk amount by IPCL.

Another problem in this field essentially lies in the history of IPCL complex. All its machinery was installed at a much higher price as compared to international installation. Though it is claimed that only 31% of the
value of the plant and equipment at Vadodara complex is of imported origin, the fact is that many of the Indian suppliers have as high as 70% import content in their supplies. Customs and other duties in multi-stages of fabrication must have added up to a fairly substantial magnitude.

When overall petrochemical group at all India level is examined it is found that the maximum expenditure is incurred on raw material consumption which is 14.11% of total expenditure. It indicates a positive sign for the industry. Next to it is the expenditure on manufacturing and administration. Since the industry is mostly labour intensive as compared to IPCL its expenditure on administrative needs to be cut down. Further, the expenditure on depreciation is 7.24% of total expenditure which is quite high in comparison to IPCL which is only 4.46%. This indicates that old and worn-out machinery needs immediate replacement. The expenditure of manufacturing and administration has risen as replacement of spare parts at times becomes more expensive. Hence government should look into the matter and IDBI should give adequate finance to these units. Wage bill has increased at the rate of 6.60% per annum which is quite satisfactory and interest cost increases by 7.90% per annum which is also reasonable.

The trend of production in IPCL reveals a growth of 6.05% per annum and its sales have grown at the rate of
8.70% per annum whereas in case of petrochemical group at all India level the production has increased at an annual rate of 9.11% and sales have increased only at the rate of 7.09% per annum. A comparison of growth in production and sales reveals a satisfactory picture for IPCL. However, for the industry as a whole it is not at all a healthy sign. It clearly indicates that there is stock of finished goods which has grown by about 2% per annum held-back due to market fluctuations. Unsold stocks tend to curtail profits. Hence this matter should be seriously tackled by the government. Cooperatives can be set up in this industry also which would help in the clearance of unsold stock.

Looking at the inventory control of IPCL it is observed that the total inventories have increased at an annual rate of 3.08% whereas in the case of overall Indian petrochemical industry the total inventories have increased at an annual rate of only 0.14%. IPCL has the potentiality to have a higher inventories because firstly, it is a sound company in terms of finance and to overcome the timely bottlenecks it has the policy to have higher inventories. Secondly, IPCL is more committed to public needs and in order to maintain its supply lines it has to maintain higher level of inventories, whereas Indian petrochemical industry on the whole is poorly managed and financed and whatever raw material is purchased is used for production and then is sold. They run short of finance and due to lack of
government support, they are unable to maintain adequate inventory to overcome any crisis. It may be noted that petrochemical industry is subject to various bottlenecks and shortages hence facilities may be created for the maintenance of reasonable amount of inventory by this industry.

From the overall results of IPCL it is observed that IPCL is doing quite well and is expanding far and wide and over and above it is generating substantial surplus for further expansion. But a point that needs attention is relating to future potentiality of the petrochemical market. With the advent of various new projects it is going to be quite competitive. Hence what would happen to all this surplus expansion if the management finds it difficult to control with market competitiveness. It is strongly felt that given the objective with which this company has been set up it is time for the company to make its commitments consistent with the national priorities. True to its image of a pioneer, IPCL should confine itself to petrochemical development as it did in the seventies. The manufacturing aspect of IPCL should serve the aspects of market development and technological development. It would be well advised to retain only those manufacturing interests that are absolutely necessary. Further, it should restrain its monopolistic tendencies and thereby should be more committed to public needs.
In case of labour, the workers participation in management needs to be revived. The company should revive the 'area committee' and 'plant level committee' in practice and let more and more workers participate in it rather than to have these things only on paper and it is time to avoid long administrative channels and the committee level members should be given enough powers to take their decisions on the spot which will ensure immediate implementation. This will help retain workers confidence in management. Citizen group like CERC should increase their role in social performance of the company. These measures will help the corporation to enable its performance.

8.1 Innovation of petrochemical technology and its distribution:

Innovation here includes various commercially viable projects and the distribution of technology to the processors that use IPCL's products. So far IPCL is only undertaking its innovations in the field of production and market. IPCL is a major producer of polymer resins which is a raw material for plastic processors. These processors find difficulty in marketing their products. What IPCL does is that it helps developing the market for them, for

* Problems relating to the industry were highlighted in a study undertaken by me for M.Phil. degree.

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instance, in processed food plastic packaging is heavily required and water scarcity leads to major thrust in plasticulture. Right kind of innovation is required in these areas too.

- Concern over technological diffusion: It is observed that the technology required to process the polymers into final products is very simple and it is also seen that there is a scarcity of technically qualified persons. Hence the problem is faced by the processors in the early stages. When a particular raw material is required to be used for a particular application only the product is accepted by the market. As IPCL has the related technology at its disposal it is rightly in the position to advise the processors regarding its usage. IPCL through its customer service division and product application department tries to satisfy these needs and hence help in the upliftment of the small entrepreneurs.

IPCL also possesses testing facilities of its new products. The other problem faced by these processors is from the machinery manufacturers who supply technology during production stage. These processors get the knowledge through experience and not much from the machinery manufacturers who are usually not available when the need arises.
It is strongly observed that there is no coordination among IPCL authorities and these processors and have complaints against each other. Processors feel that their technology is leaked out to other processors if they cooperate with IPCL authorities and IPCL personnel feel that processors do not cooperate with them. There are many ways to solve these problems such as the following:

- Proper linkages should be observed with foreign machinery manufacturers and these personnel should be versatile and mobile. Only those machinery should be bought which ensure future market.

- Further, there is tremendous scope for improvement in the market. India is still in its teens as far as plasticulture is concerned, hence we have a great scope to expand the market. New application areas can be brought into consideration like plastics in household furnishing, construction, agriculture etc. IPCL's R&D department can help processors in this area whereas processors can help IPCL authorities by being honest in replanning the manufacturing lines.

6.2 Petrochemicals Tomorrow

In spite of some weaknesses the benefit of self reliance cannot be quantified. IPCL's operations over the last decade or so had a subtle but substantial influence in the material life of the nation. It can be called a
backbone of petrochemical industry in India. The spin-offs in other industrial sectors have also been quite extensive, and it has created a great impact on everyday life. Without IPCL this extensive development could have been impossible. IPCL has been quite successful in creating employment of 5,000 employees directly in Varodara itself and 5,00,000 employed indirectly in downstream units.

On the basis of past growth rates of various variables that are taken in the study their future projections are worked out for the next ten years. This will give us a broad picture of petrochemical industry by the turn of 2,000 A.D. provided the same economic environment prevails in next ten years.

Here an important aspect that should be looked into is the rationale for assuming a constant growth rate for future projections. In other words, why we do not include any tendency for acceleration or deceleration in the growth rate in future? This can be seen by taking into account the latest technologies transferred from developed countries and their new substitutes that can take over these products in future. If this possibility is visualised, then there can be hurdles to petrochemical industry but so far the developed economy of the world has not been able to achieve any break-through towards the substitutes of petrochemical products or towards the curbing of the dependence of other industries on this industry. It seems that petrochemicals
would be required as a feedstock or as subsidiary feedstock in every manufacturing industry.

8.3 Global Scenario

It has been observed that globally nearly 70 percent of the manufacturing capacity of basic petrochemicals is located in the United States, Western Europe and Japan all of which also happen to be the main centres of consumption. However, during the last decade significant capacities have been built up in Canada, Saudi Arabia and some of the Latin American countries. Asian countries particularly Malaysia, Thailand, China and India have also doubled their basic petrochemical capacity during the last ten years. In the case of India the growth in setting up new capacities during the next ten years is likely to be even higher but at the same time we should not forget our present extremely low base of consumption of petro-based products like plastics. Even after the fulfilment of these so called ambitious targets by the year 2000. India's plastic consumption will be about 2.6 kg. per capita against the present level of well below 1 kg. This is against the present day world average (including under developed countries) of over 15 kg (and the range of 80 kg in developed countries). This is, as stated before, due to the range of petrochemicals and their wide and diverse usage. Thus, it clearly indicates that there will be no tendency for deceleration in growth
rate in petrochemicals in future. The future prospects of IPCL as well as of petrochemical group at all India level are given in Appendix.

8.4 Salient Features

As per the future projections derived for the next ten years (see Appendix) it is observed that in case of IPCL the percentage of net fixed assets to total assets are declining from 67.75% to 13.81% whereas the percentage of capital work in progress has increased from 2.11% to 30.04% which clearly indicates that the expansion process is expected to get momentum during the next ten years. The current liabilities as ratio to total assets in percentage terms are likely to increase from 5.29% to 62.02% and working capital will rise from 30.14% to 38.29% which is not a positive sign for the corporation. In case of industry on the whole net fixed assets are rising in importance marginally whereas current assets are increasing from 4.61% to 418.16% of total assets. Hence we can hope for future expansion for the industry which is a positive sign. From cost of production in case of IPCL it is observed that purchase of resale will increase from 3.19% to 40.83% and raw material consumption will fall from 32.69% to 18.14% which is not a healthy sign for the corporation. Employee wage bill remains stationary to 4.57% and manufacturing and administrative expenditure, interest rate will rise marginally and depreciation will fall to
3.32% making the prospects brighter for the corporation.

In case of industry on the whole raw material consumption will increase from 4.27% to 89.93%, while wage bill will increase tremendously from 9.47% to 83.02% and interest rate will rise from 4.2% to 43.06%. Manufacturing and administrative expenditure rises from 7% to 190% and depreciation from 1% to 38% which is a substantial rise. In case of IPCL production to sales ratio is expected to fall from 173.02% to 70.75% if the same conditions prevail in the corporation. This cannot be considered a healthy sign for the corporation. In the case of industry on the whole, the production to sales ratio is projected to rise from 79.32% to 115.35% indicating a healthy growth.

Total inventories to working capital ratio in case of IPCL is expected to remain stationary in next ten years, whereas total inventories to working capital in case of industry on the whole is likely to fall in next ten years from 24.68% to 5.28%.

Profit to sales ratio in case of IPCL is unlikely to change and may remain stationary to around 8.50% in next ten years. The profitability based on ratio of profits to net fixed assets is expected to increase from 25.51% to 50%, while that based on ratio to working capital is likely to fall from 36.52% to 17.90%. The profitability based on ratio of profits to value added is projected to rise from 0.30% to 38.55% in next ten years.
Thus, by all measures on the basis of current trends the IPCL is expected to improve its profitability performance. In the case of industry on the whole the reverse tendency may be observed. Thus profit to sales ratio is likely to increase from 0.06% to 5.24% in next ten years, while profitability to net fixed assets ratio may rise drastically from 0.05% to 12.63%. The profit to working capital ratio, however, is likely to rise from 0.34% to 25.25% due to earlier trend of fast increase in working capital. This future trend has led to this steep rise. Further, irregular market faced by industry compels it to purchase various raw materials etc. The profits as proportion to value added are also expected to marginally fall from 0.32% to 30.18%. These are all not very healthy signs for the industry. There is also an indicator of a rise in share of wages in value added.

6.5 Suggestions for the future

Petrochemical industry is going to be the key industry of 21st century. Hence appropriate conditions should be created for the further development of the industry.

Petrochemical industry is highly capital intensive. It has been estimated that about Rs.1,000 to 1,500 crore is required to be invested in each of such projects. For an economy like ours where the finance should come from other than exchequer as our resources are scarce. Therefore,
sources like financial institutions in India and abroad, development corporations, market borrowing and internally generated funds are the only other options. IPCL has established itself through internally generated resources whereas Reliance Petrochemicals has established itself from the resources generated through capital market. The generation of resources of a particular corporation depends firstly upon the confidence level generated by the organiser's including financial institutions and secondly upon the confidence that Indian industry has been able to generate in central government which can affect the industry through its policy interventions.

Petrochemical industry requires a very high technology. There are more public enterprises and few private houses entered in this field. This industry has a tremendous potential for various product capacities and applications which require rapid technological upgradation. There is also a great need to develop indigenous equipment fabricators and material suppliers as the small scale industries that bring their products as the raw material are geographically spread far and wide. These units contribute immensely to the nation through development of small scale units and thereby employment generation. Therefore looking towards these needs public sectors have played a tremendous role in fulfilling their requirements. But in some cases private sector can also contribute to a great deal.
It has been observed that due to our collaboration with other countries, administration cost goes high. Hence we should not go in for turnkey projects, instead more and more Indian engineers, consultants, equipment fabricators and machinery suppliers should be involved.

- The raw material should not be supplied to few large consumers, instead it should be supplied to small consumers who are also manufacture and should be rigorously balanced.

- Hoarding and speculation should be checked and thereby having the prices controlled.

- Irrespective of the profit or loss public sectors should take care of important areas such as plastic in agriculture, milk packaging, drip irrigation and canal lining where demand persists and which are public utilities.

- More and more emphasis should be given to R&D departments.

- An important aspect which is preservation of environment should not be neglected. In fact some of the private sectors have shown their commitments towards public needs much better than the public sectors. These private sectors should be encouraged.

- The petrochemical industry needs continuous technological upgradation. Every technology has a life
cycle or so called a "product life cycle". Hence innovation as well as product development and diversification is continuously required. For this aspect, what is required is liberalization of technology imports and development of indigenous technology. In case technology imports are brought under Open General Licence (OGL) as done under recently revised Industrial Policy, it will prove to be fruitful as this industry will develop the whole infrastructure of all the other related industries.

The fiscal levies and the policy interventions of the past are also responsible for the existing state of this industry.

An important aspect that needs attention is about refining gas and its separation facilities. The petrochemical industry can not grow unless refinery products like naphtha, kerosene and separated cracked gas are available. Therefore, projects for the production of raw material inputs including gas-separation facilities and fluid catalytic crackers should be cleared further and faster before the augmentation of petrochemical capacities is taken up, as any import required in this field would induce considerable amount of foreign exchange.

Table 8.1 shows clearly that the supply of naphtha and gas is more than its demand and hence
smooth working of petrochemical projects in future can be expected.

### TABLE 8.1

All India Supply Demand Balance of Naphtha

<table>
<thead>
<tr>
<th>Year</th>
<th>Refinery</th>
<th>Naphtha</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>Demand</td>
<td>Surplus</td>
</tr>
<tr>
<td>1985-86</td>
<td>41770</td>
<td>7796</td>
<td>5598</td>
<td>1198</td>
</tr>
<tr>
<td>1986-87</td>
<td>42784</td>
<td>7735</td>
<td>5873</td>
<td>1862</td>
</tr>
<tr>
<td>1987-88</td>
<td>43467</td>
<td>7850</td>
<td>6267</td>
<td>1583</td>
</tr>
<tr>
<td>1988-89</td>
<td>43467</td>
<td>7850</td>
<td>6816</td>
<td>1034</td>
</tr>
<tr>
<td>1989-90</td>
<td>46327</td>
<td>8239</td>
<td>7303</td>
<td>936</td>
</tr>
<tr>
<td>1990-91</td>
<td>53187</td>
<td>8748</td>
<td>7573</td>
<td>1175</td>
</tr>
<tr>
<td>1991-92</td>
<td>55887</td>
<td>9003</td>
<td>7804</td>
<td>1199</td>
</tr>
</tbody>
</table>

Even the gas is available in excessive quantity than demand (Table 8.2). In 1989-90 total gas only from Bombay High is 34.16 MMM/day, and by 1999-2000 it will be 34.16 so that quite huge projects like MGCC gas as a base can also be recommended.
TABLE 6.2

Gas Availability in Bombay Offshore Fields

(MMM/day)

<table>
<thead>
<tr>
<th>Year</th>
<th>Associated gas</th>
<th>Free gas</th>
<th>Total</th>
<th>Lean gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983-89</td>
<td>7.89</td>
<td>-</td>
<td>7.89</td>
<td>6.51</td>
</tr>
<tr>
<td>1986-87</td>
<td>9.91</td>
<td>6.76</td>
<td>16.67</td>
<td>13.06</td>
</tr>
<tr>
<td>1989-90</td>
<td>11.05</td>
<td>17.80</td>
<td>28.55</td>
<td>20.96</td>
</tr>
<tr>
<td>1992-93</td>
<td>8.06</td>
<td>21.80</td>
<td>30.46</td>
<td>21.56</td>
</tr>
<tr>
<td>1999-2000</td>
<td>3.82</td>
<td>30.34</td>
<td>34.16</td>
<td>21.56</td>
</tr>
</tbody>
</table>

Hence these are the requisites for the successful development of this industry to be an important component of Indian industrial development. Given the fact that every other segment of industry depends the petrochemical industry for one or more of its raw material inputs they must receive due consideration. It is only then that the petrochemical industry would be able to realise fully its potential to make a fruitful contribution to the Indian economy.