CHAPTER VI

SUMMARY AND CONCLUSIONS
6.1 SUMMARY

The Planning Commission 1980 reveals that to eliminate a country's techno-economic backwardness, it is necessary to develop industrial sector and then to diversify it over a wide range of area and activities. The industrial development plays a crucial role in restructuring the economy, as it involves changes in production techniques, factor substitution, changes in productivity etc. Thus the trends of productivity growth and degree of elasticity of substitution of manufacturing sector have been considered as the most significant policy variables in the formation of growth oriented industrial strategy.

Any technical change introduces a shift in the production frontier due to changes in relative efficiency, economies of scale, increased capital-intensity, and ease of substitution between factors. The increased efficiency and economies of scale can lead to higher output without introducing either labour-saving or capital-saving devices. It may be understood that increased capital-intensity, which is another component of technological change, need not increase output for a given level of inputs. Technological progress, on the other hand, manifests itself in the increased overall efficiency and returns to scale may or may not involve a change in the capital intensity measured in terms of the amount of capital required to employ one unit of labour. If technical progress involves increased capital-intensity, then more capital will be required to employ one person. This implies that such a technical change should take place only when the growth in capital exceeds the growth in labour, and capital is cheaper than labour.
The another component of technological change measures the ease of substitution between labour and capital. If factors can be easily substituted for each other, then it will lead to intensive use of a faster growing factor and thereby better utilization of abundant resource in the economy. Therefore, the analysis of factor substitution and returns to scale in the manufacturing sector helps to understand the ability of the economy to absorb the surplus labour available to switch over to modern methods of production. However, in the production function approach, the various components of technological change can be estimated directly. A production function shows the relationship between the maximum output, obtainable from a given set of inputs, and the relation between the inputs themselves, in the existing state of technological knowledge. So, the production function is central to all discussions of productivity.

Summary of the present study itself shows how the objectives of the study are achieved within the framework described. A very few studies have been carried out to examine the trends in productivity and degree factor substitution in A.P manufacturing sector. Hence, this study is taken up to examine the various aspects of production function, technical progress, returns to scale and elasticity of substitution. The following five major industries of A.P manufacturing sector are selected for realising the objectives of the study. The period covered for the analysis in the present study was 1979-80 to 1997-98.

1. Food and food products
2. Beverages tobacco and tobacco products
3. Cotton textiles
4. Basic metals and alloys
5. Electrical and non-electrical machinery
We have tried three different forms of production functions in empirical studies i.e. C-D, CES, and VES production functions. The empirical results showed that the underlying production function is Cobb-Douglas in Basic metals and alloys and Electrical and non-electrical machinery industry groups, CES in Cotton textiles and VES production function in Food products and Beverages tobacco and tobacco products industry groups.

The partial productivity indices have been computed to assess the efficiency of individual factor inputs. Besides the partial productivity indices labour and capital inputs, capital-labour ratio has also been computed for each industry. Further an attempt has been made to analyse the functional relationship between labour productivity and capital intensity and the effect of technical change on labour productivity measures. But these partial productivity ratios some times do not reflect the true picture of the efficiency of industry, because it is very likely that different partial productivity indices have opposite trends and in that case it may not be possible to make any generalisation of the efficiency of an industry. Thus, the TFP index is more comprehensive method to study the output per unit of labour and capital combined.

Various productivity indices have been calculated with the help of the methodologies developed by Solow (1957), Kendrick (1961) and Jorgensen and Christensen (1969). Our empirical results show declining trend in all the selected industries except in Food industry. A very low growth rate has been observed in the food industry. To identify the causes of productivity decline in the selected industry, we made an attempt to analyse the factors affecting the Total Factor Productivity with the help of regression analysis.
Further, an attempt has been made to relate trends in managerial resources to trends in productivity of each industry for the selected industries through regression analysis. The regression analysis is also used to disclose the interrelationship between Managerial resources on the one hand and productivity ratios on the other. It may useful to analyse the level of entrepreneurial skills of each industry under study. The conclusion drawn on the basis of inter-industry differences in respect of growth in labour productivity are explainable in terms of inter-industry differences in the growth of fixed capital, value added and managerial resources. Industries, which experience above average growth rates in fixed capital and managerial resources, will also have average growth in labour productivity.

6.2 CONCLUSIONS

As mentioned earlier, to examine the factor substitution and returns to scale, first we determine the suitable functional form for the selected manufacturing industries by fitting VES production function. It has been observed that the elasticity of substitution is a variable in the case of Food products and Beverages tobacco and tobacco products, and constant in the case of Cotton textiles industry group. The elasticity of substitution is not significantly different from unity in the case of Basic metals and Electrical and non-electrical machinery. Hence, the suitable functional form for these industries are of C-D type.

The returns to scale has been statistically tested and it is observed that the Cotton textiles, Basic metals and alloys and Electrical and non-electrical machinery industry groups are operating under constant returns to scale since the hypothesis of
constant returns to scale was not rejected. Hence there are no economies of scale in these three industries.

Elasticity of substitution

Our study emphasis that the elasticity of substitution is not significantly different from unity in the case of Basic metals and alloys and Electrical and non-electrical machinery industry groups since these industries are of C-D type. In the case of Cotton textiles industry group the elasticity of substitution is very high (2.2). In the case of Food products and Beverages and tobacco and tobacco products industry groups the elasticity of substitution is a variable and it is high. This implies that a high absorption of surplus labour in response to changes in factor prices. i.e., the changes in the factor prices would result in a switch over from the use of capital intensive techniques to the labour intensive techniques of production in the manufacturing sector of the industry where the elasticity of substitution is greater than one.

Productivity trends

The partial labour productivity, capital productivity and capital intensity for the selected industry groups have been measured. The movements in labour productivity and capital productivity are also quite diverse. Labour productivity has increased significantly in all the selected industries. However, capital productivity has not increased appreciably in all the industries; rather the reverse is true in all the industries. The indices of labour productivity series reveal significant rates of growth for all the selected industry groups. In Food and food products industry the annual growth rate of labour productivity is the highest (8.77), followed by Basic metals and alloys (8.10).
The indices of capital productivity estimates reveal that a significant negative growth rate is observed in three industry groups viz., Beverages, Cotton textiles and Basic metals and alloys. And in the case of Food products and Electrical and non-electrical machinery industry groups the growth rates are positive but insignificant at 5 per cent level of significance. This shows that the capital productivity has remained almost stable over the period of study for Food and Electrical and non-electrical machinery industry groups.

The significant substantial rate of growth in capital intensity is observed in all the five selected industries. The growth rates varied from 2.67 to 16.56 per cent. On the whole, in all the selected industry groups the partial labour productivity and capital intensity have been rising. Partial capital productivity on the other hand has been declining. Rising labour productivity and capital intensity indicate that capital deepening alone does not push the efficiency of capital to a higher level. Owing to the use of old and obsolete plants, machineries and equipments, high degree of capacity underutilisation and crude technology, inefficiency in this industry continue to prevail over time, i.e. the decline in capital productivity may be an indicator of diminishing returns to capital. Thus, the increasing application of capital was perhaps, not accompanied by increasing or significant 'technical progress' required to prevent the partial productivity of capital from falling in the face of increasing capital deepening.

The functional relationship between the labour productivity and capital intensity for the selected industries have been measured. The empirical estimates showed a significant association between labour productivity and capital intensity in Food products, Beverages, Cotton textiles, Electrical and non-electrical machinery industry groups and in Basic metals and alloys there is insignificant association between labour productivity and capital intensity. Further the effect of technical
change on labour productivity has been estimated and it is clear that there is significant effect of technical change on labour productivity in Food products, Basic metals industry groups. This indicates that technical change has affected labour productivity favorably. It is evident that, our empirical results have shown divergent trends in partial factor productivity ratios. So, it is not possible to infer about the overall efficiency of the selected industry groups of A.P.

Our empirical estimates of three TFP indices according to Solow, Kendrick and Divisia clearly highlighted the performance of selected five two-digit industries. It is observed that there is a marked fall in the growth rate of TFP, except in food products industry. Regarding the comparability of the trends of the three measures of TFP, although the three indices portrayed a similar trend, yet the values of the Solow and Divisia were almost similar in most of the cases, but the values of Kendrick indices were somewhat different.

The growth rates of the indices of TFP are computed and tested for their significance. The following table shows the growth rates of the five industries.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Growth Rates</th>
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<tbody>
<tr>
<td></td>
<td>SOLOW</td>
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<tr>
<td>Food Products</td>
<td>0.83</td>
</tr>
<tr>
<td>Beverages Tobacco</td>
<td>-3.29*</td>
</tr>
<tr>
<td>Cotton Textiles</td>
<td>-3.19*</td>
</tr>
<tr>
<td>Basic Metals and Alloys</td>
<td>-15.64*</td>
</tr>
<tr>
<td>Electrical and non-electrical Machinery</td>
<td>-3.15</td>
</tr>
</tbody>
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* indicates significance at 5 per cent level of significance
Among the five selected industry groups of Andhra Pradesh manufacturing sector, four major industry groups recorded negative growth rate of TFP. The impact of retrogression is found in all the four industry groups. The highest growth in TFP is observed in the case of Food products industry.

It is interesting to observe that the TFP indices are even zero and negative for Basic metals and alloys industry during the period 1990-91 to 1993-94. It has led to decrease in the overall efficiency of industry. It may be due to fact that the figures of Net value added during 1991-92 to 1993-94 and profits of that particular industry during 1990-91 to 1995-96 are negative. The data has been collected from ASI census sector. We hope the TFP indices highly fluctuated due to high fluctuations in fixed capital during 1990’s. For instance during the period 1989-90 the fixed capital was 26,272 and it has been suddenly increased to 7,50,749 during 1990-91.

Two possible explanations for the slowdown in TFP growth may be offered. First, industrial production in 1990-91 and 1991-92 was constrained by factors such as import compression, tight money policy, inflationary pressures and fiscal contradictions initiated by the Government as part of the macro-economic stabilization programmes. These led to a recessionary trend in the manufacturing sector. Second, mergers began to pick up only towards the end of 1995 and constraints operate in the functioning of the labour markets, particularly the exit policies that ought to supplement the trade liberalisation attempts.

As productivity has shown a declining trend during the period of study, we made an attempt to analyse the factors affecting TFP in each industry. The regression
estimates highlights a positive and significant relationship between Gross value added and TFP. The notable thing is that the coefficient of capital intensity have negative sign and found to be significant in four out of five selected industries, barring food industry, the results broadly reflect a negative impact of capital intensity on TFP growth. This indicates that the contribution of capital intensity is very low in all the industries. This may be the possible reason for low productivity in the selected industries during the period under study. Thus, it is reasonable to conclude that the argument that the higher rate of capital intensity follows higher productivity growth does not seem to be valid in the selected manufacturing industries of A.P, since our results show a significant high growth rate of capital intensity. On the whole, TFP growth rate has been observed to be positively associated with Gross value added and negatively associated with capital intensity during the period.

We examined the relationship between the trends in Managerial resources and trends in productivity through regression analysis. The statistical exercise brings out clearly the fact that Managerial resources had a systematic influence on productivity ratios in Cotton textiles, Beverages, Electrical and non-electrical machinery industry groups. It is observed from the estimates that the managerial resources and fixed capital have a significant positive relationship with each other. The same is the case with managerial resources and capital productivity. The simple correlation coefficient is statistically tested and it reveals that there is a significant effect of managerial resources on fixed capital and capital productivity ratios. On the other hand it appears that the managerial resources had no systematic influence on productivity in the case of Food, Basic metals and Electrical and non-electrical machinery industry groups.