SOME ASPECTS OF CHANGES IN THE STRUCTURE AND GROWTH OF THE MANUFACTURING SECTOR IN TAMILNADU : 1973-74 TO 1986-87

Dissertation submitted in partial fulfilment of the
requirement for the award of the degree of
Master of Philosophy
in
Applied Economics
of the Jawaharlal Nehru University, New Delhi

M. HELEN MARY JACQUELINE

CENTRE FOR DEVELOPMENT STUDIES
TRIVANDRUM
1991

I hereby affirm that the research for this dissertation titled "Some Aspects of the Changes in the Structure and Growth of the Manufacturing Sector in Tamilnadu : 1973-74 to 1986-87" being submitted to the Jawaharlal Nehru University for the award of the Degree of Master of Philosophy was carried out entirely by me at the Centre for Development Studies, Trivandrum.

Trivandrum,
31-8-1991.

M. Helen Mary Jacqueline

Certified that this dissertation is the bonafide work of M. Helen Mary Jacqueline and has not been considered for the award of any other degree by any other University.

Supervisors

Raman Mahadevan
Associate Fellow

K.K. Subrahmanian
Fellow

P.S.George
Director,
Centre for Development Studies,
Trivandrum.

A c k n o w l e d g e m e n t

I would like to thank my supervisors Raman Mahadevan and K.K. Subrahmanian for clarifying conceptual issues and structuring the arguments and analysis in a coherent form. To Dr. Subrahmanian for his incisive comments, suggestions and tremendous patience for going through the numerous drafts in various forms. To Shri Raman for stylishing the work in a short span of time.

To Miss. Prabha who introduced me to CDS.

To Anandraj who introduced me to the subject and initated the research process.

To the faculties, especially, Shri.K. Navaneetham for their timely help.

To my friends Jaya, Beena, Vaiju, Sunanda, Viji, Radha, Saikat, Mallik, Upendra, Albin, Baskar, Christo, Pyarelal and my classmates for making my stay at the Centre a pleasant and enjoyable one.

To Impressions Xerox for efficient and quick photocopying.

To my achi who would have been happy to see the final form.

To my mother for everything.

M. Helen Mary Jacqueline

C O N T E N T S

		Page No.
Chapter I	INTRODUCTION	1-33
Chapter II	INDUSTRIAL DEVELOPMENT IN TAMILNADU: A Historical Perspective	34-68
Chapter III	GROWTH AND STRUCTURAL CHANGE	69-102
Chapter IV	TRENDS IN PRODUCTIVITY	103-137
Chapter V	REGIONAL DISPARITY IN THE INDUSTRIAL GROWTH	138-158
Chapter VI	SUMMARY AND CONCLUSION	159-165
	BIBLIOGRAPHY	166-173

List of Tables

Table No.		Page No.
2.1	Number of Registered Factories during 1962 and 1971	55
2.2	Productive Capital Invested in the Factories	57
2.3	Number of Employees in the Factories	59
2.4	Structural Ratios Between Productive Capital, Employment and Number of Factories During 1962 and 1971	61
2.5	Value Added by the Registered Factories	63
2.6	Structural Ratios Between Value Added, Productive Capital and Employment During 1962 and 1971	65
3.1	Trends in Sectoral Shares in SDP: Tamilnadu and Rest of India: 1973-74 to 1986-87 (1970-71 price)	75
3.2	Growth Rates of State Domestic Product: 1973-74 to 1986-87	77
3.3	Trends in Sub-sectoral Shares in Tamilnadu and Rest of India: 1973-74 to 1986-87 (1970-71 price)	79
3.4	Trends in Sub-sectoral Growth Rates: Manufacturing	81
3.5	Trends in Growth Rates: Total Manufacturing	84
3.6	Number of Factories by Major Industry Groups	86
3.7a	Capital Stock by Major Industry Groups at Constant (1970-71) prices	88
3.7b	Growth Trends in Capital Stock by Major Industry Groups	89
3.8a	Employment by Major Industry Groups	91
3.8b	Growth Trends in Employment	93
3.9a	Value Added by Major Industry-Groups at Constant (1970-71) price	95
3.9b	Value Added by Major Industry-Groups	96
3.10	Relationship Between Growth Rates of Value Added and Employment	99
3.11	Relationship Between Growth Rates of Value Added and Fixed Capital	100

4.1	Trends in Partial Productivity Growth	106
4.2	Partial Productivity Growth: Industry Wise Estimation	108
4.3	Summary Results of Regression Analysis of Labour Productivty on Output Growth	115
4.4	Summary Results of Regression Analysis of Labour Productivty on Capital Intensity	118
4.5	Summary Results of Regression Analysis Labour Productivty on Wage Rate	121
4.6	Summary Results of Regression Analysis Labour Productivty on Pattern of Employment	123
4.7	Summary Results of Regression Analysis of Labour Productivity on Value Added, Capital Intensity and Wage Rate on Pattern of Employment	125
4.8	Summary Results of Regression Analysis of Capital Productivty on Output	127
4.9	Summary Results of Regression Analysis of Capital Productivty on Capital Intensity	128
4.10	Summary Results of Regression Analysis of Capital Productivty on Capital Intensity and Value Added	129
4.11	Trends in Total Factor Productivity Growth	132
4.12	Contribution of Labour, Capital and TFPG to Value Added	134
5.1	Percentage Share in Total No. of Factories, Fixed Capital, Employment and Value Added	140
5.2	District-wise and Major Group-wise Distribution of Factories in Tamilnadu: 1986-87 (in per cent)	142a
5.3	Growth Rates and Share of Industrial Employment by Districts of Tamilnadu	143a
5.4	Co-efficient of Variation across Districts	146
5.5	Hirschman-Herfindhal Index	147
5.6	Industrial Base of Districts in Tamilnadu in 1986-87	150
5.7	Industrial Diversification/Specialisation of Districts in 1977-78 and 1986-87	154

CHAPTER I

INTRODUCTION

Since Independence, considerable emphasis has been laid on industrial development in India. This is clearly revealed from the plan objectives and allocations. In the first plan, the major emphasis was on agricultural development and better utilisation of the excess capacity then existing in the industrial sector of the economy. In the subsequent plans, industrial development received increasing priority in resource allocations. As a result, the share of manufacturing sector in the net domestic product at constant prices (1970-71 = 100) increased from 13 per cent in 1970-71 to 15 per cent in 1982-83. During the planning era of 35 years (1951-86), industrial output increased nearly six-fold. The average annual rate of growth in industrial production was about 5.5 per cent during this period.

As far as industrial development is concerned, the planning process has also had to deal with the `regional' problem - the problem of different regions growing at uneven rates. Regional disparities are almost inevitable in the course of development; some regions offer more advantages than others and regions which gain a lead tend to become more and more prosperous. In the absence of State intervention, the play of market forces normally tends to increase, the inequalities between regions.

Industrial planning and policies in India have also been directed towards spatial spread of industries as one of the important means of promoting balanced regional development. Thus the question of location received special consideration in granting industrial licensing, in relation to the Monopolies and Restrictive Trade Practice Act, and in the sanction of loans by the national financial institutions, etc. This aspect of balanced regional development received greater emphasis in the early seventies, when certain areas were identified as industrially backward and special promotional schemes were formulated to induce the development of industries there. Also in 1970, certain districts in each of the States were declared as backward and protective and promotional measures along with public sector investment were adopted to reduce regional imbalance. Apart from such intervention by the central government and all-India institutions, state governments have also evolved various schemes to promote industries in the less developed parts of their states. These include incentives and concession in the access to infrastructural facilities like land, water and electricity, refund of sales tax in the form of outright grant or long term low interest rate loans, capital participation and liberal loan facilities, price preferences etc.

From the above discussion, it is apparent that Indian planning has not only been concerned with the structural changes and the growth of industrial sector in the country as a whole but also the inter-state and intra-state disparities in industrial development. The purpose of this chapter is to review earlier studies dealing with the structural changes, growth pattern and

regional disparities in the industrial sector during the post independence period. Since the literature on the subject is very vast in terms of its coverage of issues and period of analysis, the review is restrictively selected to serve the objective of bringing together the key issues for preparing a framework of analysis for the present study on some aspects of changes in the structure and growth of the manufacturing sector in Tamilnadu during 1973-74 to 1986-87.

Review of Literature

The studies reviewed in this section can be broadly grouped under two broad heads namely, (1) studies on the structural changes and growth pattern of industries in India and selected states and (2) studies on the regional disparities in industrial development.

Studies on Structural Changes and Growth Pattern

The literature on Indian industrialisation is rich with analytical studies that capture the structural transformation and the pattern of growth in the industrial economy in different time periods since independence. In particular, there has been notable contributions on the question of industrial deceleration (stagnation) since the mid-sixties. There is also a burgeoning literature on the recovery of overall growth in the eighties which to some is due to high growth of certain newer types of industries with qualitatively different type of structural change as compared to the earlier phase. It will be difficult to review

all the studies given the constraints of space. It is therefore proposed to limit the coverage to some of the major studies, in this area.

At the All-India level S.L. Shetty (1978) analysed the structural retrogression in the Indian economy and found that the share of the 'secondary' sector in net domestic product which was continuously rising earlier, remained stagnant or declined in sixties. Within the industrial sector, the growth of basic and capital goods industries had been slower than in the past and also slower than the average growth in industrial output. He also observed that in a majority of the industries which belonged to the elite oriented consumer goods sector, the growth had been moderately high. The industries which were manufacturing the mass consumption requirements like cotton textiles had gone up marginally. Also within cotton textiles, the share of coarser varieties of cloth had declined drastically.

Sharma's (1981) study revealed that industrial policies in the first two five year plans, had created a good industrial base, but failed to generate adequate growth of employment in the industrial sector. Sharma underlined the need for an integrated approach to planned industrial growth covering all agencies involved viz. banking, finance and agriculture for the overall development.

Shetty (1982) examined the industrial growth and structural changes as seen through the ASI data for the factory sector of India. According to him, the share of fixed capital of

the various industries remained the same in 1978-79 as it was in 1973-74. The share of employment and emoluments paid showed a declining trend whereas the share of profits and interest payment rose sharply. The analysis at two-digit level industry-classification showed that 43.9 per cent of total capital was accounted by the electricity generation, transmission and distribution industry. However, its share in other attributes like employment, emoluments and gross output wwere low. Shetty concluded that over the years, the three industry groups which emerged as predominant in the factory sector in terms of fixed capital were the electricity, basic metals and chemical and chemical products, but in terms of number of units these three industries had very low share. On the inter-industry differences in the structural ratios, the capital output ratio was high in the electricity (8.25) and basic metals and alloys (3.18) and low in cotton and jute textiles, metal products, wood products and the beverages and tobacco products.

Kumar (1985) examined the developments in the industrial sector in India during the period 1950 to 1970. Based on the weights assigned to the output of various industry-categories, he found that the weights of basic and capital goods industries increased from 20 per cent in 1950 to more than 48 per cent in 1970. According to him, the growth of capital goods industries in India could increase, only if adequate provisions were planned to ensure a steady growth in consumer goods industries. But the growth of consumer goods industries remained constrained because of the fluctuations in the performance of agriculture and inequitable distribution of income.

Ahluwalia (1985) studied the industrial growth in India by focussing on the specific question of stagnation since mid-sixties. To analyse the trends across industries, she had estimated semi-logarithmic time trends for each of the measures like value added, value of output, etc. The period of analysis was from 1959-60 to 1979-80 with a break at 1965-66/1966-67. She found that the results obtained in the trend analysis using NAS and ASI data on value added and value of output were very much different from those using the industrial production data: NAS and ASI data showed that the industrial deceleration was concentrated in heavy industries (i.e., basic goods and capital goods), while the industrial production data revealed deceleration across the board. Based on the empirical analysis of industrial deceleration, she concluded that four principal factors were responsible for deceleration viz., (1) Slow down in public investment and resulting inadequate infrastructure investment, (2) Poor management of the infrastructure sector, (3) Slow growth in agricultural incomes and the resulting slow growth in demand for industrial products and (4) Restrictive industrial and foreign trade policies leading to high-cost industrial structure.

C.P. Chandrasekhar (1988) while analysing some aspects of growth and structural change in Indian industry followed the following periodisation: 1951-1965 period of growth; 1966-1975 period of stagnation; and 1976-1985 period of recovery. He concluded that in 1950's and the early 1960's industrial growth occurred across-the-board. During this period, consumer goods as a whole grew at a pace slower than the basic, capital and inter-

mediate goods sector. After the mid-sixties, though the consumer goods sector as a whole did record a slight deceleration, consumer durable continued to grow at a rate (6.2 per cent per annum) much higher than the rate of growth of the capital and intermediate goods sector. According to him, the 1960's growth was dependent on `chemical-based' and `metal-based' rather than on `agro-based industries. So their growth depends on demand and not on public investment. He also argued that the policy of liberalization in the eighties were directed towards consumer-goods led industrial growth.

T.Rama Rao (1989) analysed the structural changes of the registered manufacturing sector and their impact on different aspects of the Indian economy. The main data source for his analysis was Annual Survey of Industries and the period of analysis was from 1965 to 1985. He observed that the cotton textiles industry and agro-based industry which were predominant in 1950's lost their importance gradually. On the other hand, the importance of engineering and chemical based industries increased and in later years, electrical products and the electronic goods dominated the industrial scene. Two industry groups viz. `food products' and `non-electrical machinery' were found to be having a larger share in total value added. In terms of total fixed assets, `basic metals and alloys' constituted the highest at 14.8 per cent followed by chemical 9.5 per cent.

Let us now turn to some selected studies which have examined the same issues of structural change and growth but at

the regional (State) level. Y.K.Alagh and P.G.Pathak (1973) analysed the structural aspects of industrialisation in Gujarat during 1960-69. Their analysis revealed that the major industries in Gujarat consisted of textiles, chemical and non-metallic mineral products, with machinery industries becoming more important in the later decade. During the period of analysis, the fastest growing industries were machinery industries, bicycles and jewellery, closely followed by agro-based industries. Finally, they concluded that agro-based and engineering industries were at the core of the fast growing industrial sectors of the state economy.

Kulwinder Kaur (1983) had critically examined the growth pattern of industries in Haryana over the period 1966-78 and showed that employment, output and value added in the registered factory sector of Haryana exhibited a higher annual average growth rate than that of Punjab. The factors which contributed to rapid industrialisation in the state were geographic location, rapid development of infrastructure (power and transport facilities), agricultural development and special incentives, facilities and concessions offered by the State government.

The study made by M.L.Pandit (1985) on industrial development in Punjab and Haryana attempted to enquire into the factors which influence the location of footloose industries and the development of a particular region in terms of such industries. On the basis of comparative analysis of the cost of production, he found that the location and development of

footloose industries in Punjab and Haryana regions were influenced by the easy availability of skilled labour and entrepreneurial capabilities.

Surjeet Singh (1989) made a study of industrial structure of Rajasthan. The period of the study was from 1977-78 to 1984-85. He found that the share of manufacturing sector in State Domestic Product had declined. There was an increase in consumer goods industries in contrast to a decline in capital goods industries. The average capital-output ratio marginally increased but the major capital goods industries showed a decline. Capital intensity was the highest in electricity group followed by chemical and chemical products with lowest in repair services. The highest labour productivity was in chemical industry and the lowest in leather, leather and fur products.

Rana Pratap (1985) studied the regional pattern of industrial complexes in Bihar. The main objective of his study was to delimit the industrial complex on the basis of workers employed and units clustered together and their regional pattern, to present a chronological study of the growth of industries and industrial complexes and to analyse the factors affecting the growth of industrial complexes. From the analysis, he found that the industrial development of the state was lop-sided. He identified six industrial complexes and found that the locational trend of these complexes was raw-material oriented.

C.Thangamuthu (1983), in his study on industrial structure and changes in Tamilnadu, analysed the changing trends

in the relative shares of different industrial groups in terms of labour and capital employed and value added during 1960-80. He found a declining trend in food processing, textile, paper and printing and construction industry groups whereas, chemicals, engineering, metal products and transport equipment showed a substantial progress in their relative contributions to the industrial sector till mid-sixties. From mid-sixties onwards, the declining trend was seen in food processing and textiles, but the rate of decline was slower. On the other hand, the capital goods industries which were increasing till 1966, showed deceleration after 1966. However, he pointed out that the industrial sector of Tamilnadu witnessed a sort of structural stagnation since the mid-sixties. Regarding the spatial dimension of industrial structure in Tamilnadu, he pointed that Madras and its sub-urban Chengalpattu accounted for the major share of 57 per cent of total capital, 50 per cent of value added and 40 per cent of labour employed in the industrial sector. The least industrialised districts were Pudukottai and Dharmapuri which accounted for a very meagre share of 0.35 per cent of total capital, 0.14 per cent of value added and 0.68 per cent of labour employed in 1976-77.

In another study, M.N.Sivasubramanian (1986) analysed the structural change in the manufacturing sector of Tamilnadu during 1960-80. Using ASI data, he analysed the growth pattern of value added and employment for the sub-periods 1960-65, 1965-70, 1970-75 and 1975-80. The study revealed that the traditional industries viz. food products, textiles, tobacco & beverages and leather & leather products together accounted for

about 60 per cent of the total value added in 1960. But, their shares together went down and the share of non-traditional industries went up in 1970. Between 1970 and 1980, there was no major change except that the share of chemical and chemical products went up. Regarding the employment structure, it was observed that in 1960, traditional industries accounted for about 60 per cent of the total factory employment, their share fell down to 45 per cent in 1970 but marginally rose to 50 per cent in 1980. In terms of input-based classification, the agro-based industries registered a fall in their shares while metal-based industries increased their shares between 1960 and 1970. Between 1970-80, chemical based industries increased their share while metal based industries experienced a decline in their share in value added. In terms of use-based classification, the basic goods and capital goods industries increased their shares during 1960-70 and a fall in their shares during 1970-80. The study concluded that the industrial structure of Tamilnadu underwent a substantial change between 1960 and 1970 and that there was no major change in the industrial structure between 1970 and 1980.

In a recent study on trends in industrialisation in Tamilnadu, Nasir Tyabji and Padmini Swaminathan (1989) found that machinery and machine tools, transport equipment, rubber, plastic, petroleum and coal products, chemicals and chemical products and cotton textiles accounted for 55.4 per cent of value added in 1985-86. These industries formed the base of the industrial structure of Tamilnadu since Independence. Tobacco & beverage recorded the highest annual compound growth rate of 14 percent during 1970-80 which had showed a decline of 8.3 per cent

during 1960-70. Transport equipment which grew at 16.7 per cent in 1960-70, virtually stagnated during 1970-80. In terms of modernisation of the industrial structure, there had been a substantial progress. In 1960, the traditional group accounted for 68.5 per cent of value added and the modern for 25.8 per cent. In 1970, the corresponding proportions were 42.6 per cent and 45.8 per cent. By 1980, the traditional sector rose marginally to 44.7 per cent and the modern more substantially to 54.6 per cent. The study concluded that the industrial situation in Tamilnadu showed a mixed pattern, and that, stagnation seems to stem from the early 1980's.

Studies on the Regional Disparity in Industrial Development

Since the growth pattern of the industrial sector varies across regions and over time significantly, the question of inter-regional disparity in industrial growth was also a major concern that attracted the attention of many scholars. This issue is examined at two levels, i.e., State level using inter-state data and district level using inter-district data.

P.N.Dhar and D.V.Sastry (1969) studied inter-state variations in industrial development during the period 1951-61. Using the shift-share technique, they found that there was a gradual decline in the industrial development of Maharashtra and West Bengal, whereas Punjab, Orissa, Madhya Pradesh and Andhra Pradesh which were industrially backward, had improved their positions. Using Co-efficient of Variation they concluded that the regional variation in manufacturing industry had tended to

narrow down across states during the period under study. It should be noted that they had taken power consumption as the relevant indicator because they found a high positive correlation between power consumption and industrial output from the cross-section data of the Annual Survey of Industries.

Alagh,Y.K., Subrahmainan,K.K., and Kashyap,S.P., (1971) in their study on regional industrial diversification in India used 'economic-base' type of analysis, viz., estimation of location quotients and specialisation co-efficients for each of the 15 states that have been identified as regions. The estimates are based on factory employment statistics. From the location quotient analysis, they found that traditional primary-resource-oriented base is the basic characteristics of the industrial base of the regional economies in India, except Maharashtra, West Bengal, Tamilnadu and to some extent Punjab, which besides specialising in resource-based industries also specialise in capital goods and foot-loose industries. They have classified the regions into three broad groups according to their levels of diversification and found that in 1966, Maharashtra, West Bengal and Tamilnadu were the industrially diversified regions; Punjab, Mysore, Madhya Pradesh, Gujarat and Uttar Pradesh were grouped in the 'middle level' of diversification; while Rajasthan, Bihar, Andhra Pradesh, Jammu and Kashmir, Orissa, Kerala and Assam, were regarded as less diversified regions. Finally, they examined the relationship between industrial diversification and levels of industrialisation of the regions and found that a diversified industrial structure is a concomitant of a high level of industrialisation of a region.

Ravindra H.Dholakia (1978) made a inter-State analysis of capital and output in the registered manufacturing sector with two-fold objectives (1) to estimate the real output and net stock of real capital in the registered manufacturing sector of different state economies in India for the years 1960-61 and 1970-71; and (2) to examine the extent and behavior of state inequalities in these aggregates in the sixties. Based on the Annual Survey of Industries data of the manufacturing sector, he derived the estimates of income and capital stock in real terms of the major state economies in India for two years 1960-61 and 1970-71. He found that there were significant inter-state variations in the per capita output and capital stock and that the inequalities declined between 1960-61 and 1970-71. The decline in the capital stock inequality was greater than the state income inequality. Neither did the investments in different states take place strictly on the criterion of reducing the regional disparities, nor were they based on the principle of exploiting the best technology. In order to reduce the state inequalities, he argued for a more rational allocation of investment consistent with national objectives.

Krishna Bharadwaj (1982) made an attempt to analyse the regional differentiation in India. She adopted the periodisation conforming to qualitative changes in the overall growth situation and discussed the `regional' problem with reference to (1) the colonial period until the world war, (2) Inter-war periods and after, until Independence, (3) Post-Independence period until the mid-sixties and (4) Period after the mid-sixties. To measure the pattern of agglomerated growth based on generally capital-

intensive, large-scale manufacturing units located in a few cities and the 'dispersed' pattern where growth was relatively dispersed in small towns and rural settlements, composite indices were constructed. The finding of the study was that city-based industrial development was found to be localised in six regions viz., (1) Calcutta conurbation (2) Madras conurbation (3) Bombay-Gujarat conurbation (4) Delhi metropolitan region (5) Jamshedpur-Dhanbad-Bokaro complex and (6) Ludhiana-Jullunder complex. She observed a higher industrial activity in those areas where agricultural growth had been promising or favorable as in Gujarat and Haryana.

A.Uday Sekhar (1983) examined the trends in the inter-state distribution of industry in India during 1961-75. The main objective of the study was to determine whether the disparities was increasing or decreasing over time. The main data source was Annual Survey of Industries. He used Hirschman-Herfindahl and Theil's Inequality Indices to measure concentration. His results revealed a continuous and significant reduction of inter-state imbalances in industrial development during the period 1961-75.

R.T.Tewari (1988) studied the changes in inter-regional pattern of industrialisation in India during the period 1971-81. The States which are Politico-Administrative units of India were taken as regions. Using composite index and 'normative' approach, the analysis was carried out at selected two points of time viz.,(1970-71 and 1980-81. The index method was used to construct composite indices of industrialisation for different regions/States. The co-efficient of variation was used as a

measure to assess the magnitude of regional disparities in levels of industrialisation. The ratio of value added between consumer goods and capital goods industries was used to analyse changes in the organization of industrial production over the period 1961-81. In order to analyse the relative importance of agricultural development, economic infrastructure and urbanization, the multiple regression model was employed. Using the composite index approach, he found that the six States of Gujarat, Maharashtra, Tamilnadu, West Bengal, Punjab and Kerala were industrialised on the one hand, and on the other hand, by normative approach, only the first four States were industrialised States. In the multiple regression analysis, urbanisation emerged as a dominant explanatory variable for the observed variations in levels of industrialisation across the States followed by economic infrastructure and agricultural development.

Brijesh K.Bajpai (1989) looked into industrial disparities in India in a historical perspective. He analysed the trends in the per capita industrial output for 16 States and observed that the magnitude of inter-regional disparities in industrial development which was 73 percent in terms of co-efficient of variation in 1969, reduced to 67 per cent during 1977. The range between the states of the highest and the lowest ratios which stood at 245.31 in 1969 also decreased to 238.27 during 1977. An interesting part of the analysis was that the states of Maharashtra, West Bengal, Haryana, Gujarat and Tamilnadu which were industrially developed states in 1969 were found to have maintained their same position during 1977. He had

also looked into the causes of industrial disparity and categorised the causes under two heads namely, (1) the disparities caused by the production efficiency, negligence and shortage of raw materials in backward regions and (2) the disparities due to better industrial performance and proper resource utilisation for industrial production in industrially advanced regions. According to him, this joint effect of positive and negative industrial performance magnify the extent of disparity.

Bishwanath Goldar and Vijay Seth (1989) studied the trends in industrial output in 12 major states during the period 1960-61 to 1985-86 with the objective of finding out the spatial variations in the rate of industrial growth in India. They divided the growth experience of Indian manufacturing sector into three distinct sub-periods viz. (1) 1956-65: the period of rapid industrial growth, (2) 1965-75: the period of industrial deceleration or relative industrial stagnation and (3) 1975 onwards: the period of recovery and acceleration. They estimated the growth rates by fitting separate exponential trend lines by the ordinary least squares method to each sub-periods of the series. From the analysis, they found that the industrial growth experience of the different states in the three sub-periods followed three patterns and the states were accordingly divided into three groups. The first group consisted of states which did not experience any marked improvement in the growth rate after the mid-seventies i.e. the states in which industrial output grew by and large at a uniform rate. This category included Tamilnadu along with Maharashtra, Andhra Pradesh, Gujarat and Karnataka.

Second group consisted of States which experienced a significant deceleration in the growth rate of industrial output after the mid-sixties and a significant recovery after the mid-seventies: they were Bihar, West Bengal, Orissa, Rajasthan and Uttar Pradesh. The third group consisted of Kerala and Madhya Pradesh which experienced a continuing deceleration in the rate of industrial growth.

Dholakia (1989) analysed the regional aspects of industrialisation in India over the period 1979-84 and found a significant regional differentiation in the pattern and growth of industry. The nature of industrialisation in terms of capital per worker and capital productivity sharply divided the national economy into the North and the South. It was observed that in North, the capital per worker was higher and capital productivity was lower whereas in South, the capital per worker was lower and the capital productivity was higher. He made the following suggestions to reduce regional disparity without sacrificing growth: (1) greater regional spread of individual industries (2) diversification of industrial base for the northern states and (3) greater specialization of industrial structure for the Southern states.

Dinesh N. Awasthi (1989) made a study on the trends in the inter-regional inequalities in India between 1961 and 1978. He used various measures of inequalities such as Co-efficient of Variation (weighted and unweighted), Standard Deviation of Logs, Gini Co-efficients, Theil's Inequality Index and Hirschman-Herfindahl Index. The major data source for the analysis was

Annual Survey of Industries. He had carried out the analysis in terms of variables like fixed capital, employment and value added. The results showed a clear trend towards reduction in the level of inter-regional inequalities over the years, irrespective of the index or variable considered. He also found that inequality in terms of fixed capital declined most rapidly compared to the other two variables. Overall, regional industrial inequalities, on an average, declined at an annual compound rate of growth of approximately 1.5 per cent in value added, 1.75 per cent in employment and 2.0 per cent in fixed capital per annum.

T.Rama Rao (1989) while studying the regional pattern of industrial development in terms of number of factories and output found that the western region accounted for 30 per cent of the total factories and 39 per cent of total value of output in 1984-85. The state of Maharashtra dominated the factory sector both in terms of number and output. However, a gradual decline in the growth rate of factories was found with Gujarat, claiming a share of 11 per cent each in total factories and output in the country. Southern region occupied the second position accounting for 33 per cent in total factories and 23 per cent in total output within this region Tamilnadu accounted for a higher share of 14 per cent in total factories and 10 per cent in output.

The focus of the studies referred above was on the question of the inter-state industrial disparity at the national level. Most of these studies were inclined to accept the view that the regional disparity in industrial growth across states

had been declining over time. In addition to these there are a few studies which have tried to examine this issue at a disaggregated level i.e., at the State level using the district level data.

Thus, Yoginder K.Alagh and Pravin G.Pathak (1973) examined the relative position of different districts in the industrial economy of Gujarat state during the last decade. They analysed the regional dispersal of industries based on employment data and they found that six districts accounted for roughly 3/4th of the state's industrial activity. They concluded that the changes had taken place on an industry-wise rather than a region-wise pattern within the state.

In their studies on spatial diversification of industries in Uttar Pradesh for the period 1960 to 1975 T.S.Papola et.al.(1979) and T.S.Pappla (1980), observed that the industrial concentration remained unchanged during the period under study. There was a significant growth in chemicals and engineering industries compared to sugar and textiles and a decline in the raw material location specific industries. They had also examined the hypothesis that the spatial distribution of industrial activity would be determined by the availability of basic raw materials and nearness to the market. They found that the infrastructure and agglomeration emerged as the major determinants of location overshadowing the importance of the location of raw materials and markets. They argued that fiscal and financial incentives played only a marginal role in the diversification of industries mutually supporting each other and

using and providing certain facilities for the promotion of skills, entrepreneurial training, economy in raw material procurement and marketing for effective industrial development in backward areas.

The changes in the spatial distribution of industries in Haryana State during the period between 1966 and 1978 was examined by Kulvinder Kaur (1983). Using data from Annual Survey of Industries, he concluded that regional disparities in industrial development in Haryana had widened.

Harphool Singh (1987) analysed the regional disparity in the industrial growth of Rajasthan. His study mainly focused on the implication and significance of industrial growth centers, causes responsible for industrial disparity and backwardness, the role of state government and private enterprises, the impact of industrial centers on the economic growth and the future prospects of expansion of industrial growth centers in Rajasthan. The study was mainly based on sample survey of the districts and centers of industrial location. He examined the disparity of industrial development at three levels viz. Infrastructure level, manufacturing level and demographic level-pattern. He observed that the disparities are maximum at the manufacturing level followed by the infra-structure level and the demographic level. But all the three levels had shown a declining pattern of disparity. A highly concentrated pattern of industrial growth leading to extensive industrial disparity in the State was observed. He concluded that regional disparity in industrial development increased over the years.

Jyotsna Paranjape (1989) attempted to identify the factors determining industrial location in Maharashtra and Gujarat. The analysis was done at two levels (i) by using secondary data with districts as regions. and (ii) by using data collected through field surveys of industrial units at selected growth centers. To find out the inter-regional industrial disparities, industrial employment per thousand population and value of gross industrial output per capita were used as indicators. She used incremental industrial employment for observing changes in regional patterns of industrial development, and correlation analysis to identify the variables responsible for the location of industrial activity at the district level. The correlation analysis showed that the incremental industrial employment in a region was positively related to the initial level of industrial employment in the region. Incremental industrial employment in a region was influenced by the economic efficiency of already existing industrial units in the region. The attraction exerted by industrialised districts on industries was not only due to the availability of local markets and input sources but also due to the existence of many complementary and supplementary factors like well-developed infra-structural facilities, lower costs of production, higher industrial credit- which strengthen the locational advantages of these industrially developed areas by providing agglomeration economies. Using the field survey data, she examined the impact of government intervention and found that, industrially developed areas usually formed the first location preference and backward areas were often been selected as the second-best location. From the

analysis, it was clear that government incentives had been effective in promoting industry mainly in areas which were relatively nearer to the established industrial centers and areas which had fairly developed urban and industrial facilities. She concluded that government assistance for inducing industrial development would be successful only in areas where incentives were available in combination with other facilities, mainly infra-structural facilities.

Debdas Mukhopadhyay's (1989) study was an enquiry into the reasons for district-wise variation in employment in the industrial sector in West Bengal during the period 1970-71 to 1982-83. By using co-efficient of variation, he found that the degree of variability in employment among the districts had been decreasing over the period 1971-81 (from 141 in 1971 it decreased to 1138 in 1981). Using the composite ranking approach, he noticed that several districts like Burdwan, Howrah, Calcutta, and Nadia had maintained their position in the hierarchical ordering of districts as compared to 1971. He had also used the normative approach to analyse the problem. For the sake of convencence, he clubbed the districts into different categories like non-industrialised districts where the average daily employment in factories was between 0.015 to 0.64, industrialising (0.265 to 1.150), semi-industrialised (1.151 to 2.000) and highly industrialised districts (2.00 and above). To highlight the spatial cluster of industries, he has calculated location quotient and found that the districts of Calcutta, Burdwan, Darjeeling etc. which were most developed industrially had specialized in large number of industrial activities, and

also the districts that were benefited by public sector investments. From the analysis, he concluded that the variability is caused by two sets of factors (i) economic and (ii) non-economic.

The foregoing review of selected studies on growth pattern and structural changes has revealed that the growth pattern of industrial sector in India is a complex one. There is a structural change in the process of industrial development over time and the industrial growth pattern varies across industries and states. From the studies on regional disparities, it is observed that the industrial disparity is significant not only across states of India, but also across districts within each states. Moreover, when the regional disparity in industrial development across states is found to be decreasing in India, the specific regional studies with reference to Haryana and Rajasthan concluded that the disparity had been widening. Thus, one can conclude that regional level studies are necessary to understand structural change and growth pattern and to examine the regional disparity in industrial growth .

Objectives, Sources of Data and Methodology

The present study attempts to examine the experience of industrial development in Tamilnadu. The studies by Thangamuthu (1983), Sivasubramanian (1986), Nasir Tyabji and Padmini Swaminathan (1989) taken together, throw useful light on the pattern of industrial growth and change in Tamilnadu. However, these studies have tended to focus attention exclusively on the

question of structure and growth, somewhat in isolation from the question of productivity trends and the spatial dimension. The present exercise is a modest attempt in this direction. It not only reviews structural change and growth in conjuction with the trends in productivity, but also takes into account the spatial dimension, using the `economic base' typology.

Objectives

The main objective of the study is to examine the growth and performance of industrial sector in Tamilnadu, with focus placed on changes in the structure and spatial dimension. The specific objectives are:

1. to provide a long term historical perspective of the industrial development in Tamilnadu,
2. to analyse the sectoral growth trends in the macro economy since 1973-74,
3. to examine the changes in the structure and the growth pattern of the manufacturing sector,
4. to trace the productivity trends in the manufacturing and,
5. to examine the spatial disparities in the levels of industrial development across districts.

Source of data

This section describes the data base, its limitations and adjustments carried out on the basic data to construct the relevant variables.

The two basic sources of production data are (1) Index of Industrial Production and (2) Annual Survey of Industries. The Index deals with only selected products and selected firms. The present study has opted to use the more comprehensive data source of Annual Survey of Industries. This has been supplemented by the reports of the Annual Statistical Abstract of Tamilnadu.

Annual Survey of Industries (ASI) covers all factories registered under 2m(i) and 2m(ii) of the Indian Factories Act 1948. This includes all factories employing 10 or more workers with power and those employing 20 or more workers without power. For the purpose of collecting and tabulating the data, the registered factory sector is divided into two categories viz., Census Sector and Sample Sector. The census sector covers all units employing 100 or more workers and not using power. The sample sector comprises all factories employing 10 to 49 workers and using power and units employing 20 to 99 workers and not using power. While all the units in the census sector are enumerated completely, the sample sector units are covered on the basis of a probability sample[1].

The ASI reports provide continuous time-series data (from 1959 onwards) for important industrial characteristics such as (1) number of factories (2) employment and earnings (3) capital stock and investment (4) input, output and value added, at detailed levels of disaggregation of the manufacturing sector. A major limitation of ASI is that it excludes the entire unregistered sector. This includes the household and non-

household non-factory units. The ASI data are available separately for the census and sample sector upto 1970-71. Since 1973-74, the data are published for the census and factory (census aggregates + sample aggregates) sector. Final survey results for the census sector are available till 1973-74 (except 1972-73, when no survey was conducted and 1959 and 1967-68 for which the results were not published) and for 1978-79 (results were presented for calendar years till 1964 and are available for financial years since then). Final results (and summary results) for the sample sector are available from 1959 to 1970-71. 'Summary results' for the factory sector, i.e., the census and the sample sectors combined, are published annually and are available since 1959 except 1970-71 and 1971-72 for which the results were not published and 1972-73 when there was no survey.

The difference between the final and the summary results is that the latter is tentative. Summary results are based on the information provided in the summary block of the ASI survey schedule. Final results are issued later after scrutinising the data for consistencies with the details provided elsewhere in the schedule. It was found out that the difference between the final and the summary results for a common year is marginal for the entire manufacturing sector and for most of the two-digit groups. There are however substantial differences for some three-digit groups[2].

For the period since 1973-74, we have no option but to use the summary results for the factory sector, because the final results have not been published except for the census sector for

1973-74 and for 1978-79. The latest ASI report available was for the year 1986-87, and hence the reference period of the investigation is from 1973-74 to 1986-87.

Time series analysis of ASI data poses several problems of comparison. Their limitations have been pointed out, time and again in several studies[3]. One major source of incomparability of ASI data is the categorisation of factories into census and sample sectors. The criterion on the basis of which the sample units are defined underwent changes several times during 1960-70. Such frequent shifts in criterion render attempts at inter-temporal comparison of the sample sector subject to doubtful validity. It is therefore decided to confine the detailed time series analysis of industrial performance of Tamilnadu to the factory sector alone.

Another problem about the time series analysis of ASI data is the changes in the industrial classification. Since 1973-74, ASI has been following the National Industrial Classification (NIC) whereas for the earlier period, a detailed version of the Indian Standard Industrial Classification was in use. These two classification systems do not strictly correspond either at the three or two digit levels. To overcome this difficulty, the present study considers NIC alone and so the analysis starts from 1973-74 onwards.

Thus, the data constraints discussed above, have compelled us to confine the time series analysis to the seventeen two-digit level product-groups in the manufacturing as mentioned

below:

20-21	Food Products
22	Beverages, Tobacco & Tobacco Products
23	Cotton Textiles
24-25	Wool, silk and jute textiles
26	Textile Products including wearing apparel other than foot-wear
27	Wood Products Furniture and Fixtures
28	Paper and Paper Products and Printing, Publishing and allied industries
29	Leather and Leather Products (except repair)
30	Rubber, Plastic, Petroleum and Coal Products
31	Chemicals and Chemical Products
32	Non-Metallic Mineral products
33	Basic Metal and Alloys Industries
34	Metal Products and parts except Machinery and Transport Equipments
35	Machinery, Machine Tools and Parts Except Electrical Machinery
36	Electrical Machinery Apparatus Appliance and Supplies and Parts
37	Transport Equipments and Parts, and
38	Other manufacturing industries.

The concepts used in the study have the same connotations as defined in the ASI volumes. Some elaboration of the important concepts used in the present study may, however, not be out of place.

Output

In the empirical literature, output is measured in terms of either value of gross output or the value-added by manufacture. In the present study, gross value added is used to represent the output. In fact, net value added is more relevant, but the net value added figure as given in ASI has the limitation to the extent that the depreciation figures do not reflect the actual capital consumption. Gross value added is the increment to the value of goods and services contributed by the manufacturing process and is estimated by deducting the total

value of inputs from the gross ex-factory value of output. The real gross value added in the study are obtained by deflating the current values by the official wholesale price indices (at all-India level) for specific products of industries with 1970-1971 as the base.

Labour

Labour input is generally measured in terms of the total number of manhours worked or the average number of persons employed. The use of 'manhours worked' is often regarded as a better measure as it takes into account, changes in the working days in a year as well as the working hours in a day. However, it has been pointed out that the computation of manhours in ASI is carried out by multiplying the number of workers in a shift by eight and both by the actual duration of the shift and then aggregating such products across factories. So, the resultant series do not measure the actual manhours worked. Therefore, we have considered 'total employees' as a measure of labour input.

Emoluments

Total emoluments as stated in ASI reports include all payments made to workers in cash as compensation for work done during the year. In addition, it includes imputed value of benefits in kind i.e., the net cost to the employers of these goods and services provided to employees free of charge or at markedly reduced cost, which are clearly and primarily of benefits to the employees as consumers.

Capital

In the present study, we have used Perpetual Inventory Method for measuring capital stock. For this, we have taken the gross fixed capital of 1973-74 as a bench mark year and calculated gross investment in the subsequent years at the price level of bench mark year. The gross investment is deflated by using wholesale price index of plant and machinery at 1970-71 prices. Deflated gross investment is added to the bench mark year capital stock (see Goldar, 1985). Therefore,

$$K_t = K_0 + \sum_{i=1}^{n} (I_t - dK_{t-1})$$

where,

K_t = gross fixed capital at the end of the year t,
K_0 = the bench mark year,
I_t = annual addition of capital stock, and
d = annual rate of discarding.

Chapter scheme

This first chapter has reviewed a selected list of studies on the industrial sector with a view to identify the objectives and attempted the analytical framework of the present study. The second chapter provides a historical overview of the industrial development in Tamilnadu. This analysis was intended to capture the broad trends in the evolution of the structure in the pre 1970 period, and the possible influences of this process in the changes that followed.

The third, fourth and fifth chapters are the core analytical chapters. In third chapter, the sectoral composition

of State Domestic Product with the emphasis on the trends in manufacturing sector is discussed. While analysing the performance of the industrial sector, certain principal variables like growth of factories, fixed capital, employment and value added are chosen as indicators. The period of analysis is from 1973-74 to 1986-87. Two breaks are given at the periods 1978-79 and 1982-83.

The fourth chapter looks at the trends in productivity in the factory sector of Tamilnadu. This chapter is divided into four sections. Section I discusses about the trends in Partial Productivity and section II discusses about the trends determinants of partial productivities. The trends in the Total Factor Productivity Growth is examined in section III. The final section deals with the contribution of factors to the growth in value added by the manufacturing sector.

The study then turns to the spatial dimensions of growth in the fifth chapter. Due to non availability of data, the analysis is restricted to the period from 1975-76 to 1986-87. The concentration of industries in the districts and its changes over time is analysed by using Co-efficients of Variation, Location Quotient, Theil's Inequality Index and Specialisation Co-efficient. In order to understand, the concentration of industries in the districts, data at two points of time (industry wise/district wise) 1977-78 and 1986-87 both at two-digit and three-digit level are analysed. Finally, chapter VI summarises the main findings of the study.

Notes:

1. The sample fraction was about one-sixth till 1967. It was raised to one-third for the year from 1968 to 1970 and thereafter, it was further raised to one-half in order to cover the entire non-census sector once in two years.

2. According to a CSO official, reclassification of firms as mentioned above is one of the reasons why differences between the final results and the summary results can be substantial for some three-digit groups (e.g., 211,212,214 but not for two-digit group 21 in 1969-70.

3. Alagh (1972); Lakdawala, Alagh and Sharma (1973); Dholakia (1976); Ahluwalia (1985); Goldar (1986).

Chapter II

INDUSTRIAL DEVELOPMENT IN TAMILNADU : A Historical Perspective

Introduction

This section seeks to provide a broad historical over view of the industrial development in Tamilnadu. More specifically, an attempt has been made to capture the principal trends in the process of the evolution of the modern industrial structure, extending over both the pre and the post independence period. This exercise, it is believed, is useful in contextualising the problem of changes in industrial structure and regional disparity in the post 1970s - the principal focus of the study. This chapter is divided into two sections. While section one discusses the development of industries and its regional spread up to 1960 on the basis of published secondary sources, section two focuses on the growth of industries, and changes in its structure between 1962 and 1971 using the Annual Survey of Industries data[1].

Section I

Origin and Growth of Modern Industries up to 1960

South India in general and Tamilnadu in particular has in the past been commonly perceived as being essentially an agricultural hinterland. Industries were considered only of peripheral importance. The lag in industrial development between

Tamilnadu and the other major states was usually sought to be explained in terms of the inadequate resource endowments of the region. This is clearly reflected even in the following observation of the NCAER sponsored Techno-economic Survey of the State conducted in 1958. "The physical resources basis of the State is ostensibly weak. It is deficient in key minerals essential for a rapid economic development on modern lines. Of Coal, there is none; iron available is not of high grade; other metallic minerals are not plentiful, forest resources too are meagre. Power development is reaching, or will soon reach, thepoint of saturation. The centers of industry in the region,such as they are, are far from the main fields of raw material supplies". While, such inadequate physical and infra-structural endowments had a bearing on the growth pattern of industries in Tamilnadu, these conditions by themselves are not sufficient to explain the relative industrial backwardness of the Tamil region at that point of time. The subsequent record of industrialisation in the state in fact reveals the inadequacy of the argument.

In fact, when viewed from a long term historical perspective, it becomes evident that there were other significant constraining influences. These may be broadly related to the conditions of colonial rule and of India's position as a dependent colonial economy. The specific pattern of industrialisation as it took shape was influenced by these conditions. This aspect has been discussed in detail elsewhere and need not detain us here[2]. Moreover, before the first world war modern factories in India constituted an enclave economy and

were essentially concentrated in the two nodal centers of Bombay and Calcutta, Madras was a relatively late starter in initiating modern industries. Furthermore, the colonial situation in Madras in the nineteenth and early part of the twentieth century was characterised by the near dominance and control exercised by European capital over almost the entire organised sectors of the economy. This had the effect of restricting the role of indigenous capital accumulation and consequently delayed the entry of Indian capital into industry[3]. Despite, the efforts of enlightened officials like Alfred Chatterton to encourage and stimulate industrial activity in the Madras region, the State policy towards modern industry lacked a clear direction[4].

It is now well recognised that the Tamil region had a fairly long industrial tradition. This is reflected in the significant presence of a number of cottage or traditional industries of which handlooms were by far the most important. However, the modern factory sector as indicated earlier, was slow in taking roots in the region. The origin of modern industrial venture can be traced back to 1820s when a steel plant was set up in Porto Novo. In spite of considerable financial assistance by the government, the venture proved to be infructuous. Thereafter till 1870s, about the only reasonably successful industrial venture was in the field of sugar[5]. The availability of palmgur, a source of cheap raw material and the growing demand for sugar, were important factors in encouraging private investment in this field. During the last quarter of the nineteenth century, there was a fairly significant growth of investment in textiles. The growth in the overseas demand for yarn, and the availability of

cheap cotton was among the major factors inducing this initial investment. In both sugar and textiles, right from the very outset, the control by European firms was fairly pronounced. Another industry which had begun assuming some importance at this time was leather tanneries. These were concentrated in the North Arcot district. Now we shall discuss the growth pattern of some major industries in the State.

Cotton Textile Industry

Cotton Textile Industry was the most important industry in the Tamilnadu State. The development of factory production in the State became significant, following the growth of the cotton textiles industry around Madras and Coimbatore region. British Managing Agencies established a number of spinning mills and a few composite mills. Ironically the first two textile mills came to be set up by Bombay merchants. However, neither of these two were very successful and in course of time were closed down[6].

The subsequent initiative in this field came from the three European agency cum trading houses, namely, Binnys, Harveys and Stanes. Most of the mills controlled by these European houses were established during the last quarter of the nineteenth century. Binnys established the Buckingham Mills and the Carnatic mill in 1876 and 1884 respectively. Harveys started a mill at Papanasam in Tirunelveli district in 1885, another at Tuticorin in 1889 and a third at Madurai in 1892. Stanes set up the Coimbatore spinning and weaving Mill in 1890, and assumed control over Coimbatore Mall mills in 1910. The Papanasam Mill

set up by the Harveys group was the first and the only mill which was operated by water power. This mill had 10,000 spindles and provided employment to 400 - 500 workers.

It is interesting to note that among the three European agency houses Harveys controlled the biggest group of mills. By 1890s the two mills under Binny's management between them operated over 70,000 looms and 1580 looms and Harveys accounted for about 70,000 spindles by 1898, whereas the Stanes group of mills based in Coimbatore accounted for about 50,000 spindles by 1910. While all the three European managing agencies expanded their operation in the subsequent years, the growth of Harveys was particularly striking. Of the total spindles under the three European managing agencies Harveys accounted for 2,15,848 spindles, Binnys and Stanes controlled 93,540 and 52,508 spindles respectively in 1922. Nearly 60 per cent of the total spindles in European mills were controlled by the Harveys group, 26 per cent by Binnys and 14 per cent by Stanes group. It is worthwhile to note that these three European managing agencies between them accounted for almost 78 per cent of the total spindles in the Madras State[7].

During the period under reference, except the Buckingham and Carnatic Mills, in all other mills the spinning department developed more than the weaving departments. This was because, the raw cotton available in Madras Presidency enabled to produce relatively low counts of Yarn in the mills (of 20 counts or less). The coarse cloth produced from this could not find a market segment between handloom cloth and the finer quality

imports. Therefore, the largest part of the yarn produced was utilized by the cotton handloom industry in the region, while a small part was exported to East and South East Asian countries, the rest was exported to the mills in Western India. Thus, the entry of the mill made yarn into the handloom sector eroded the growth of the hand spinning industry and handloom weavers increasingly came to depend on mill made yarn for their requirements[8].

Following the examples of Europeans, the Indians also started investing their surplus in textile industry. The early initiative came from the Nattukottai Chettiars. The Malabar Spinning and Weaving mill set up in Calicut in 1888 and Kaleeswara mill established in Coimbatore in 1906 were the outcome of their investments. The Chettys also assumed control in 1908 over the Kovilpatti Mills which had been started in 1892. Lack of capital and the absence of a favourable climate proved to be the limiting factors for the growth of industries during this period[9].

The second phase of industrial expansion in general and of the cotton mill industry in particular occurred in the 1930s. In many respect the thirties represent a turning point with regard to investment in Industry. The depression in 1930s, by causing the terms of trade between agriculture and industry to shift in favour of the latter promoted a flow of capital from agriculture and money lending towards industry. Thus, a fairly significant portion of the capital invested in agro-based industries during this period was largely agrarian capital in

"retreat from the countryside"[10]. The relative decline of imports and the introduction of tariff protection also contributed in stimulating industrial activity in the Madras region.

In addition to this, the industrial investment also gained momentum as a result of a set of favourable conditions specific to Tamil region. These included; (1) Swadeshi Movement: The boycott movement increased the demand for swadeshi yarn and reduced the sale and profits of European firms. The worst affected was the Binnys, whereas Stanes and Co. agreed to the terms and conditions of the Congress and signed an undertaking. This created a favourable condition for the indigenous capital to flow into the textile industry. (2) Close proximity to the market and raw materials (3) Large supply of labour force on relatively low wages and (4) Relative cheapness of mill machinery due to the depression in 1930s. Another major factor favouring the growth of industries particularly in Coimbatore region was the availability of cheap hydro-electric power. Following the inauguration of Pykarah electricity system in 1932, there was an expansion of industry in Coimbatore. In addition to this facilities were provided by government to import, through Tuticorin port, American and Egyptian long staple cotton which was essential to spin superior counts of yarn and supply of high quality cotton, like karunganni within the State.

The outbreak of the second world war and the cessation of imports and the consequent growth in the war induced demand for various commidities, yet again provided a boost to import

substitution. In short, there was a significant heightening of industrial activity. The war also provided an opportunity for entrepreneurs to amass vast profit both legitimately and through speculative dealings. However, the accumulated surplus capital could not easily and immediately find outlet in industry owing to various constraining factors. These included, various government regulatory controls, principally the control of capital issues, the difficulties in securing mill machinery and the requisite foreign exchange for procuring capital goods from non Empire countries. The consequent pent up pressure of industrial investment was released only in the late 1940s and 1950s and may perhaps to an extent explain the heightened industrial activity of the early 1950s.

The textile industry experienced a phenomenal growth in the 1930s. Even during the period of world wide depression between 1929 and 1934, when Bombay and Ahmedabad mills were incurring heavy losses, the mills at Coimbatore recorded handsome profits. In fact, Coimbatore was considered as one of the most important textile centres in the Indian Union comparable only to Bombay and Ahmedabad. Between 1928 and 1938-39, 26 mills were established in Coimbatore and 9 in other parts of Tamilnadu. Among the European agencies the Harveys continuously expanded their production capacity and controlled 4,65,424 spindles and dominated both the raw material and product market in 1941. The most striking features of changes in industry during this period was (1) the steady rise of the number of spindles and yarn production and (2) the significant entry of Indian Capital into industry.

This was particularly evident in the rise of Naidu and Kamma entrepreneurs in Coimbatore. With the profitability of cotton industries in Coimbatore, a section of Naidus who were prosperous land-owners cum traders invested in industry. The investment in the field by the three Naidu families G. Kuppuswami Naidu or Lakshmi group, V. Rangaswami Naidu or Radhnakrishna group and P.S.G. Naidu were particularly significant. The three groups by 1941 controlled 2,52,158 spindles[11].

There was a steady decrease in the proportion of lower counts yarn (1-10s) and a rise in higher counts (31-40s) of yarn production. This implied not only changes in the kinds of cotton used, but also in spinning technology. In contrast there was no similar increase either in the number of looms or in the production of cloth. By 1952-53, there were a total of 83 mills in Tamilnadu, of which 56 or around 67 per cent were purely spinning units. The largest mills during this period were also two of the oldest mills. In 1952, Binnys had 1,19,916 spindles and 2,781 looms in 1952 and Harveys with two mills at Madurai and two mills at Tuticorin and Ambasamudram accounted for a total of 4,64,748 spindles and employed 15,511 persons in 1956. Coimbatore had the largest number of mills, (46 working units), and was followed by Madurai and Madras[12].

Between 1951 and 1961, there was another spurt of expansion as reflected in the increase in the number of mills from, 71 to 134. During this period the percentage of mills in Madras state to the total in the Indian Union has risen from 16 per cent to 29 per cent. The number of spindles increased from

17 lakhs to 30.64 lakhs and the share of the Madras State from 15.4 per cent to 22.5 per cent. The textile industry in the state was basically concentrated on spinning rather than weaving. The output of yarn increased from 273 million lbs to 303 million lbs in 1961. The number of persons employed in the textile industry increased from about 90,000 in 1951 to 1,20,000 in 1961. The weaving capacity, was not large because most of the units were selling their output of yarn to handloom weavers and to consumers in other states[13].

Sugar Industry

The sugar industry in fact predated the cotton textiles. Despite an earlier start, the industry was unable to register the pace of expansion and spread as that of cotton textiles. In fact, the first modern industry (besides the abortive iron and steel venture at Porto Novo) to be promoted in Tamil region was that of Sugar[14]. The abolition of slavery in the West Indies in 1834 and the suspension of the discriminatory duties against East India sugar were among the factors inducing investment in the field of sugar. The growth of Parrys, one of the Madras based European managing agencies who were to emerge as one of the largest producer of sugar in Southern India, can be traced to this period. Between 1842 and 1855, they promoted or came to be associated with as many as four sugar factories in and around South Arcot district. Nellikuppam which was to eventually emerge as their core production unit was promoted in 1845[15]. The late nineteenth century also witnessed the entry of small Indian capital in this field, especially of palmgur production.

However, with some exception most of the indigenous sugar refineries were not particularly successful.

The dominating influence of Parrys over sugar market may also have, had an effect in restricting the flow of Indian capital into the industry. Above all the tardy progress of the sugar industry in the pre 1930 period can be broadly related to (1) the absence of adequate supply of sugar cane and (2) the fiercely competitive market conditions as reflected in the unrestricted import of the cheaper Javanese and European beat sugar. As in the case of cotton textiles, it was the creation of a congenial industrial climate in the wake of the depression which resulted in a spurt in growth of the industry. Of particular significance in this context was the fairly substantial increase of acreage under sugar cane, which could well have been a response to the relatively higher prices that cane fetched in relation to other cash crops. The extension of fairly substantial protection to the sugar industry was also a major factor in influencing investment and growth of the industry[16].

In 1950s, five sugar factories were set up, one in each districts of Coimbatore, Madurai, North Arcot, South Arcot and Tiruchirapalli. But the crushing capacity of these plants were very low except for the one at south Arcot which had a capacity of 2,200 tones per day. In 1950s, the acreage under cane was 1,18,000 acres. Compared to north India, the yield was also quite high. The plants in this region also enjoyed a longer crushing season of 134 days between 1950-1955. Even though

expansion started taking place in 1930s, significant growth took place only after 1955-56. The output of the eight unit which was 1.25 lakh tones, during 1955-56 and had doubled to nearly 2.50 lakh tones with 12 units functioning in 1961-66. Between 1951 and 1960 the number of sugar factories increased from 3 to 8, cushing capacity from 3,500 tones of cane per day to 7,700 tones and output per annum from 50,000 tones to 1,27,500 tones[17].

Leather Industry

Another major industry that developed was leather tanning industry. Charles D'Souza, a french Eurasian, was the founder of the Madras Tanning Industry. Following his enterprise, several small tanneries were established by the beginning of this century. The curing of leather is a traditional craft in Tamilnadu and the western tanning processes were introduced as early as 1857. The first World War gave an impetus to the industry; hides and skins were imported from northern provinces and wattle bark from South Africa. By the end of this period two modern chrome factories were set up, near Madras. The great depression of 1930s severely affected the tanning and leather industry. The abolition of the export duties on hides and skins in 1935, helped the recovery of the export trade, and World War II induced a big boom. At the end of this period, there were more than 150 tanneries. When the South African Wattle bark imports stopped, local tanning materials like Avaram, Kanam, and Myrobalams were substituted[18]. In Noth Arcot region skilled labour coupled with the availability of good water ensured the concentration of the industry in this region.

The factories at North Arcot became the main producers of East Indian Tanned Leather, a form of semi-finished leather that was mainly exported. The industry was for long dominated by British trading houses such as Gordon Woodroffe, but during the inter-war years Indians also began to enter the trade[19]. Most of the tanneries were small units though a few factories existed. Between 1951 and 1961, the number of tanneries increased form 63 to 91 and employment from 4025 to 6000 persons[20].

Cement Industry

Significant investment in the cement industry and its growth occurred mainly after the 1930s. Though some attempts had been made even in the earlier phase to invest in this field[21], however, the limited size of the market, the absence of protection and the greater competitive strength of the larger producers between them precluded a significant flow of capital into this industry in Madras.

Thus, like cotton and sugar, a noticeable expansion of cement industry took place only after 1930s. The Associated Cement Company set up a plant at Madukkarai near Coimbatore in 1934. This plant had an initial capacity of 80,000 tones, and employed nearly 1500 workers. The late 1930s saw the entry of Dalmia with the establishment of a major plant at Dalmiapuram in Tiruchirappalli district. The Dalmiapuram plant had an initial annual production capacity of 75,000 tones. The subsequent growth of the industry occurred after the second world war, following (1) a heightened growth in demand for cement and (2)

fairly significant change in state policy, which sought to curb monopoly conditions in the industry. Thus, The India Cements Limited, was promoted by the Sankarlinga Aiyyar group in the late 1940s. As abundant limestone deposits were available close to its factory, it increased its capacity from 4 lakh tonnes to 5 lakh tones. Protection was extended to this industry which helped it to expand its capacity of production. The plant at Madukkarai increased its capacity to 2.82 lakh tones and the one at Dalmiapuram increased its capacity to 4.12 lakh tonnes. In addition to the protection given to this industry the increased post-war demand for cement, and the availability of electricity in this region led to further investment in this industry.

In 1953, these three plants accounted for around 17 per cent of the all India capacity and together employed more than 2350 workers. In 1961 a new unit was set up `Madras Cements Ltd. by a group of industrialists from Rajapalayam, at Tulukkapatti, near virudhunagar, with an initial capacity of 75,000 tonnes annually which was increased to 2 lakh tonnes in 1964. Though the availability of lime stone deposits available in Tamilnadu represented only one per cent of total resources of limestone deposits in the country the deposits available were of high quality. The number of cement factories increased from 3 in 1951 to 4 in 1961 and the installed capacity per annum increased from 5 to 13.7 lakh tonnes as the older factories also increased their capacity. Employment in this industry was nearly 4000 workers[22].

Other Industries

By the mid 1950s, in addition to these major industries, expansion and growth of production took place along other lines as well. In particular, reference needs to be made of the chemical industry. There were two major heavy chemical plants which were set up in pre independence period in the state. One at Ranipet in Noth Arcot and the other at Mettur. The Ranipet plant part of the Parrys group was the older of the two and produced sulphuric acid. Mettur chemicals was a larger complex established in 1940s and manufactured caustic soda, liquid chlorine, hydrogenerated oils and bleaching powder. The government assisted this industry by supplying electricity and water from Cauvery at concessional rates. The salt requirements was met from a factory on the east coast and lime for bleaching powder from a quarry 40 miles from Mettur. Of the total estimated employment of 1783 in the chemical industry in 1953, Mettur chemicals alone accounted for 553 or 31 per cent. Mettur unit provided an impetus to the expansion of the match industry mainly in and around Sivakasi and Ramanad district.

Apart from chemicals, investment in engineering and capital goods sector also began to assume importance between 1950 and 1956. This initiative was taken up by both public and private sector. Except for a few engineering units, in Coimbatore and the development of the public sector undertakings in Tiruchirapalli, the bulk of the output of engineering goods was accounted for by establishments in the Madras industrial area. The shortage and scarcity of mill machinery and its spares

and the growth of automobile workshop, appear to have provided the initial impetus for the subsequent growth of the industry. The establishment of Tube Investments of India at Ambattur in 1949, a large sized unit manufacturing bicycles, can perhaps be said to mark the beginning of the Engineering industry in this region. This unit has progressed steadily and by the 1960s accounted for over 20 per cent of the All India output. The starting of the bicycles industry acted as a catalyst for the growth of many other units in the transport and allied industry[23].

The above account tends to reveal that the manufacturing sector in Tamilnadu has since the late 1940s, entered into a phase of dynamic and rapid growth. These in turn could be related to the momentum generated in the earlier period, consequent upon the emergence of a favorable climate for industrial investment. While protection and the policy of import substitution during the colonial period were important in facilitating the initial consolidation of the industrial structure, it was the more overtly interventionist policy of the state after Independence which was crucial in enabling the state to sustain the tempo of industrialization at a high level.

Two distinct period of boom were discernible, the first in the last few years of the 1940s and the second beginning a decade later, coinciding with the period of the second five year plan. The number of `factories' located in Madras and Coimbatore rose during the decade 1945 to 1955 at an average compound annual growth rate of 11 per cent. The largest part of this increase

appears to have come in a single spurt between 1948 and 1949. Average daily employment in units coming under the Factories Act, 1948, rose to a compound annual growth rate of 4.51 per cent during the year 1948 to 1955.

The second boom took place in the decade 1955 to 1965. Of the 787 licenses issued to entrepreneurs in Tamilnadu for the setting up of new undertakings in the period 1951 to 1970 635 or 80.91 per cent were issued during these ten years. The period was also marked by the commissioning of several public sector projects some of which as in the field of power, had the effect of strengthening the industrial infrastructure. Several public sectors corporations were also set up in this period to encourage industrial investment in the State[24].

From the above account it appears feasible to very roughly categories the industrial development of the State, into three broad phases namely[25],

Period I between 1900 and 1929
Period II between 1930 and 1950
Period III between 1951 and 1961.

In the First Phase, Madras State was mildly affected by industrialization, in other words, the State did not experience the real effect of industrial development as was the case in Bombay and Bengal. The number of textile mills increased from 11 in 1901 to 19 in 1929-30 and spindles from about 3 lakhs to 7 lakhs. The industrial structure itself was narrowly based and the overall climate for investment did not favour any significant Indian investment in industry.

The second phase in contrast, witnessed a pronounced acceleration in the tempo of industrial activity and investment. Of particular significance was the phenomenal growth of the cotton textile industry. There were also clear signs of the beginning of the process of broadening of the industrial structure. The relative weakening of the `colonial metropolitan nexus, following the depression of the 1930s and the second world war and the consequent buoyancy of the domestic market was a major factor in providing a boost to private investment in industry. The policy of protection and the availability of cheap power provided a further impetus to this trend. There were 71 mills in 1950 registering a 3.5 fold increase since 1930.

In the third phase of development following the initiation of the five year plans, the role of the state in promoting industrial development assumed considerable significance. During this phase, the laissez faire policy was abandoned and a positive policy for rapid industrialisation was pursued. For initiating industrial development in the private sector encouragement was given by the provision of loans, financial and technical aid, facilities for importing plant and machinery and collaboration with foreign firms. Public sector industries were established by both central and state Governments. During this period there was a significant expansion of industrial activity. The number of registered factories rose from 586 in 1951 to 979 in 1961, and thereby recorded an increase of 67 per cent. The total authorized capital of these registered firms showed a four-fold increase from Rs.45.46 crores in 1951 to Rs.187.00 crores in 1961, a four-

fold increase. There was a broadening of the industrial structure, characterised by a shift from agro-based to intermediate and capital goods industries. Thus, the number of metallurgical units including iron, steel, alloys, structural castings, pipes etc. increased from 8 to 55; the engineering units comprising cars, trucks, cycles, boilers, pumps, prime-movers, machinery for sugar, textile, pharmaceutical, cement and other industries, typewriters and sewing machines increased from 16 in the first five year plan to 133 in the second. The number of industries in chemical industries rose from 10 to 55.

In the foregoing discussion, we have examined the origin and growth of industries till sixties, using the data and evidences available from various sources. The growth pattern was traced individually for the major industries of the State. Though such an analysis highlighted the broad changes that happened in the industrial environment of the State and the growth pattern of the major industries, it failed to provide a total picture of the industrial sector due to the non-availability of systematic industrial data. For the subsequent period, we have a fairly comparable data based on Annual Survey of Industries, that could provide a macro picture about the growth pattern of industries. In the following section, a detailed analysis is carried out by using the same data in order to understand the structural change and growth pattern of the industrial sector during the period between 1962 and 1971[26].

Section II

Growth Pattern of Industries between 1962 and 1971

This section discusses the changes in the factory sector between 1962 and 1971. The principal indicators choosen to analyse the changes in the industrial structure during this period are the number of factories, productive capital, number of employees and value added.

In 1962 there were 4,307 registered factories in the State. These factories employed a productive capital of Rs.25,414 lakh and provided employment to 3,12,186 employees. The total income (value added) generated from these factories was Rs.11,456 lakhs. Within a decade, significant changes were observed in all these variables. In 1971, there were 6,140 registered factories which employed a productive capital of Rs.1,22,706 lakhs, provided employment to 5,84,364 employees and generated Rs 32,152 lakhs as value added to the state income.

In terms of percentage changes, the number of factories and productive capital showed an increase of 43 per cent and 383 per cent respectively and variables like employment and value added recorded an increase of 87 per cent and 181 per cent respectively during the period of reference. Substantial changes can also be found in the structural ratios. Employment per factory rose from 72 persons in 1962 to 95 persons in 1971, an increase of 31 per cent. Productive capital per factory and value added per factory which were 5.9 lakhs and 2.66 lakh

respectively in 1962 had increased to 20 lakhs and 5.24 lakh respectively in 1971 and thereby recorded an increase of 239 per cent and 97 per cent respectively. The ratios of productive capital per employee and value added per employee had recorded an increase of 158 per cent and 50 per cent respectively during the period under reference.

Number of Factories

The factory sector of Tamilnadu was dominated by grain mill product and food product industries. Each of these industries accounted for more than 800 registered factories in 1971. The spinning and weaving industry, printing and publishing and manufacturing of machinery products occupied the third, fourth and fifth positions respectively. Interestingly, while the percentage share of grain mill products and food products in the total registered factories were the highest in 1962 as well as in 1971, the share of these two industries showed a decline during 1971 when compared to 1962. Rail Road equipment, cement industry, motor and bicycles industry had an insignificant share of less than 0.2 per cent during these years.

However, the growth measured in terms of percentage changes revealed that rail road equipments industry reported the highest increase of nearly 333 per cent followed by ferrous and metal products (304 per cent), (see table 2.1). Grain mill products exhibited the lowest increase of 5.18 per cent. A look at the growth rates (average of annual percentage changes), showed that ferrous metal products registered the highest growth

rate of 20 per cent. Sugar industry and rubber industry had a growth rate around 12 per cent and 11 per cent respectively. Grain mill products, leather products and printing industry exhibited a low growth of less than 3 per cent. And the rest of the 12 industries had a moderate growth rate ranging between 5 to 10 per cent per annum.

Table 2.1:

Number of Registered Factories during 1962 and 1971

Industry Group	1962	1971	% Change	% Share 1962	% Share 1971	G.R
Spinning, Weaving	338	586	73.37	7.85	9.54	6.38
Electric Light	21	30	42.86	0.49	0.49	6.76
Mfg & repair of Motor	243	366	50.62	5.64	5.96	5.83
Mfg of Mach, except ele	245	443	80.82	5.69	7.21	7.02
Mfg of Mis food	525	827	57.52	12.19	13.47	5.32
Mfg Electrical mach	69	157	127.54	1.60	2.56	9.64
Mfg of rail, road eqip	3	13	333.33	0.07	0.21	9.02
Printing, Publishing	385	480	24.68	8.94	7.82	2.55
Chemical	41	80	95.12	0.95	1.30	7.8
Ferrous, metal	45	182	304.44	1.04	2.96	19.99
Sugar factories	9	21	133.33	0.21	0.34	12.1
Mfgof mis chem pro	192	295	53.65	4.46	4.80	5.07
Mfg of Rubber	23	57	147.83	0.53	0.93	11.12
Mfg of Cements	4	8	100.00	0.09	0.13	8.44
Mfg of metal except	180	270	50.00	4.18	4.40	4.8
Tanneries and Leather	202	257	27.23	4.69	4.19	2.8
Mfg of Motor and Bicycles	6	9	50.00	0.14	0.15	9.03
Mfg of grain mill pro	830	873	5.18	19.27	14.22	0.86
Mfg of non-metallic	29	45	55.17	0.67	0.73	5.84
Others	915	1141	24.70	21.24	18.58	2.56
Total	4307	6140	42.56	100.00	100.00	

G.R. : Growth rate are averages of annual percentage changes

Source: Department of Statistics, Annual Statistical Abstract of Tamilnadu, Government of Tamilnadu (GOTN), various issues.

Productive Capital

Productive capital employed was foremost in spinning and weaving, electric light and chemical industries and capital invested was minimal in leather products, non-metallic mineral products and motor and bicycle industries. In the year 1962 spinning and weaving industry utilised the highest amount of Rs 6571 laks followed by electric light industry of Rs 4404 lakhs, (see table 2.2). In industries like manufacture and repair of motor vehicle, chemical products, food products and cement products, capital investment ranged between Rs 1200 lakhs and Rs 1800 lakhs and in the rest of the industries it was less than Rs 1000 lakhs.

During the year the per factory investment of productive capital was observed to be the highest in cement and electric light industries and far low in grain mill products and leather industries. The per factory investment was the highest in cement industry (Rs. 305.25 lakhs), followed by electric light industry (209.71 lakhs). In industries like grain mill products, leather products and printing and publishing the investment per factory was less than Rs.2 lakhs.

When we examine the changes in the total productive capital investment and the per factory investment some interesting findings were noted, (see table 2.4). Between the years 1962 and 1971, the total capital employed showed an increase in all industries. Among the 19 industries under reference, industries of electric light, chemical, electrical

machinery and machinery products showed an increase above the average increase of 382.83 per cent for the state. Particularly the increase was prominent in electric light industry. Minimum increase of 4 per cent was found in motor and bicycle industry. The rest of the industries exhibited an intermediate increase between 70 and 300 per cent.

Table 2.2:

Productive Capital Invested in the Factories

Industry Group	1962	1971	% Change	% Share 1962	% Share 1971	G.R
Spinning, Weaving	6571	9484	44.33	25.86	7.73	5.07
Electric Light	4404	50714	1051.54	17.33	41.33	42.36
Mfg & repair of Motor	1781	4893	174.73	7.01	3.99	12.9
Mfg of Mach, except ele	954	6450	576.10	3.75	5.26	34.92
Mfg of Mis food	1262	1984	57.21	4.97	1.62	8.34
Mfg Electrical mach	377	2317	514.59	1.48	1.89	24.81
Mfg of rail, road eqip	78	1376	1664.10	0.31	1.12	2.61
Printing, Publishing	659	1260	91.20	2.59	1.03	8.92
Chemical	1576	12327	682.17	6.20	10.05	34.38
Ferrous, metal	889	3296	270.75	3.50	2.69	20.07
Sugar factories	727	2527	247.59	2.86	2.06	16.53
Mfgof mis chem pro	540	1493	176.48	2.12	1.22	17.55
Mfg of Rubber	599	2391	299.17	2.36	1.95	21.6
Mfg of Cements	1221	3458	183.21	4.80	2.82	13.98
Mfg of metal except	444	1355	205.18	1.75	1.10	14.19
Tanneries and Leather	307	521	69.71	1.21	0.42	12.98
Mfg of Motor and Bicycles	504	525	4.17	1.98	0.43	1.62
Mfg of grain mill pro	512	1306	155.08	2.01	1.06	14.91
Mfg of non-metallic	291	572	96.56	1.15	0.47	16.75
Others	1814	14457	696.97	7.14	11.78	32.6
Total	25414	122706	382.83	100.00	100.00	20

G.R. : Growth rates are averages of annual percentage changes

Source: Same as Table 2.1

However, in terms of percentage share, in 1962 spinning and weaving and electric light industry together had a share of 43.29 per cent (see table 2.2). Whereas in 1971, electric light

industry alone had a share of 41.33 per cent. A point that needs to be highlighted at this juncture is that, spinning and weaving had a major share of 26 per cent in 1962 but, in 1971 its share declined sharply to 7.73 per cent. Whereas the share of electric light which was 17.33 per cent in 1962, it increased rapidly to 41.33 per cent in 1971. This drastic change is due to the significant increase in the per factory productive capital in electric light industry.

A look at the growth rate reveals that electric light, machinery and chemical industry had a significant growth rate of above 34 per cent per annum. Specifically, the rate of growth was exceptionally high in electric light industry (42.36 per cent per annum). In industries like electrical machinery, rubber and ferrous metal industries and machinery the growth rate was quite high ranging between 20 and 30 per cent per annum. The growth rate was insignificant in motor and bicycle industry (1.62 per cent) and in rail road equipment industry (2.61 per cent per annum). Rest of the industries registered a moderate growth between 5 and 20 per cent per annum.

Employment

Number of employees employed is taken as an indicator of level of employment in the factory sector. Employment absorption was found to be notably high in textile industry when compared to all other industries. The share of employment provided by this industry in the total employment in the factory sector was 36 per cent in 1962 and 22 per cent in 1971 (see table

2.3). This industry provided employment to around 125 thousand persons in 1971, followed by electric light, power and gas industry with 90 thousand persons. In all other industries, employment provided was less than 40 thousand persons. Minimal employment of less than 3 thousand persons was provided by motor and bicycle industry and non-metallic mineral products.

Table 2.3:

Number of Employees in the factories

Industry Group	1962	1971	% Change	% Share 1962	% Share 1971	G.R
Spinning, Weaving	112201	125595	11.94	35.94	21.49	1.38
Electric Light	13870	90857	555.06	4.44	15.55	29.32
Mfg & repair of Motor	20007	36171	80.79	6.41	6.19	7.14
Mfg of Mach, except ele	16628	36670	120.53	5.33	6.28	9.58
Mfg of Mis food	17154	39807	132.06	5.49	6.81	10.42
Mfg Electrical mach	7120	18171	155.21	2.28	3.11	11.69
Mfg of rail, road eqip	978	26769	2637.12	0.31	4.58	0.89
Printing, Publishing	15401	21666	40.68	4.93	3.71	4.42
Chemical	7536	11870	57.51	2.41	2.03	6.84
Ferrous, metal	8020	19197	139.36	2.57	3.29	11.68
Sugar factories	6611	11740	77.58	2.12	2.01	7.08
Mfg of mis chem pro	11807	23934	102.71	3.78	4.10	8.36
Mfg of Rubber	2499	7510	200.52	0.80	1.29	15.15
Mfg of Cements	4209	5873	39.53	1.35	1.01	3.86
Mfg of metal except	8478	11214	32.27	2.72	1.92	4.45
Tanneries and Leather	8453	15182	79.60	2.71	2.60	8.02
Mfg of Motor and Bicycles	3167	2833	-10.55	1.01	0.48	6.76
Mfg of grain mill pro	11906	14729	23.71	3.81	2.52	3.24
Mfg of non-metallic	2855	2657	-6.94	0.91	0.45	0.71
Others	33286	61919	86.02	10.66	10.60	7.35
Total	312186	584364	87.18	100.00	100.00	7.36

G.R. : Growth rates are averages of annual percentage changes.

Source: Same as table 2.1

As compared to 1962, employment had significantly increased in rail, road equipment industry and electric light industry in 1971. The increase in employment was above 100 per cent in rubber, electrical machinery, ferrous metal industry,

food products, machinery and chemical products. And the rest of the industries showed an increase in employment except motor and bicycle industry and non-metallic mineral products which showed a decrease of -10.55 per cent and -6.94 per cent respectively.

Employment per factory was the highest in cement industry followed by sugar, electric light and motor and bicycle industries ranging between 500 and 1000 persons in 1962 (see table 2.4), where as in 1971, employment per factory was found to be remarkably high in electric light industry (3029 persons) and rail road equipment industry (2059 persons).

Electric light industry showed a significant increase in employment per factory. As mentioned above this industry registered a momentous increase in employment, productive capital and productive capital per factory. But the increase in the number of factories is not very significant. Therefore, one can say that this industry has expanded in size rather than in number, since this industry has utilised more capital and generated more employment. In industries like motor and bicycle and textile products, employment per factory and total employment had decreased, whereas productive capital and number of factories had increased. These industries had used more capital than labour and expansion had taken place in a two dimensional way i.e, both number and size had increased during the period under reference.

In terms of growth rate, electric light industry exhibited the highest growth of 29.32 per cent per annum (see table 2.3), whereas rubber products, ferrous metal products, electrical machinery products and food industry registered a

growth ranging between 10 and 15 per cent. Rest of the industries recorded a moderate growth rate of less than 10 per cent and the growth was insignificant in rail, road equipment industry (0.89 per cent) and non-metallic mineral products (0.71 per cent per annum).

Table 2.4:

Structural Ratios Between Productive Capital, Employment and Number of Factories during 1962 and 1971

Industry Group	Prok/fact 1962	Prok/fact 1971	% Change	C.G.R	Emp/Fact 1962	Emp/Fact 1971	% Change	C.G.R
Spinning, Weaving	19.44	16.18	-16.75	-2.02	332	214	-35.44	-4.74
Electric Light	209.71	1690.47	706.08	26.10	660	3029	358.54	18.44
Mfg & repair of Motor	7.33	13.37	82.40	6.91	82	99	20.03	2.05
Mfg of Mach, except ele	3.89	14.56	273.92	15.78	68	83	21.96	2.23
Mfg of Mis food	2.40	2.40	-0.20	-0.02	33	48	47.32	4.40
Mfg Electrical mach	5.46	14.76	170.11	11.67	103	116	12.16	1.28
Mfg of rail, road eqip	26.00	105.85	307.10	16.88	326	2059	531.64	22.73
Printing, Publishing	1.71	2.63	53.36	4.87	40	45	12.84	1.35
Chemical	38.44	154.09	300.86	16.68	184	148	-19.28	-2.35
Ferrous, metal	19.76	18.11	-8.33	-0.96	178	105	-40.82	-5.66
Sugar factories	80.78	120.33	48.97	4.53	735	559	-23.89	-2.99
Mfgof mis chem pro	2.81	5.06	79.95	6.75	61	81	31.93	3.13
Mfg of Rubber	26.04	41.95	61.07	5.44	109	132	21.26	2.17
Mfg of Cements	305.25	432.25	41.61	3.94	1052	734	-30.23	-3.92
Mfg of metal except	2.47	5.02	103.45	8.21	47	42	-11.82	-1.39
Tanneries and Leather	1.52	2.03	33.39	3.25	42	59	41.17	3.91
Mfg of Motor and Bicycles	84.00	58.33	-30.56	-3.97	528	315	-40.36	-5.58
Mfg of grain mill pro	0.62	1.50	142.51	10.34	14	17	17.62	1.82
Mfg of non-metallic	10.03	12.71	26.67	2.66	98	59	-40.02	-5.52
Others	1.98	12.67	539.11	22.89	36	54	49.18	4.54
Total	5.90	19.98	238.69	14.52	72	95	31.30	3.07

Notes: Prok/fact - Productive Capital per Factory
Emp/Fact - Employment per Factory.
C.G.R - Compound Growth Rates.

Source: Same as table 2.1

Value Added

The income generated by textile products, electric light, manufacture and repair of motor vehicles and machinery

products were prominent in 1971. These four industries together accounted for above 40 per cent of total value added generated by the factory sector to the state income (see table 2.5). However, in 1962, textile products had the highest proportion of value added (33.99 per cent), followed by food products (9.43 per cent). These two industries together accounted for 43 per cent of total value added by the factory sector in 1962.

Over the years significant changes had occurred in the value added generated by the registered factories. While value added had shown an increase in total, in chemical industry the value added had decreased from Rs 435 lakhs in 1962 to Rs 323 lakhs in 1971 (a decrease of 26 per cent). The increase in value added was exceptional in electrical light industry (918.74 per cent increase).

Value added per factory was found to be significantly high in electric light industry, rail, road equipment and cement industry. While it has also shown a remarkable increase in electric light industry, machinery products, rubber products and manufacture and repair of motor vehicles it had decreased in industries like chemical, rail road equipment industry, textile products and food products.

An increase in value added, employment, productive capital and number of factories were observable in machinery and rubber product industries. These industries exhibited an expansion in structural ratios also, whereas textile industry which ranks the third significant position in the number of units

and the foremost position in terms of employment and value added did not exhibit an increase in employment and value added during the period under reference.

Table 2.5

Value Added by the Registered Factories

Industry Group	1962	1971	% Change	Share 1962	Share 1971	G.R	V.A/Pact 1962	V.A/Pact 1971	% Change
Spinning, Weaving	3894	5514	41.60	33.99	17.15	5.86	11.52	9.41	-18.32
Electric Light	443	4513	918.74	3.87	14.04	39.98	21.10	150.43	613.12
Mfg & repair of Motor	880	2852	224.09	7.68	8.87	15.06	3.62	7.79	115.18
Mfg of Mach, except ele	640	3832	498.75	5.59	11.92	23.27	2.61	8.65	231.14
Mfg of Mis food	1080	1416	31.11	9.43	4.40	7.72	2.06	1.71	-16.77
Mfg Electrical mach	264	1144	333.33	2.30	3.56	19.09	3.83	7.29	90.45
Mfg of rail, road eqip	27	1334	4840.74	0.24	4.15	4.48	9.00	102.62	1040.17
Printing, Publishing	508	1086	113.78	4.43	3.38	9.6	1.32	2.26	71.47
Chemical	435	323	-25.75	3.80	1.00	6.91	10.61	4.04	-61.95
Ferrous, metal	236	940	298.31	2.06	2.92	19.38	5.24	5.16	-1.52
Sugar factories	395	876	121.77	3.45	2.72	21.01	43.89	41.71	-4.95
Mfgof mis chem pro	466	1061	127.68	4.07	3.30	14.48	2.43	3.60	48.19
Mfg of Rubber	210	1212	477.14	1.83	3.77	26.99	9.13	21.26	132.88
Mfg of Cements	271	600	121.40	2.37	1.87	11.16	67.75	75.00	10.70
Mfg of metal except	253	468	84.98	2.21	1.46	9.2	1.41	1.73	23.32
Tannieries and Leather	282	686	143.26	2.46	2.13	17.09	1.40	2.67	91.20
Mfg of Motor and Bicycles	193	310	60.62	1.68	0.96	20.27	32.17	34.44	7.08
Mfg of grain mill pro	190	385	102.63	1.66	1.20	19.3	0.23	0.44	92.65
Mfg of non-metallic	129	366	183.72	1.13	1.14	29.32	4.45	8.13	82.84
Others	641	3218	402.03	5.60	10.01	40.83	0.70	2.82	302.59
Total	11456	32152	180.66	100.00	100.00	12.25	2.66	5.24	96.87

G.R. : Growth rates are averages of annual percentage changes.

Source: Same as table 2.1

An employee in the rubber industry generated the foremost income of Rs 16,138 by using capital worth of Rs 31838 in 1971 (see table 2.6). Non-metallic mineral products, motor and bicycle industry machinery products and cement industry also generated reasonable high per employer income of above Rs 10,000

and below Rs.15,000. Between the years 1962 and 1971, value added by an employee in grain mill products increased sharply from Rs.4518 to Rs 13375, followed by machinery industry where it rose form Rs.3048 to Rs.10450.

In terms of growth rate, electric light registered a pivotal growth rate of 40 per cent per annum (see table 2.5). In non-metallic mineral products, rubber, machinery, sugar and motor and bicycle industries the rate of growth ranged between 20 and 30 per cent per annum. The growth rate was less than 10 per cent in industries such as printing and publishing, metal products, food products, chemical and textile products. Rest of the industries had a moderate growth ranging between 10 and 20 per cent per annum.

During the period under reference, all the four variables chosen to understand the performance of the industrial sector had undergone significant changes. All the variables had exhibited a increase over the decade and changes had taken place in size, composition and magnitude. Grain mill products, food products, textile products and machinery products had the highest number of factories. But textile products, electric light industry, food products and machinery industry were found important when employment and value added are considered.

The fastest growing industry in terms of number of units were ferrous metal products, rubber products, sugar factories and electrical machinery. Industries which created more employment opportunities and generated more income to the state in

terms of value added were electric light, rubber, electrical machinery, food and machinery industries. In industries such as electric light, chemical, machinery and electrical machinery consumption of capital had increased during the period under reference.

Table 2.6:

Structural Ratios Between Value Added, Productive Capital and Employment during 1962 and 1971

Industry Group	V.A/Emp 1962	V.A/Emp 1971	% Change	C.G.R	Prdk/Emp 1962	Prdk/Emp 1971	% Change	C.G.R
Spinning, Weaving	3470.56	4390.30	26.50	2.65	5856.45	7551.26	28.94	2.86
Electric Light	3193.94	4967.15	55.52	5.03	31751.98	55817.38	75.79	6.47
Mfg & repair of Motor	4398.46	7884.77	79.26	6.70	8901.88	13527.41	51.96	4.76
Mfg of Mach, except ele	3848.93	10449.96	171.50	11.74	5737.31	17589.31	206.58	13.26
Mfg of Mis food	6295.91	3557.16	-43.50	-6.15	7356.88	4984.05	-32.25	-4.23
Mfg Electrical mach	3707.87	6295.75	69.79	6.06	5294.94	12751.09	140.82	10.26
Mfg of rail, road eqip	2760.74	4983.38	80.51	6.78	7975.46	5140.27	-35.55	-4.76
Printing, Publishing	3298.49	5012.46	51.96	4.76	4278.94	5815.56	35.91	3.47
Chemical	5772.29	2721.15	-52.86	-8.02	20912.95	103850.04	396.58	19.49
Ferrous, metal	2942.64	4896.60	66.40	5.82	11084.79	17169.35	54.89	4.98
Sugar factories	5974.89	7461.67	24.88	2.50	10996.82	21524.70	95.74	7.75
Mfgof mis chem pro	3946.81	4433.02	12.32	1.30	4573.56	6237.99	36.39	3.51
Mfg of Rubber	8403.36	16138.48	92.05	7.52	23969.59	31837.55	32.82	3.20
Mfg of Cements	6438.58	10216.24	58.67	5.26	29009.27	58879.62	102.97	8.18
Mfg of metal except	2984.19	4173.35	39.85	3.80	5237.08	12083.11	130.72	9.73
Tanneries and Leather	3336.09	4518.51	35.44	3.43	3631.85	3431.70	-5.51	-0.63
Mfg of Motor and Bicycles	6094.10	10942.46	79.56	6.72	15914.11	18531.59	16.45	1.71
Mfg of grain mill pro	1595.83	2613.89	63.79	5.64	4300.35	8866.86	106.19	8.37
Mfg of non-metallic	4518.39	13774.93	204.86	13.19	10192.64	21528.04	111.21	8.66
Others	1925.73	5197.11	169.88	11.66	5449.74	23348.25	328.43	17.55
Total	3669.61	5502.05	49.94	4.60	8140.66	20998.21	157.94	11.10

Notes: V.A/Emp - Value Added per Employee
Prok/Emp - Productive Capital per Employee
C.G.R - Compound Growth Rate.

Source: Same as table 2.1

An important feature that emerged from the broad historical overview of the growth pattern of the industrial economy was that the cotton textiles, sugar, cement and leather were the major manufacturing industries in Tamil region in the early 1950s. It is also evident from the foregoing analysis that

the major industrial centres during this period were Madras and Coimbatore. These two major industrial centres still dominate the industrial sector with 31.65 per cent of the total factories, 38.63 per cent of total workers, and 33.82 per cent of the total output. While Madras holds first position among the districts in terms of workers, Coimbatore district leads in terms of number of factories and value added. While industrial structure till 1950s was dominated by light and consumer good industries, the industrial base had widened and deepened, with basic and capital goods coming into prominencein the later years. From a primary sector based structure, the change has been towards a more complex structure conforming to a higher level of industrialisation. The setting up of the high tariff walls, soon after independence and outright banning of specific imports opened up new opportunities to production and investment.

Notes:

1. This classification it is necessary to emphasis, is not based on any basic principle of periodisation, suggestive of significant changes in industrial structure. It is primarily governed by the availability of data and convenience.

2. A.K. Bagchi (1975).

3. Raman Mahadevan (1987).

4. In 1906 Alfred Chatterton, `Director of Industrial and Technical Inquiries' initiated the pioneering work in the technological up-gradation of several small-scale industries. Handloom Weaving, Aluminum Industry, Chrome Leather Tanning and Pencil Industry were selected for his experiments. He started two handloom factories. When a pencil factory was in an advanced stage of construction, and the plans for the utensil factory was made, an order by Lord Viscout Meriey the then Secretary of State for India, and an upholder of the orthodox Laissez Faire Policy banned Chatterton form all `Pioneer Factories' and the scheme had to be closed down (for futher details see Padmini Swaminathan (1987 and 1991).

5. Madras Institute of Development Studies (1988)

6. C. J. Baker (1984)

7. Raman Mahadevan (1987)

8. K.Bharthan (1984)

9. Raman Mahadevan (1987)

10. C.J. Baker (1984)

11. Raman Mahadevan (1991) forthcoming

12. K.Bharthan (1984)

13. T.N. Kapoor (1967)

14. K.Bharthan (1984)

15. Hilton Brown (1954)

16. C.J. Baker (1984)

17. T.N. Kapoor (1967)

18. ibid.

19. K.Bharthan (1984)

20. T.N.Kapoor (1967)

21. The first Cement plant came to be promoted as early as 1904, at Madras, by the South Indian Industries Limited. While the installed capacity of this plant was 10,000 tones per year the actual production was considerably lower. As a consequence of high cost of coal freight, and the competition from ACC plant, at shahbad in Hyderabad State, this industry proved to be commercially unviable.

22. K.Bharthan (1984), T.K.Kapoor (1967) and MIDS (1988).

23. ibid.

24. K.Bharthan (1980)

25. T.N.Kapoor (1967)

26. ibid.

Chapter III

GROWTH AND STRUCTURAL CHANGE

Introduction

This chapter seeks to examine the structural features of the growth performance of Tamilnadu economy since the seventies. In particular, the attempt is to highlight the trends in growth with structural changes in the manufacturing sector between 1973-74 and 1986-87.

Structural change is commonly defined as " a change in the relative weight of significant components of the aggregative indicators of the economy, such as national product and expenditure, exports and imports, and population and the labour force"[1]. In the context of a modern economy, structural change is also associated with the notion of economic growth. Thus, Fisher-Clark postulated a hypothesis wherein the economic growth of a nation would result in the shares of secondary and tertiary sectors in national income and employment in the economy going up along with a secular decline in the share of agriculture. Clark (1940), Kuznets (1971 & 1972), Chenery (1979 & 1989) and Chenery et.al. (1975 & 1986) analysed the process of economic growth and structural change for a cross-section of countries and over time and observed a structural transformation of production from agriculture to non-agriculture with a rise in per capita income.

Thus, historically it has been observed[2] that as modern economic progress takes place there is a movement away from agriculture towards the secondary and tertiary sectors of the economy both in terms of the total output produced and the employment generated. The general pattern of modern economic growth with structural change is one in which the secondary sector is found to expand relatively faster than the other sectors in the initial stage. The expansion of the tertiary sector in particular, is said to occur after the achievement of a certain level of industrialisation.

To Rostow (1960) also, structural shifts take place as the economy passes through the various stages of economic growth, from 'pre-Newtonian' traditional society to the stage of high-mass consumption. In a traditional society, there exists a limited production function; as the transformation takes place, new industries come up, commercialization of agriculture begins, new technology spreads and newer production possibilities open up. Then the economy moves towards maturity with 'older industries levelling off'. There will be a shift from coal, iron and heavy engineering to machine tools, chemicals and electrical equipments. When the economy shifts to the production of consumer durable goods and services, the stage of high-mass consumption world sets in.

Kuznets (1971 & 1972) also found that the internal structure of manufacturing undergoes change along with the structural changes marked by the rise in the share of the secondary sector and in particular that of manufacturing. He

observed that food, clothing and wood products give way to chemicals and metal products and manufacturing, thus providing the necessary momentum to the secondary sector. These structural shifts are attributed to economic input-output relations among sectors with a host of non-economic factors having a bearing on the production structure.

Empirical studies of the developed countries have shown a historically definite pattern of the diversification of production structure from primary processing to the manufacturing of consumer durables and then to the manufacturing of capital goods or from light industries to heavy industrialisation. The general pattern observed in the developing countries, however, is slightly different. This comes out rather clearly in the study by Panchmukhi et. al. (1986) which examined the nature of structural change for a sample of 92 developing countries for the period between 1970 and 1984. It revealed that the pattern of structural shift had a tertiary bias and was not synonymous with industrialisation for these countries.

Various other studies have also confirmed the view that the structural transformation of the Indian economy since Independence has tended to assume a pattern quite distinct from that of the developed countries. Thus, the contribution by V.K.R.V.Rao (1983), Roy Choudhury and Mukerjee (1984) R.M.Sundrum (1987) and others have shown that the structural shift in India has been characterised by a movement away from agriculture towards service sector without any marked acceleration in the growth of the secondary sector's share in the national

aggregates. While, there has been an increase in the relative contribution of the secondary sector, this process itself has been somewhat tardy and has taken place at a distinctly slower pace.

The remarkable rise in the share of tertiary sector in the absence of earlier industrialisation and the resulting structural dis-proportionality in India has been variously explained[3]. Panchmukhi, Nambiar and Mehta (1986), relate this trend to the increasing role of the government and especially to its "growth with equity" oriented programmes, employment generation and poverty alleviation etc. Apart from this, factors like role of urban middle class in wholesale trade and distribution, the operation of demonstration effect in the developing countries creating a similar demand pattern to those of high income countries, the comparative advantage of the latter in providing final product services such as tourism and urbanisation intensifying the demand for several services are said to have provided an impetus to the growth of services at an early stage, i.e., before the industry could dominate the scene[4]. Ashok Mitra and others on the other hand tend to attribute this trend to the nature of investment, political factors, public sector growth and the level of disposable personal income.

The pattern of structural change observed at all-India level need not necessarily be true at the level of State- regions within the country. This is because the process of industrialisation in a given State-region may differ from the one at other State-regions and also at the national level. In as

much as there are regional differences in the patterns and levels of industrial development, the pattern of structural changes at the State-regions also differs. Some State-regions may follow the traditional pattern marked by the growth of secondary sector's share preceding that of the tertiary sector.

The difference in the pattern can also be seen in the internal structure of the secondary sector and in particular, of the manufacturing. This again is a reflection of the difference in certain important aspects with regard to the process of industrialisation at the national level viz-a-viz the regional level. Thus, for example, while at the national level the government has to develop a diversified industrial base consistent with its comparative advantage in international trade and strategic consideration for self-reliance, such considerations need not necessarily operate at the level of the State or region. Besides, there are no legal barriers to the movement of factors of production and the flow of goods and services across State-regions within a country. Generally, therefore, regions within a country tend to specialise in specific industries based on local raw materials, skills and other region-specific factors, which in turn gives a specific character to the growth process and to the structural change in individual State-regions.

An attempt is made in this chapter to analyse the pattern of growth and structural change in the regional economy of Tamilnadu since the seventies. In this context, it also takes into account the changes in the internal structure of the

manufacturing sector. The principle concern is to examine and asses the extent to which the growth pattern of the industrial economy of Tamilnadu varied from the rest-of-India and the consequent implications for the overall development of Tamilnadu.

Trends in State Domestic Product (SDP)

An important economic indicator for evaluating the overall growth of a State is the State Domestic Product. A study of the sectoral composition of the state income throws light on the relative position of different sectors like agriculture, mining, industry and services. It also provides a general frame of reference for studying changes in the contribution of various sectors to the total State income. In other words, when analysed for a series of years, it enables us to measure the structural changes achieved, and concurrently indicates the sectors which need to be given a fillip for further development. Here, we propose to examine the trends in State Domestic Product and the sectoral composition of the Tamilnadu economy in relation to Rest-of-India. The period of analysis is from 1973-74 to 1986-87.

The movements in the share of different sectors in the real State Domestic Product of Tamilnadu since 1973-74 as compared to the rest of India are presented in table 3.1. In 1973-74 the net State Domestic Product of the Tamilnadu economy was Rs 2,60,934 lakhs at 1970-71 prices. Of this, the contribution of the primary sector was the highest (41.14 per cent) followed by tertiary sector (34.95 per cent) and secondary sector (23.91 per cent). A steady increase in State Domestic

Product and significant changes in its sectoral composition is clearly discernable when analysed over the years. In the year 1986-87, the total Net state domestic product of the Tamilnadu economy was Rs.4,39,168 lakhs at 1970-71 prices of which the tertiary sector's contribution was notably the highest (around 50 per cent). It was followed by the secondary and primary sector which had a share of around 30 per cent and 20 per cent respectively.

Table 3.1:

Trends in Sectoral Shares in State Domestic Product (SDP): Tamilnadu and Rest of India: 1973-74 to 1986-87 (1970-71 price)

Years	Tamilnadu			Rest-of-India*		
	Primary Sector	Secondary Sector	Tertiary Sector	Primary Sector	Secondary Sector	Tertiary Sector
1973-74	41.14	23.91	34.95	48.26	20.12	31.62
1974-75	34.06	28.27	37.67	47.11	20.16	32.73
1975-76	38.55	26.42	35.03	48.47	19.29	32.24
1976-77	35.41	29.00	35.59	45.10	20.96	33.95
1977-78	37.42	27.45	35.13	46.19	20.72	33.10
1978-79	35.39	28.72	35.89	44.74	20.87	34.39
1979-80	30.11	34.19	35.70	41.61	21.28	37.11
1980-81	28.93	32.70	38.38	43.52	20.15	36.34
1981-82	30.80	29.58	39.62	43.02	20.17	36.81
1982-83	20.88	31.94	47.18	41.03	20.61	38.36
1983-84	23.29	29.60	47.11	42.00	20.07	37.93
1984-85	24.02	31.19	44.79	40.17	20.26	39.57
1985-86	23.17	30.32	46.50	38.81	20.61	40.57
1986-87	20.79	30.67	48.55	36.87	21.21	41.93

Notes: Sectoral shares are in percentages.
(*) arrived at by deducting SDP of TamilNadu from NDP at factor cost.

Source: Calculation based on data from CSO, Estimates of State Domestic Product and National Account Statistics. Ministry of Planning, Government of India, New Delhi. (various issues).

As far as the changes in sectoral composition of Tamilnadu economy are concerned, one observes a steady decline in the share of primary sector, a moderate rise in the share of the secondary sector and continuous increase in the share of tertiary sector. Over time the decrease in the share of the primary sector is more pronounced than the corresponding increase in the share of tertiary sector. The changing pattern of sectoral composition of Tamilnadu economy has been more or less in consonance with that of rest of India, especially in terms of the declining share of primary sector and the growing importance of the tertiary sector.

Regarding the changes in the sectoral contribution of the state domestic product of the rest of India, the share of primary sector which was 48.26 per cent in 1973-74 had steadily decreased to 36.87 per cent by 1986-87. On the other hand, the share of secondary sector remained more or less unchanged between 20.12 to 21.21 per cent. In contrast, the share of tertiary sector registered a significant increase from 31.62 per cent in 1973-74 to 41.93 per cent by 1986-87.

Thus, while the "tertiary bias" was observable in both the cases, however in respect of Tamilnadu its growth came about following a significant growth in the secondary sector itself consequent upon a process of dynamic industrialisation. The process was slightly different for rest of India, where the growth of tertiary sector was not preceded by the growth of the secondary sector. Moreover, the rate of decline in the primary sector's share was more pronounced in Tamilnadu than the rest of

India. The decline in the share of agriculture was compensated more or less equally by the growth of the secondary and tertiary sectors in the case of Tamilnadu.

The difference in the pattern of sectoral change as between Tamilnadu and rest of India is probably due to the differential rate of growth of State Domestic Product and its components. This is clearly evident from table 3.2 which gives the annual average growth rates between 1973-74 and 1986-87. It is seen that the State Domestic Product of the Tamilnadu economy recorded an annual growth of 4 per cent during the entire period of analysis. As for the sector-wise growth rate, the primary sector recorded a negative growth rate of 1.25 per cent. This loss was compensated by more or less equal positive growth rates in the secondary sector (5.92 per cent) and the tertiary sector (6.53 per cent). The pattern of sectoral change for rest-of-India was slightly at variance. Thus, all the three major sectors registered positive growth rates for rest-of-India though the growth rate of the primary sector was rather slow (2 per cent per annum). Further, the growth rate in Domestic Product was marginally higher than that of Tamilnadu.

Table 3.2:

Growth Rates of State Domestic Product: 1973-74 to 1986-87

	Primary Sector	Secondary Sector	Tertiary Sector	Domestic Product
Tamilnadu	-1.25	5.92	6.53	4.00
Rest of India	2.13	4.61	6.37	4.20

Note: Growth rates are averages of annual percentage changes.
Source: Same as table 3.1.

While comparing the trends in the pattern of structural change in Tamilnadu economy with that of rest-of-India, the most notable difference is with regard to the trends in the secondary sector. The increase in the share of the secondary sector in Tamilnadu has been relatively higher than that of rest-of-India. The share of the secondary sector for rest of India remained more or less stagnant except for a marginal increase of one per cent over a secular span of 14 years. The decline in the share of primary sector income for rest-of-India was not offset by an increase in the contribution by the secondary sector as in the case of Tamilnadu. Thus, an important feature of the structural transformation in Tamilnadu economy has been the expansion of the secondary sector at a rate significantly higher than that of rest-of-India.

From the above account, it is clear that the broad pattern of structural change in Tamilnadu was not quite along the lines indicated by Clark (1940), Kuznets (1971), Chenery (1979) Chenery and Syrquin (1975) and others, a path more appropriate for the developed countries. They had perceived that there would be a significant rise in the share of the secondary sector and a marginal increase in the tertiary share in the initial stages and only after a 'long phase of industrialisation' was the share of the tertiary sector expected to increase. In the case of Tamilnadu, the fall in the primary sector was compensated more or less equally by the secondary and the tertiary sectors and in fact, the rate of increase in the tertiary sector was marginally higher than the secondary sector.

Growth Trends in Secondary Sector

The secondary sector comprises of the three sub-sectors namely, Manufacturing, Construction and Electricity, Gas & Water Supply. Among these, the most dynamic sub-sector in Tamilnadu is manufacturing (see table 3.3). It has been contributing not less than three-fourth of the value added by the secondary sector throughout the period of analysis. In 1986-87, its contribution was Rs. 1,04,199 lakhs at 1970-71 prices which

Table 3.3:

Trends in Sub-Sectoral Shares in Tamilnadu and Rest of India
1973-74 to 1986-87 (1970-71 price)

	Tamilnadu					Rest-of-India				
Years	M.Reg	M.unreg	T.Mfg	Constn	E.G & Ws	M.Reg	M.unreg	T.Mfg	Constn	E.G & Ws
1973-74	63.77	36.23	74.61	19.20	6.19	62.26	37.74	70.67	24.53	4.80
1974-75	63.02	36.98	74.09	19.57	6.34	61.86	38.14	71.91	23.03	5.06
1975-76	63.50	36.50	74.10	19.50	6.40	60.86	39.14	69.22	25.23	5.55
1976-77	67.24	32.76	75.67	18.58	5.75	62.52	37.48	68.68	25.36	5.96
1977-78	69.69	30.31	75.09	18.54	6.37	62.02	37.98	68.13	26.18	5.68
1978-79	70.39	29.61	76.81	16.83	6.36	62.27	37.73	70.11	23.84	6.04
1979-80	57.87	42.13	81.67	13.06	5.27	63.76	36.24	69.87	23.70	6.43
1980-81	63.17	36.83	80.55	12.86	6.59	62.29	37.71	68.94	24.51	6.55
1981-82	61.47	38.53	78.80	14.58	6.62	63.55	36.45	69.72	23.54	6.74
1982-83	65.83	34.17	79.02	15.19	5.79	64.74	35.26	70.79	22.28	6.93
1983-84	63.31	36.69	77.21	16.90	5.88	65.52	34.48	71.22	21.74	7.04
1984-85	65.99	34.01	78.96	14.53	6.50	65.82	34.18	70.95	21.58	7.47
1985-86	68.55	31.45	78.82	15.44	5.74	65.92	34.08	71.19	21.10	7.71
1986-87	69.75	30.25	77.37	16.42	6.21	64.63	35.37	72.76	19.89	7.35

Notes: (a) M.Reg = Registered Manufacturing, M.unreg = Unregistered Manufacturing, T.Mfg = Total Manufacturing, Constn = Construction and E. G. & Ws = Electricity Gas and Water supply.

(b) The share of Manufacturing, Construction and Electricity Gas and Water supply are corresponding to value added of secondary sector, whereas the share of registered and unregistered manufacturing are corresponding to total manufacturing.

(c) Sectoral shares are in percentages.

Source: Same as table 3.1.

accounted for 77.37 per cent of the income generated from the secondary sector in Tamilnadu, whereas the corresponding figure for rest-of-India was 72.76 per cent. Further, the share of the manufacturing sector showed an upward movement more or less consistently (with the exception of a sharp increase during 1979-80 and 1980-81) in the case of Tamilnadu, whereas the share remained more or less constant for rest-of-India.

It is also interesting to note that with regard to Tamilnadu, the share of construction came down and that of electricity etc., remained stagnant in the value added contribution of the secondary sector. For rest-of-India, the relative importance of construction had declined, but the share of electricity, gas and water supply had increased. On the whole, manufacturing constituted the major sub-sector within the secondary sector both in Tamilnadu and rest-of-India, but as is evident from the table 3.3, it enjoyed a position of greater importance in the industrial structure of Tamilnadu.

Growth Trends in Manufacturing

The manufacturing sector has two segments: registered and unregistered. The growth of manufacturing sector is mainly contributed by the growth of the registered segment. This is evident from the increasing trends in the contribution of registered sector to the total value added by the manufacturing both for Tamilnadu and rest-of-India (see table 3.3). The contribution of registered sector in manufacturing has increased

from 63.77 percent in 1973-74 to 69.75 per cent in 1986-87 whereas the contribution of unregistered sector in manufacturing had decreased form 36.23 per cent in 1973-74 to 30.25 per cent in 1986-87. For rest-of-India the sectoral composition of the manufacturing sector remained more or less stagnant over the years except for a rise of around 2 per cent in the registered manufacturing and a decline of around 2 per cent in the unregistered manufacturing activities.

The growth rates for the manufacturing sector and its segments are given in the table below (table 3.4). The growth trends may now be analysed for three sub-periods, viz., period 1: 1973-74 to 1978-79, period 2: 1978-79 to 1982-83 and period 3: 1982-83 to 1986-87. The periodisation has been made on the basis of the cyclical behaviour of the residuals of the value added by the registered manufacturing after eliminating the trend[5].

Table 3.4:

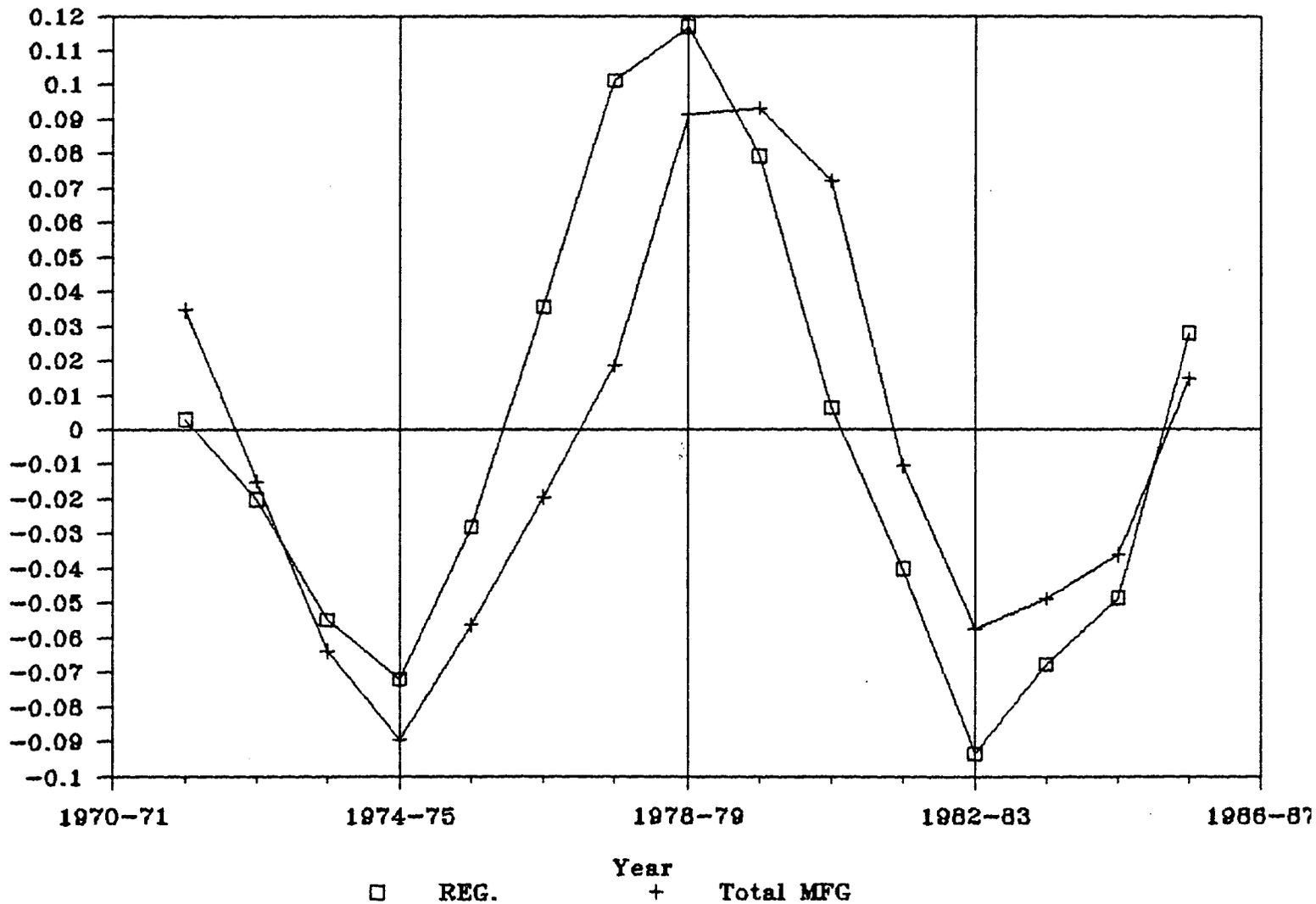
Trends in Sub-sectoral Growth Rates: Manufacturing

Region	Sub-sectors Manufacturing	1973-74 to 1978-79	1978-79 to 1982-83	1982-83 to 1986-87	1973-74 to 1986-87
Tamil nadu	Reg. mfg	9.93	2.44	7.52	6.89
	unReg. mfg	3.93	7.69	3.03	4.81
	Total Mfg	7.96	4.11	6.08	6.2
Rest of India	Reg. mfg	5.82	3.27	6.10	5.12
	unReg. mfg	5.81	0.60	6.22	4.33
	Total Mfg	5.82	2.30	6.14	4.83

Notes: Growth are averages of annual percentage changes.

Source: Same as table 3.1.

Cycles of Reg. and Total MFG Sector– TN



The growth rates of the total manufacturing and registered manufacturing are relatively higher for Tamilnadu than rest-of-India. The growth rate of unregistered manufacturing activities was comparatively lower than registered manufacturing in both the cases, but it was relatively more significant for Tamilnadu than rest-of-India.

The sub-period wise analysis of growth rates reveals that there was a notable deceleration in the growth rates during the second period (1978-79 to 1982-83) in respect of Tamilnadu and the rest of India. A peculiar feature of the Tamilnadu industrial economy is that during this period remarkable growth had taken place in the unregistered manufacturing, whereas for rest-of-India, it had a very insignificant growth of 0.60 per cent per annum.

The foregoing analysis of the trends in the Domestic Products and its sectoral composition reveals a rising trend in the value added by the industrial sector in Tamilnadu in contrast to the stagnant growth of industrial income in rest-of-India during the period of our study. Given the relative importance of manufacturing in the structural transformation of Tamilnadu, a disaggregative analysis to bring out its internal structure and character is the next logical step. This takes us to carry out a detailed analysis of growth trends in major industrial groups in the manufacturing sector. In the following section, we propose to undertake this analysis.

After briefly examining the growth pattern of the manufacturing sector in Tamilnadu as a whole, it is proposed to analyse the growth trends at 2-digit level of National Industrial Classification (NIC). In this direction, seventeen manufacturing units have been selected and the trends in value added, employment and capital invested analysed. Since we are interested mainly in the manufacturing industries, electricity, gas and steam, water works and supply, storage and warehousing, sanitary services, recreational and cultural services, personal services and repair serves have been excluded. The gross value added and emoluments paid for the selected manufacturing industries have been deflated by the respective price indices at 1970-71 price level. The main data source for this analysis is Annual Survey of Industries, the limitations of which has been discussed in chapter 1. The period of analysis is from 1973-74 to 1986-87 which is further broken down into the three sub-periods as stated earlier.

In 1973-74, the manufacturing sector in Tamil Nadu consisted of 6,458 factories which together by investing around Rs.87,028 lakhs and employing a labour force of 5.65 lakhs persons generated gross value added (income) of Rs.36,598 lakhs at 1970-71 prices. By 1986-87, there were 13,381 units with a total capital stock of Rs 2,40,359 lakhs, the labour force employed was 8.61 lakhs and gross value added generated was of the order of Rs.83,871 lakhs at 1970-71 prices. In other words, the manufacturing sector as a whole witnessed average annual growth rates in the relevant variables of the magnitudes shown in table 3.5 which underlined a fact that the growth in labour

absorption was disproportionately low as compared to the growth in capital and value-added.

The value-added by the aggregate manufacturing sector over the years grew at the rate of 6.38 per cent per annum. But it must be noted that there was a fall in the growth rate during the period 1978-79 to 1982-83, which however picked up in the latter period. In the case of capital, the growth rate was a continuous increase whereas, employment showed a declining trend over time. The increase in growth of employment in the third phase (1982-83 to 1986-87) was very negligible; in fact, it recorded a negative growth rate of 0.02 per cent per annum as against a very high growth rate of the capital stock. Thus, the process of industrialisation that was taking place in Tamilnadu during the period of analysis could said to be one that was based on capital deepening and labour displacing.

Table : 3.5

Trends in Growth Rates of Value Added, Capital and Employment: Total Manufacturing

Variables	1973-74 to 1978-79	1978-79 to 1982-83	1982-83 to 1986-87	1973-74 to 1986-87
Value Added	9.66	3.67	4.99	6.38
Capital	6.01	7.25	10.64	7.81
Employment	5.40	3.79	-0.02	3.24

Notes : Growth rates are averages of annual percentage changes.

Source: Calculation based on data from, Department of Statistics, Annual Statistical Abstract of Tamilnadu, GOTN. (various issues).

Growth and Structural Change: A Disaggregated Analysis

We now move on to examine the internal structure and growth of the manufacturing sector. This has been done on the basis of an analysis of Annual Survey of Industries data in terms of (1) number of factory units, (2) capital stock, (3) employment and (4) value added for 16 industrial groups of the National Industrial Classification at two-digit level.

Number of Units:

In 1986-87, Food-products industry-group accounted for the largest share (21.84 per cent) of the total number of manufacturing factory units in the State (see table 3.6). The second position was occupied by cotton textiles (12.90 per cent). This was followed by chemical products (8.33 per cent) machinery and parts (7.62 per cent). These four industry-groups together constituted more than one half (51 per cent) of the total number of manufacturing factory units in the State in 1986-87. The other major industry-groups in terms of number of units included paper products (6.80 per cent), Textile products (5.15 per cent), basic metal products (4.60 per cent), metal products (4.07 per cent) and leather products (4.04 per cent). The rest of the groups individually occupied marginal shares in the total number of factories.

The comparison of the industrial structure of the factory sector between 1973-74 and 1986-87 as seen in terms of the number of factory units reveals the continued importance of

cotton textiles and food products. In contrast to these two industry groups, whose ranking remained unchanged, there was decline in the relative importance in the ranking of six industry-groups; these included: (1) beverage products and (2) wool,silk & jute textiles, (3) paper products, (4) wood products (5) basic metal products and (6) electrical machinery. The remaining nine industry-groups improved their ranks between these two periods; the major ones were (1) transport equipment, (2) non-metallic mineral products and (3) basic metal products.

Table 3.6:

Growth and Share of Number of Factories in Total Manufacturing Industries: Major Industry Group-wise

Industry Group	1973-74 (%Share)	rank	1986-87 (%Share)	rank	73-74/86-87 G.R
Food Products	27.64	1	21.84	1	3.79
Beverage products	4.21	7	1.75	16	-0.33
Cotton Textiles	10.33	2	12.90	2	7.17
Wool,Silk,Jute Tex.	2.85	11	2.20	14	6.73
Textiles Products	4.21	7	5.15	6	7.72
Wood Products	2.35	13	2.11	15	5.55
Paper Products	7.94	3	6.80	5	4.10
Leather Products	3.86	10	4.04	9	5.28
Rubber Products	2.21	15	3.06	12	7.78
Chemical Products	5.70	4	8.33	3	8.20
NonMetallic Products	2.32	14	3.78	10	11.06
Basic Metal Products	5.39	5	4.60	9	5.02
Metal Products	3.93	9	4.07	8	6.51
Machinery & Parts	5.31	6	7.62	4	8.25
Electrical Machinery	2.74	12	2.74	13	6.10
Transport Equipments	1.95	16	3.22	11	9.92
Other Manu. Ind.	1.01	17	0.60	17	2.26
All Industries	100.00		100.00		5.67

Note: G.R - Compound growth rate.
Source: Same as table 3.5.

In terms of growth rate in the number of units as between 1973-74 and 1986-87, the first position was recorded by non-metallic mineral products (11.06 per cent), followed by

transport equipments (9.92 per cent), and machinery and parts (8.25 per cent). Other industry-groups recording growth above the average for the aggregate manufacturing sector included chemical products (8.2 per cent), rubber products (7.78 per cent), textile products (7.72 per cent), cotton textiles (7.17 per cent). wool,silk & jute textiles (6.73 per cent), metal products (6.51 per cent) and electrical machinery (6.1 per cent). A negative growth rate (- 0.33 per cent) in terms of number of units was recorded by only one industry viz. beverage products. On the whole, there was a fair degree of change in the structural composition in terms of number of units. The picture could be different in terms of other variables like capital, employment and value added which has been discussed in detail below.

Capital:

In 1986-87, the total fixed capital invested in the manufacturing sector was Rs 2,40,359 lakhs. As shown in table 3.7a, more than one half of this investment was shared by eight industry-groups viz. (1) chemical products (10.56 percent), (2) cotton textiles (10.06 per cent) (3) transport equipment (6,03), (4) paper products (5.85), (5) machinery & parts (5.71), (6) rubber products (5.34), (7), basic metal products (5.25), (8) food products (4.12). In 1973-74 eleven industries together had accounted for one-half of the total capital investment in the manufacturing sector. It appeared that chemical products and cotton textiles continued to remain to be the largest two industries throughout the period. Also, there did not take place significant shifts in the ranks of different industry groups. In

fact, the correlation between the rank-structure in these two time points was statistically very high. In a broad sense, there did not take place significant structural changes in terms of capital investment within the manufacturing sector during the period of analysis. Some industries such as paper products and leather products showed a notable increase in their shares which was compensated by a significant fall in the shares of machinery and parts, rubber products and food products. A marginal change in ranks can also be found in beverage products, textile products, transport equipment, wool, silk & jute textiles, non-metallic mineral products and basic metal products[6]. Industry groups like, chemical products, cotton textiles, electrical machinery, metal products and wood products have maintained their relative position.

Table 3.7a:

Capital Stock by Major Industry Groups
at Constant (1970-71) Prices

Industry Group	1973-74 (%Share)	1986-87 (%Share)	Rank 1973-74	Rank 1986-87
Food Products	4.68	4.12	5	8
Beverage products	0.34	0.52	15	14
Cotton Textiles	6.70	10.06	2	2
Wool,Silk,Jute Tex.	1.23	0.63	11	13
Textiles Products	0.19	0.42	16	15
Wood Products	0.13	0.06	17	17
Paper Products	3.31	5.85	8	4
Leather Products	0.52	1.39	14	11
Rubber Products	6.53	5.34	3	6
Chemical Products	9.72	10.56	1	1
NonMetallic Product	4.05	3.93	7	9
Basic Metal Product	4.32	5.25	6	7
Metal Products	0.75	1.02	12	12
Machinery & Parts	2.75	5.71	9	5
Electrical Machinery	1.49	1.51	10	10
Transport Equipments	4.87	6.03	4	3
Other Manu. Ind.	0.65	0.27	13	16

Note : Shares are percentages to the total capital stock in the manufacturing sector.
Source: Same as table 3.5.

Over the years, the capital stock (at constant price 1970-71=100) of the manufacturing sector had increased at an annual average rate of 7.8 per cent.(see table 3.7b). All the industry groups other than wood products, food products, wool, silk and jute textiles and non-metallic mineral products, recorded a growth rate above the average for the total manufacturing. Yet, the overall growth was mainly accounted for by the high growth rate of leather products, textiles and machinery and parts (table 3.7b).

Table 3.7b:

Growth Trends in Capital Stock by Major Industry Groups

Industry Group	Growth Rates 1973-74 to 1978-79	1978-79 to 1982-83	1982-83 to 1986-87	1973-74 to 1986-87
Food Products	14.12	-1.95	6.47	6.82
Beverage products	10.03	18.54	5.28	11.19
Cotton Textiles	9.41	15.90	7.87	10.94
Wool,Silk,Jute Textile	-0.7	7.92	1.67	2.68
Textiles Products	21.9	7.50	10.85	14.70
Wood Products	-0.8	13.27	-5.50	2.08
Paper Products	9.11	5.12	23.10	12.19
Leather Products	27.66	6.89	7.29	15.39
Rubber Products	-4.96	12.20	14.35	6.26
Chemical Products	9.14	3.96	12.08	8.45
NonMetallic Products	1.27	11.16	11.90	7.58
Basic Metal Products	11.88	4.73	10.70	9.32
Metal Products	8.94	16.69	5.11	10.15
Machinery & Parts	19.03	11.67	8.19	13.43
Electrical Machinery	2.23	13.41	9.65	7.95
Transport Equipment	3.57	18.56	7.70	9.45
Other Manu. Ind.	1.32	-3.82	5.74	1.10
All Industries	6.01	7.25	10.64	7.81

Note : Growth rates are averages of annual percentage chagnes.

Source: Same as table 3.5.

Individual industry-wise a mixed trend in the growth of capital stock could be seen during the three sub-periods. Industry group such as beverage products, cotton textiles, wood products, metal products, electrical machinery and transport equipment exhibited a notably high growth rate in the second period compared to the first and third period. Food products, textiles, leather products and basic metal products indicated a high growth in the first phase and the growth rate fell down sharply in the second phase and increased marginally in the third phase. Industry groups like, machinery and parts exhibited a continuous decline in growth rate over the three subsequent sub-periods.

An interesting feature that needs to be highlighted in the period-wise analysis is that the leather products which recorded exceptionally high growth rate (27.66 per cent) in the first period declined very sharply in the second and third sub-periods. On the other hand, rubber products which showed a negative growth (-4.96 per cent) in the first period, recorded a significant positive growth of 12.20 per cent and 14.35 per cent respectively in the subsequent sub-periods.

Employment

The factory sector of the State provided employment to more than 8 lakhs persons in 1986-87 compared to 5 lakhs persons in 1973-74. On an average, the factory sector in Tamilnadu could annually provided only 21 thousand addition employment only during the period of analysis. The biggest employer had been the

cotton textiles which absorbed more than 19 per cent of the total factory sector employment. This was followed by food products (13.27 per cent), chemical products (10.47 per cent), and transport equipments (9.69 per cent). These four industries together accounted for nearly 53 per cent of employment in the manufacturing sector during the year 1986-87. (see table 3.8a).

Table 3.8a:

Employment by Major Industry Groups

Industry Group	1973-74 (%Share)	1986-87 (%Share)	Rank 1973-74	Rank 1986-87
Food Products	14.06	13.27	2	2
Beverage products	1.85	1.05	13	15
Cotton Textiles	17.23	19.22	1	1
Wool,Silk,Jute Texti	1.57	1.10	14	14
Textiles Products	1.12	2.75	15	10
Wood Products	0.90	0.60	16	16
Paper Products	4.63	4.27	6	6
Leather Products	2.22	3.66	11	7
Rubber Products	2.35	2.38	10	12
Chemical Products	5.73	10.47	5	3
NonMetallic Products	3.33	3.55	6	8
Basic Metal Products	4.20	3.54	7	9
Metal Products	2.11	1.87	12	13
Machinery & Parts	6.29	8.17	4	5
Electrical Machinery	3.15	2.75	9	10
Transport Equipment	9.79	9.69	3	4
Other Manu. Ind.	0.71	0.51	17	17

Note : Shares are percentages to the total employment in the manufacturing sector.

Source: Same as table 3.5.

In 1973-74, these very four industries namely, cotton textiles (17.23 per cent), food products (14.06 per cent), transport equipments (9.79 per cent), and chemical products (5.73 per cent) together with machinery and parts (6.29 per cent) accounted for 53 per cent of total employment in the manufacturing sector. However, there has been some changes in

the ranks of individual industry-groups. Three industries namely, cotton textiles, leather products and chemical products improved their ranks considerably whereas, eight industry-groups viz., beverage products, rubber products, non-metallic mineral products, basic metal products, metal products, machinery and parts, electrical machinery and transport equipment showed a decline in their relative position. And rest of the five industries maintained their relative ranks. When employment is taken as the relevant parameter, some structural change seemed to have taken place in the manufacturing factory sector of Tamilnadu.

Regarding the growth trends, all industries (except beverage products) showed positive growth rates though the annual average growth rate for the manufacturing sector as a whole was only 3.24 per cent. Seven industry-groups recorded growth rates above the total manufacturing average. These were textile products leather products, chemical products, machinery and parts, cotton textiles non-metallic mineral products, and rubber products. In ten industry-groups the growth rate was below the average for the total manufacturing sector. These were food products, beverage products, wool,silk & jute textiles, wood products, paper products, basic metal products, metal products, electrical machinery, transport equipment and other manufacturing industries.

The period-wise analysis showed that there was a consistently continuous decline in employment in the factory sector as a whole. There were however industry-wise variations.

In none of the industry-groups there was a continuous growth in employment. Four industry groups viz., food products, wool silk and jute, chemical products, and metal products, showed a steady decline whereas in six industry groups viz., beverage products, wood products, non-metallic mineral products, basic metal, electrical machinery and transport equipment a mixed pattern marked by a higher growth in the second period compared to the first and third sub-periods was observed.

Table 3.8b:

Growth Trends in Employment

Industry Group	1973-74 to 1978-79	1978-79 to 1982-83	1982-83 to 1986-87	1973-74 to 1986-87
Food Products	8.65	3.30	-5.04	2.79
Beverage product	0.37	6.98	-11.10	-1.13
Cotton Textiles	7.39	2.97	1.03	4.07
Wool,Silk,Jute	6.88	5.18	-12.21	0.49
Textiles Product	17.06	6.61	5.09	10.16
Wood Products	-4.02	10.44	-4.74	0.21
Paper Products	2.76	1.92	3.08	2.60
Leather Products	10.70	4.54	5.11	7.09
Rubber Products	5.46	1.89	2.12	3.33
Chemical Product	14.60	5.66	1.67	7.87
NonMetallic Prod	3.49	6.92	0.85	3.73
Basic Metal Prod	2.83	6.03	-3.35	1.92
Metal Products	8.17	3.83	-6.63	2.31
Machinery & Part	5.96	5.99	3.64	5.25
Electrical Machi	0.95	6.91	-0.95	2.20
Transport Equipm	-0.54	7.19	3.75	3.16
Other Manu. Ind.	5.80	2.90	-7.96	0.67
All Industries	5.40	3.79	-0.02	3.24

Note: Growth rates are averages of annual percentage chages.

Source: Same as table 3.5.

A striking point that needs to be highlighted is that the industry groups which registered a significantly high growth in the first period showed a sharp decline in the second and

third periods. To illustrate, textiles which recorded annual average growth rate of 17.06 per cent in the first period could record only 6.61 per cent and 5.09 per cent in the second and third periods respectively. A similar pattern was presented by chemical products, leather products and metal products. Yet one more disturbing aspect was that all the industry groups showed a slower growth rate (many industries registered a high negative growth per annum also) in the third sub-period than in the first and second sub-periods in labour absorption.

Value Added:

From the point of view of value-added generation by the manufacturing sector, the important industries in 1986-87 were cotton textiles (16.30 per cent), Chemical products (11.69 per cent), transport equipments (10.68 per cent), machinery and parts (10.23 per cent) and rubber products (8.52 per cent). As shown in table 3.9a, these five industries together accounted for more than one-half (57.42 per cent) of the value added by the total manufacturing sector in 1986-87.

Interestingly, these very five industries together had contributed an equally high proportion (58.69 per cent) of value added in the manufacturing sector in 1973-74. Further, four industry-groups only improved their shares in the total value-added between 1973-74 and 1986-87. There was a fall in the rank of two industries. Other eleven industry-groups only maintained their ranks. The correlation of ranks of the industry groups between the two points in time showed high positive value (99%).

All these would imply that a major structural change did not take place in the industrial structure in terms of value added in Tamilnadu during the period of analysis.

Table 3.9a:

Value Added by Major Industry-Groups at constant (1970-71) price

Industry Group	Percentage share in total Value Added 1973-74	1986-87	Rank 1973-74	1986-87
Food Products	5.91	8.40	6	6
Beverage products	0.80	0.98	13	13
Cotton Textiles	18.22	16.30	1	1
Wool,Silk,Jute Texti	0.68	0.51	15	16
Textiles Products	0.72	0.86	14	14
Wood Products	0.37	0.15	17	17
Paper Products	5.60	4.76	7	7
Leather Products	1.33	1.60	12	10
Rubber Products	7.20	8.52	5	5
Chemical Products	9.99	11.69	3	2
NonMetallic Products	3.66	4.19	9	9
Basic Metal Products	3.17	2.05	10	10
Metal Products	2.08	1.50	11	11
Machinery & Parts	9.93	10.23	4	4
Electrical Machinery	4.83	4.76	8	7
Transport Equipment	13.35	10.68	2	3
Other Manu. Ind.	0.51	0.85	16	15

Note: Growth rates are averages of annual percentage changes.

Source: Same as table 3.5

Over the years, the value added at constant price (1970-71=100) had increased at an average rate of 6.32 per cent per annum. Regarding the industry-wise analysis all industry-groups (except wood products) accounted for a positive growth in value added during the study period. The value added generated by food products registered the highest growth rate of 9.08 per cent per annum which was remarkably above the aggregate

manufacturing figure of 6.32 per cent. A remarkably high growth rate (above the average of the total manufacturing sector) was recorded by nine industry-groups namely, other manufacturing industries, food products, beverage products, leather products, textile products, rubber products, chemical products, non-metallic mineral products, and machinery & parts. In eight industry-groups the growth rates were below the average of the total manufacturing sector. These are, cotton textiles, wool, silk & jute textiles, wood products, paper products, basic metal products, metal products, electrical machinery and transport equipment.

Table 3.9b:

Value Added by Major Industry-Groups

Industry Group	Growth Rates 1973-74 to 1978-79	78-79 to 82-83	82-83 to 86-87	73-74 to 86-87
Food Products	16.63	4.32	4.41	9.08
Beverage products	5.93	18.33	-0.08	7.89
Cotton Textiles	7.91	-1.92	9.98	5.52
Wool,Silk,Jute Texti	11.32	-7.97	-3.02	0.97
Textiles Products	7.31	4.21	11.82	7.75
Wood Products	-5.31	8.47	-2.83	-0.30
Paper Products	1.63	0.00	14.32	5.13
Leather Products	16.48	5.08	-0.44	7.77
Rubber Products	-2.11	10.46	17.12	7.68
Chemical Products	14.52	7.39	-0.87	7.59
NonMetallic Products	6.32	12.00	4.22	7.42
Basic Metal Products	17.32	-9.85	-1.92	3.04
Metal Products	5.53	8.23	-2.03	3.85
Machinery & Parts	8.95	3.34	6.96	6.61
Electrical Machinery	4.45	8.81	5.99	6.27
Transport Equipment	2.50	10.34	1.69	4.66
Other Manu. Ind.	15.17	8.03	6.48	10.30
All Industries	9.66	3.67	4.99	6.32

Note: Growth rates are averages of annual percentage changes.

Source: Same as table 3.5.

The period-wise estimation of growth rate of value added for total manufacturing showed that the first sub-period was marked by a period of acceleration followed by deceleration (2nd sub-period) and recovery (3rd sub-period). The broad pattern that was observed for the total manufacturing can also be seen in industries like basic metal, food products, wool, silk, jute textiles, cotton textiles, textile products and paper products. In the first sub-period along with the high growth rate of total manufacturing, industry-groups like, basic-metal products, food products, leather products, chemical products, wool, silk and jute textiles also recorded a high growth rate of above 10 per cent. Leather products and chemical products showed a continuous decline in growth rates. In contrast, rubber products showed a continuous rise in growth rates during the subsequent three sub-periods, while paper product exhibited a very high growth in the third phase alone.

In the second phase, though the growth rate of the aggregate manufacturing sector declined, industry-groups such as beverage products, wood products, non-metallic mineral products, electrical machinery, metal products and transport equipment witnessed a high growth rate of 10 to 18 per cent per annum, which was remarkably above the aggregate manufacturing average of 4 per cent per annum during this period. A feature that needs to be highlighted here is the growth rate of wool, silk and jute textiles which was quite high (11.32 per cent) in the first phase, sharply declined to -7.97 per cent (lowest) in the second phase, in contrast, the growth rate of rubber products which was

-2.11 per cent (lowest) in the first phase increased to 10.46 per cent in the second phase and further increased to 17.12 per cent in the third phase. On an average the growth rate of value added in the factory sector has relatively declined in the second phase when compared to phase I and III.

Thus, we observe differential trends in value added, employment and fixed capital across industries. When we examine the trends of these indicator by relating one with other, certain interesting findings are observed. The relationship between growth rates of value added and employment (see table 3.10) indicates that a significant positive association is found between a large number of industry groups such as, wool, silk & jute textiles, wood products, textile products basic metal and alloy products, paper products, metal products, rubber products, non-metallic mineral products and machinery and parts. However, in industry groups such as beverage products, electrical machinery and food products the growth in value added is greater than that of employment and in industry groups such as cotton textiles, transport equipment, textile and leather products growth rate in employment is greater than that of value added. Though food products registered highest growth in value added, the employment did not grow with same pace. In contrast, cotton textiles and transport equipment accounted for a higher growth rates in employment and a low growth in value added.

Table 3.10

Relationship Between Growth Rates of Value Added and Employment

		Growth in Value Added		
		<6	6-9	>9
Growth in Employment	<3	Paper products Wood products, Basic metal Wool, silk & Jute Textiles and Metal products	Beverage products and electrical machinery	Food products and Other Mfg. Ind
	3-6	Cotton textiles and Transport equipment	Machinery & parts Rubber products and Non-metallic products	
	>6		Chemical products Textile products Leather products	

Source: Table 3.8b and 3.9b.

Similarly, growth rate of value added and that of capital stock (see table 3.11) were found to be significantly associated in the industry groups like jute, wool & silk textiles, wood products and chemical products. In industry groups, such as food products, rubber products, non-metallic mineral products and electrical machinery and parts, the growth in value added was higher than that of capital and in all other industry group particularly in paper products the relationship was in other way i.e., the capital grew faster than the value added.

Table 3.11

Relationship Between Growth Rates of Value Added and Fixed Capital

Growth in Capital Stock	Growth in Value Added: <6	Growth in Value Added: 6-9	Growth in Value Added: >9
<8	Wood products and Jute, wool & silk	Rubber products, Non-metallic Products and electrical machinery	Food products and Other mfg.ind.
8-12	Basic metal, Cotton textiles, Metal products and Transport equipment	Chemical products	
>12	Paper products	Leather products, Machinery & parts Beverage and Textile products	

Source: Table 3.7b and 3.9b.

From the above discussion, the following can be observed:

(i) There is a steady increase in the State Domestic Product.

(ii) Of the changes in sectoral composition of SDP there is a decline in the share of primary sector, a moderate rise in the share of the secondary sector and a continuous increase in the share of the tertiary sector.

(iii) The growth in secondary sector is contributed by the increase in the value added generated by manufacturing sector, whereas the share of construction has come down and that of electricity etc. remained stagnant.

(iv) The growth of the manufacturing sector is mainly contributed by the growth in the registered segment.

(v) The growth rates in employment and capital employed indicated that the industrialisation in the state is capital deepening.

(vi) The industry-wise analysis at two digit level of disaggregation indicated differential growth pattern in terms of value added, employment and capital stock across industries and also over time.

Thus, though changes in the structure and growth pattern in the industrial sector of the state is highlighted, what has been neglected is the productivity trends of the manufacturing sector, which we shall discuss in the next chapter.

Notes

1. Ishikawa S. (1987) p 523.

2. dealt empirically by Clark (1940), Kuznets (1971 and 1972), Taylor (1969), Chenery (1979 & 1989) Chenery et al. (1975 & 1986) and Batchelor et al. (1980) for a cross-section of countries and over a historic period of time.

3. Ashok Mitra (1988), Arup Mitra (1989), Panchmukhi, Mambiar and Mehta (1986) and others.

4. Arup Mitra (1989), p 4.

5. Time series by definition contains four components such as trend, seasonal cyclical and irregular. Since the given time series is an annual series, the seasonal component gets canceled out. By fitting trend for the given series using semi-log function, we computed trend values, and then subtracted trend values form the given time series, in order to arrive at the residuals. The residuals has cyclical and irregular components. By assuming that random component (irregular component) follows normal distribution with mean zero and variance one. The residuals has been plotted in a graph to identify whether the given time series has strong element of cycle or not. If so, it also help in understanding phases and length of the cycle. Following this methodology, we have analysed the behaviour of time series of the real value added by the registered manufacturing sector of Tamilnadu and found that it clearly follows three distinct phases and accordingly periodisation has been made.

6. first three increased their positions while the remaining decreased in their relative positions in 1986-87 compared to 1973-74.

Chapter IV

TRENDS IN PRODUCTIVITY

Introduction

An important feature that emerged inter alia from the analysis of the growth and structural transformation of the industrial economy of Tamilnadu, is an ongoing process of capital deepening in the recent period. In the context of the need for economising scarce factors (e.g. capital) and putting to effective use, the relatively more abundant factors (e.g. labour) in the industrialisation efforts of a developing region, this phenomenon has to be seen with concern. Viewed in this perspective, an understanding of the efficiency with which manufacturing industries have utilised the resources[1] and of the sources of output growth, is analytically important. The next logical step in our study, therefore, lies in examining the trends in factor productivity and sources of growth in the manufacturing industries of Tamilnadu. This is what is attempted in this chapter.

Productivity is commonly defined as the ratio of output to input reflecting efficiency in factor-use. It is seen in terms of either partial factor productivity or total factor productivity. Partial productivity reflects the efficiency with which a particular input is employed in the production process keeping other factors constant. In other words, the ratio of

output to a particular input, say labour, is called labour productivity. Other things remaining same, this is a measure of the efficiency in the use of labour in terms of its contribution to output (income). Similarly, capital productivity can be measured by taking the ratio of output to capital given the stock of labour.

Obviously, an analysis of factor productivity and factor-use efficiency is carried out in a production function approach which seeks to explain growth in manufacturing income in terms of the contribution of various factor inputs. The efficiency of factor-use is sought to be understood in the productivity analysis by using the total factor productivity growth analysis. In the analytic of Total Factor Productivity (TFP), the total output is the outcome of the play of a weighted composition of all the inputs used in the production process so that one can differentiate the contribution of labour (wages), capital (profit) and the residual representing "technology".

This chapter has looked into the trends in Partial Productivity Growth as well as the Total Factor Productivity Growth in the registered manufacturing sector of Tamilnadu during the study period: 1973-74 to 1986-87. As in the previous chapters, the 14 year-period is divided into three sub-periods viz., (a) 1973-74 to 1978-79, (b) 1978-79 to 1982-83 and (c) 1982-83 to 1986-87. The growth rates estimated for these sub-periods are the averages of annual percentage changes. The chapter is divided into four sections. In section I, the trends in partial productivities (i.e., labour productivity and capital

productivity) and capital intensities are discussed. Section II deals with the determinants of the partial productivities, particularly, labour productivity. This is followed in Section III by a discussion of the Total Factor Productivity Growth of the manufacturing sector in Tamilnadu. Finally, section VI deals with the contribution of factors [i.e., labour, capital and the residual (technology) contribution] to the growth in value added (income) by the factory manufacturing sector.

Section I

Trends in Partial Productivities

The partial productivity indices used in the study are labour productivity and capital productivity. Labour productivity is measured as the ratio of gross value added to number of employees (V/L) and capital productivity is measured as the ratio of gross value added to gross capital stock (V/K). Another ratio that is used is capital intensity which is measured as the ratio of gross capital to the number of employees (K/L).

Aggregate Manufacturing

At the outset, we propose to discuss the growth pattern in partial productivities and capital intensities of the factory manufacturing sector as a whole. One finds from table 4.1 that labour productivity has been registering an average increase of 3.14 per cent per year during the period from 1973-74 to 1986-87. In striking contrast, during the same period, there has been a fall of 1.44 per cent in the corresponding growth rate of capital

productivity. Growth in capital intensity averaged about 5 per cent per annum during the same period.

Table 4.1

Trends in Partial Productivity Growth

	Labour Productivity V/L	Capital Productivity V/K	Capital Intensity K/L
Period I 73-74 78-79	4.26	3.65	0.61
Period II 78-79 82-83	-0.13	-3.58	3.46
Period III 82-83 86-87	5.02	-5.64	10.66
Total 73-74 86-87	3.14	-1.44	4.58

Note: Growth rates are average of annual percentage changes.

Source: Same as table 3.5.

Estimates for the sub-periods revealed marked inter-temporal differences in the growth rates. A mixed trend could be observed in the case of labour productivity which grew at the average annual rate of 4.26 per cent during the first period (1973-74 to 1978-79) and fell at the average annual rate of (-) 0.13 per cent during the second period (1978-79 to 1982-83) and sharply increased to 5.02 per cent in the third period (1982-83 to 1986-87). The trend in partial labour productivity roughly followed the pattern in the output growth trends in the sense that the period of deceleration in the output growth coincided with the period of declining trend in labour productivity. A possible inference that could be drawn from this trend is that

the deceleration in output growth may have been largely contributed by a fall in the labour productivity.

In variance with the trends in labour productivity, the average annual growth rate in capital productivity showed a continuous decline (3.65 per cent in the first period to -3.58 per cent in the second period and further to -5.64 per cent per annum in the third period). There was correspondingly an upward movement in the average annual rate of growth of capital intensity (K/L) in the succeeding sub-periods. The decline in the partial productivity of capital taken together with the rise in the partial productivity of labour indicates that the rate of increase in capital-stock has been proportionately higher than that of the value added, while the trend has not been so with respect to labour. Implicitly, this also refers to the capital-intensive nature of the growth process of the manufacturing sector. This trend was pronounced during the third sub-period (1982-83 to 1986-87) which was a period of acceleration in output growth. The increase in capital intensity during this period was three times more than the increase in the second period and more than ten times that of the first period.

Industry-wise Analysis

We now proceed to review the trends in partial productivities in major industries at two-digit level of dis-aggregation. For the purpose of this analysis, we have taken into consideration, 17 major industry groups. This would enable us to observe whether the overall pattern of growth in partial

productivities is confined to a few industries or a group of industries or whether it is uniformly across the board. The trends in the partial factor productivities for industry-groups are traced in table 4.2.

Table 4.2

Partial Productivity Growth : Industry Wise Estimation:

Industry Groups	Labour Productivity				Capital Productivity				Capital Intensity			
	73-74 to 78-79	78-79 to 82-83	82-83 to 86-87	73-74 to 86-87	73-74 to 78-79	78-79 to 82-83	82-83 to 86-87	73-74 to 86-87	73-74 to 78-79	78-79 to 82-83	82-83 to 86-87	73-74 to 86-87
Food Products	7.99	1.02	9.45	6.29	2.51	6.27	-2.06	2.26	5.48	-5.26	11.52	4.03
Beverage Products	5.56	11.35	11.01	9.02	-4.10	-0.21	-5.37	-3.29	9.66	11.56	16.38	12.31
Cotton Textiles	0.52	-4.89	8.96	1.45	-1.50	-17.82	2.11	-5.41	2.02	12.93	6.85	6.86
Wool,Silk,Jute Tex	4.44	-13.15	9.19	0.49	12.02	-15.88	-4.69	-1.71	-7.58	2.74	13.88	2.20
Textiles Products	-9.75	-2.40	6.73	-2.42	-14.58	-3.29	0.97	-6.32	4.84	0.89	5.76	3.91
Wood Products	-1.29	-1.96	1.90	-0.51	-4.51	-4.80	2.67	-2.39	3.22	2.83	-0.77	1.87
Paper Products	-1.13	1.60	11.24	2.53	-7.49	-4.80	-8.77	-7.06	6.36	3.20	20.01	9.59
Leather Products	5.79	0.54	-5.55	0.68	-12.17	-1.81	-7.73	-7.62	17.96	2.35	2.18	8.30
Rubber Products	-7.57	8.57	15.00	4.34	2.85	-1.74	2.78	1.42	-10.42	10.31	12.22	2.93
Chemical Products	-0.08	1.73	-2.54	-0.28	5.38	3.43	-12.95	-0.86	-5.46	-1.70	10.41	0.58
NonMetallic Products	2.80	5.07	3.37	3.69	5.05	0.04	-7.68	-0.16	-2.22	4.23	11.05	3.85
Basic Metal Products	14.49	-15.88	1.43	1.12	5.44	-14.58	-12.62	-6.28	9.05	-1.30	14.05	7.40
Metal Products	-2.64	4.40	3.90	1.54	-3.41	-8.46	-7.74	-6.30	0.77	12.86	11.64	7.84
Machinery & Parts	2.99	-2.65	3.32	1.36	-10.08	-8.33	-1.23	-6.82	13.07	5.68	4.55	8.18
Electrical Machinery	3.50	1.90	6.94	4.07	2.22	-4.59	-3.66	-1.69	1.28	6.50	10.60	5.75
Transport Equipment	3.04	3.15	-2.06	1.50	-1.07	-8.22	-6.01	-4.79	4.11	11.37	3.95	6.29
Other Manu. Ind.	9.37	5.13	14.44	9.62	13.85	11.85	0.74	9.20	-4.49	-6.72	13.70	0.42
All Industries	4.26	-0.13	5.02	3.14	3.65	-3.58	-5.64	-1.44	0.61	3.46	10.66	4.58

Note: Growth rates are averages of annual percentage changes.

Source: Same as table 3.5.

It appears that the overall increase in the labour productivity is mainly contributed by the above average annual growth in a few industries like beverage products, food products, rubber products, electrical machinery, chemical products, non-metallic products and other manufacturing industries. In most of the other industries, the rate of

increase in the labour productivity has been marginal, and in two industry-groups (namely textile products and wood products), the growth rate has been negative for the period under study as a whole.

The period-wise analysis indicates that individual industry-groups behaved differently during different periods. The only exception to this continuous decline in labour productivity was that of leather products. Another interesting facet is that, a negative growth rate in labour productivity was found only in three industry groups during the third sub-period when the overall output growth has been the highest. In a relatively large number (six) of industry-groups, labour productivity showed a negative growth rate of higher magnitude during the second period when the overall output growth was marked by deceleration. When the information in table 4.1 is read along with the data on the output growth of individual industry-groups (see table 3.9b of the previous chapter), it appears that most industries which recorded negative growth rate in output are the ones which also witnessed negative growth rates in partial labour productivity. It, therefore, seems reasonable to infer that the trends in the output growth is largely influenced by the trends in labour productivity in industry-groups in Tamilnadu.

The industry-wise estimation of growth in partial capital productivity showed that all the industry groups (except food products, rubber products and other manufacturing industries) recorded negative growth rate during the period

1973-74 to 1986-87. The estimated growth in capital productivity for the sub-periods revealed that individual industry-groups showed a mixed trend during the three sub-periods. Machinery and parts registered a continuous increase, in contrast, other manufacturing industries recorded a continuous decline in capital productivity growth in the subsequent sub-periods. A comparison of table 3.7b cited in the earlier chapter with that of table 4.2 reveals that the rate of growth of capital stock and partial productivity growth rate are inversely related. In almost all the industry-groups where the growth rate of capital was found to be positive and high, the growth rate of capital productivity was very low and negative.

The ratio of capital to employees i.e., capital intensity showed that there was a continuous rise in the growth rate of capital investment in the total manufacturing sector. A significant positive growth rate was registered by almost all the industries and a marginal growth of less than one per cent per year was recorded by chemical products and other manufacturing industries. This would suggest that apart from chemical products and other manufacturing industries in all other industry-groups, the capital investment increased and labour absorbtion declined. It also suggests that the growth rate of labour is relatively low compared to the growth rate of capital which resulted in the negative growth rate of capital productivity. Though the overall growth of capital intensity showed a continuous increasing trend, the industry-wise estimates recorded a mixed trend in the sub-periods. It is interesting to note the trends in the movements of machinery and parts industry, which revealed a continuous

decrease in the growth of capital intensity. In contrast, beverage products registered a continuous increase in the three sub-periods.

The high growth rate of capital intensity implies that capital deepening process is taking place in the industrial economy of Tamilnadu which is more pronounced in the third sub-period. During this period, eleven industries exhibited a significant growth of ten to twenty percent which was above the average growth of the total manufacturing sector. From the above analysis, it is clear that the production process of the manufacturing sector tends to be more capital-intensive. A preliminary comparison of the trend growth rates of labour productivity, capital intensity and capital productivity indicates that capital intensity has grown at a more rapid rate than labour productivity resulting in a declining trend in capital productivity.

So far, we have documented the progress of the industrial sector of Tamilnadu with respect to some crucial indicators of performance. These relates to the growth of factor productivity and capital intensity of investment. Each of the factor productivities have revealed varying trends during the study period, with a better performance on the part of labour productivity particularly during the third sub-period. The increase in labour productivity can be attributed to capital deepening.

Growth rate of productivity of capital registered a continuous decline in the three sub-periods resulting from the high growth rate of capital investments. The first sub-period (1973-74 to 1986-87) represents the period of acceleration. In this period, the growth rate of labour productivity and capital productivity was high and the growth of capital intensity was minimal which resulted in a high growth rate of output. Even though the labour productivity was relatively high in the third sub-period, the relatively lower growth of output in this period could be the result of the negative growth of capital productivity.

We may, therefore note with some qualification that the growth in output (value added) of the manufacturing sector resulting from improved productivity has generally accrued from labour, when productivity of capital was declining. The qualification here is that factor productivity does not constitute the sole reason for the growth in output, which can also partly result from aggregate increases in factor inputs (while not necessarily improving productivity) and partly for technological reasons.

Section II

Determinants of Partial Productivities

Having looked at the trends in partial productivies, we move on to the determinants of partial productivities. We observed that the trend in partial labour productivity was more or less in consonance with that of the pattern observed in output

growth. The recovery in the third phase (1982-83 to 1986-87) in output growth was mainly due to the better performance on the part of labour productivity, which is one of the crucial indicator of industrial performance. Therefore, this section is devoted to examine the factors that determine the growth in partial productivity in general and labour productivity in particular.

Determinants of Labour Productivity Growth

Several hypotheses have been advanced to explain the productivity differences over time and among industries. "Verdoorn's Law", suggests a positive linear relationship between productivity growth (p) and output growth (q). Mathematically,

$$p = \alpha + \beta q \; ; \; \beta > 0$$

where α and β are constants.

Melman (1956) suggests three inter-related hypothesis regarding changes in labour productivity. Following are the three hypotheses, (1) the degree of mechanization of industrial work is controlled by the ratio of alternative labour cost to machine cost (2) labour productivity is governed by the degree of mechanization and (3) growth of administrative overheads in industrial firms has limited effect on raising labour productivity. He found that the ratio of alternative labour cost to machine cost has risen over time in several industrial countries and the size of the ratio determines the prevailing levels of mechanization. As the relative cost of labour increases, a firm substitutes machines for labour. He also observed a positive relationship between mechanization and labour

productivity and growth of administrative overheads and rise in productivity. Hirschman (1958) puts forth the hypothesis that labour productivity is more in capital intensive than in labour intensive industries.

Taking into consideration the availability of relevant data, we confine in our empirical analysis to four[2] variables viz.: (1) output growth (value added) (2) capital intensity, (3) wage rate and (4) pattern of employment. This analysis is carried out in two different stages. In the first stage, each variable is analysed independently using simple regression models assuming 'ceteris paribus'. In the second stage, multiple regression models are utilised to disentangle the influence of the explanatory variables on productivity differentials.

(1) Output Growth:

In order to test the empirical validity of Verdoon's law in the context of the manufacturing industries in Tamilnadu, the following simple linear regression equation is fitted by the method of Ordinary Least Square (OLS).

$$pt = \alpha\, qt + vt,$$

where pt and qt are the average annual growth rates of labour productivity and output. The results of the regressions are presented in Table 4.3. The estimated values of all the regression coefficients are positive and highly significant in the case of total manufacturing and the major industry-groups except beverage products, wood products and metal products. Prima facie, this evidence is in line with the Verdoorn's law.

Table 4.3

Summary Results of Regression Analysis of Labour Productivity on Output

Industry group	Intercept	Regression Coefficient	R^2	D-W Stat
Food Pro	-2.39	1.00 * (0.17)	0.75	1.26
Beverage pro	13.36	-0.02 (0.06)	0.01	2.88
Cotton Tex	-4.15	1.05 * (0.09)	0.92	2.25
Wool,Silk&Jute	-0.49	0.52 * (0.07)	0.85	2.35
Textile Pro	-8.42	0.95 * (0.18)	0.67	2.47
Wood Pro	3.75	0.89 (0.55)	0.19	2.47
Paper Pro	-1.92	0.79 * (0.06)	0.95	2.77
Leather Pro	-4.44	0.61 * (0.14)	0.65	2.61
Rubber Pro	-2.81	0.98 * (0.02)	0.99	2.01
Chemical Pro	-6.57	0.84 * (0.18)	0.64	1.58
Non-Metallic Pro	-2.82	0.97 * (0.22)	0.65	2.17
Basic Metal	7.29	1.06 * (0.23)	0.67	2.93
Metal Pro	0.92	0.89 (0.34)	0.06	2.77
Machinery&Parts	-4.60	0.99 * (0.16)	0.78	2.60
Elec Machy	0.77	0.53 * (0.15)	0.51	2.81
Trans.Equip	-2.12	0.98 * (0.32)	0.45	1.88
Total	3.30	1.02 * (0.21)	0.67	2.21

Note: Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

A comparative analysis of the trend growth rates of value added, employment, and labour productivity (table 4.2 and table 3.) reveals that value added has grown at a much faster rate than employment resulting in an increase in labour productivity. The continuous decline in the growth rate of employment in the manufacturing sector is suggestive of the fact that the capacity of this sector to generate direct new employment opportunities is predictably very low. This fact causes serious concern for the process of development and the strategies that have been followed.

(2) Capital Intensity:

Capital intensity has been identified as an other important determinant of labour productivity. It is often held to represent the technical level of the method of manufacture. The relationship between capital intensity and labour productivity is given by the equation:

$$V/L = K/L * V/K \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Differentiating the above equation totally and further dividing by V/L

$$\frac{d(V/L)}{(V/L)} = \frac{d(K/L)}{(K/L)} + \frac{d(V/K)}{(V/K)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

According to equation (1), average labour productivity is the product of capital-labour ratio and average productivity of capital. Alternatively, equation (2) shows that the growth rate of labour productivity is the sum of the growth rates of capital labour ratio and growth rate of average capital productivity. Thus, labour productivity would rise if both the variables are rising and it would decline if both are declining. In case, one

of these variables is rising and the other is falling, the magnitude and direction of growth of labour productivity would depend upon the algebraic sum of the growth rates of capital labour ratio and the capital productivity ratio.

In the preceding section (Section I), we have discussed that the trend growth rate of capital intensity is higher than that of labour productivity, implying that the increase in labour productivity is achieved mostly through capital-deepening. With a view to get a more precise picture of the nature and extent of the relationship between labour productivity and capital intensity, the following two simple regression models are estimated using the OLS method.

Model-I $P^L_t = \alpha_0 + \alpha_1 It + Ut$

Model-II $\ln(P_t^L) = \ln(\alpha_0) + \ln(\alpha_1 It) + Vt$

where P^L_t = (Vt/Lt), It = (Kt/Lt), Ut and Vt are error term.

The results of the regression analysis are given in Table 4.4. The estimated regression coefficients associated with Model-I and Model-II are positive and statistically significant for the manufacturing sector as a whole and most of its individual industry groups. For certain individual industry-group viz; wool, silk and jute textiles, leather products, chemical products, basic metal products, electrical machinery products and transport equipments, the estimated regression coefficients were not statistically significant for both the models. In wood products, the regression coefficients were significant in the second model but not in the first model. Thus, it would imply that capital intensity has been a major

Table 4.4

Summary Results of Regression Analysis of Labour Productivity on Capital Intensity

Industry Group	Model I Intercept	Reg Coeff		R^2	D-W Stat	Model II Inter cept	Reg Coeff		R^2	D-W Stat
Food Pro	-1669.09	0.86 (1.82)	*	0.87	1.82	-4.38	1.44 (0.18)	*	0.84	1.66
Beverage pro	1486.55	0.52 (0.08)	*	0.76	1.77	3.57	0.56 (0.11)	*	0.68	1.76
Cotton Tex	4375.40	0.20 (0.09)	*	0.29	1.16	5.83	0.32 (0.14)	*	0.30	1.13
Wool,Silk&Jut	6143.63	-0.03 (0.15)		0.00	1.98	10.96	-0.25 (0.39)		0.03	1.99
Textile Pro	2674.73	-0.70 (0.36)		0.00	1.80	8.15	-0.04 (0.42)		0.00	1.95
Wood Pro	-1766.29	0.23 (0.14)		0.19	2.19	4.29	0.44 (0.12)	*	0.49	1.83
Paper Pro	6634.85	0.05 (0.03)		0.14	1.40	8.13	0.08 (0.09)		0.06	1.53
Leather Pro	4615.94	-0.02 (0.09)		0.00	1.22	8.23	0.02 (0.14)		0.00	1.22
Rubber Pro	9056.20	0.28 (0.14)	**	0.24	2.10	4.72	0.53 (0.32)		0.12	2.08
Chemical Pro	11115.52	-0.04 (0.07)		-0.05	1.15	10.39	-0.12 (0.19)		0.30	1.04
Non-Metallic P	1662.77	0.32 (0.07)	*	0.65	2.07	0.85	0.82 (0.19)	*	0.60	2.05
Basic Metal	5134.27	-0.01 (0.04)		0.00	1.80	7.30	0.12 (0.27)		0.01	1.87
Metal Pro	5045.26	0.16 (0.04)	*	0.58	2.18	6.82	0.22 (0.06)	*	0.53	2.06
Machinery&Par	9002.42	0.21 (0.15)		0.14	1.59	7.09	0.24 (0.16)		0.15	1.59
Elec Machy	3933.30	0.84 (0.09)	*	0.88	0.87	3.03	0.69 (0.09)	*	0.33	0.90
Trans.Equip	7983.15	0.13 (0.11)		0.11	1.66	7.46	0.18 (0.13)		0.14	1.70
Total	3032.56	0.24 (0.04)	*	0.79	1.74	2.79	0.62 (0.10)	*	0.77	1.65

Note: Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

source of temporal variations in labour productivity. Further, the growth of labour productivity in the manufacturing sector and most of its industry groups, is mainly accounted for by the process of capital deepening. In the first model, the variables are expressed in absolute terms, where as in the second model, they are expressed in terms of logarithmic form in which the regression coefficient gives the elasticity of labour productivity with respect to capital intensitity. Our result reveals that for a one unit change in capital intensity, there is change of 0.62 unit in labour productivity for the total manufacturing sector.

(3) Wage Rate

If one accepts the view that wage rate is largely exogenous and is determined by institutional factors, it can be argued that increase in wage rates, given other factors, will increase labour productivity as labour is better provided. An increase in wage rate, relative to the price of capital, induces substitution of capital for labour, which in turn may lead to increase in capital intensity and hence, labour productivity. If the possibility of capital-labour substitution is limited due to institutional or technological rigidities and if the product prices are determined exogenously, an indiscriminate rise in wages may tend to push up costs, especially, in those industries where wages form an important component of total cost. It may lead to a reduction in the scale or size of operation and in turn adversely affect growth of labour productivity.

In order to examine the relationship between labour productivity and wage rate, the following two simple regression models are estimated using the OLS method.

Model-I $P^L_t = \alpha_0 + \alpha_1 Wt + Ut$

Model-II $\ln(P^L_t) = \ln(\alpha_0) + \ln(\alpha_1 Wt) + Vt$

where $P^L_t = (Vt/Lt)$, Wt = Wage rate, Ut and Vt are error terms.

The regression results are presented in Table 4.5. The estimated regression coefficients are found to be positive and statistically significant in the case of total manufacturing and in most of its sub groups in case of both the models. But in industry groups such as paper products, non metallic mineral products and electrical machinery products, the regression coefficients are not statistically significant for both the models and it was not significant in the case of paper products and rubber products for the first and second model respectively.

Table 4.5

Summary Results of Regression Analysis of Labour Productivity on Wage Rate

Industry Group	Model I Inter cept	Reg Coeff	R^2	D-W Stat	Model II Inter cept	Reg Coeff	R^2	D-W Stat
Food Pro	-1222.33	4.04 * (0.44)	0.88	2.20	-1.15	1.31 * (0.14)	0.88	1.96
Beverage pro	-6044.69	6.03 * (0.83)	0.82	1.65	-7.11	2.07 * (0.27)	0.83	1.68
Cotton Tex	1073.08	1.28 * (0.48)	0.37	1.29	2.21	0.78 * (0.34)	0.31	1.26
Wool,Silk&Jut	-801.00	1.88 (0.69)	0.38	1.51	-4.76	1.64 * (0.48)	0.50	1.43
Textile Pro	-1307.60	3.32 * (0.62)	0.70	1.58	-2.10	1.41 (0.29)	0.67	1.75
Wood Pro	613.13	1.28 * (0.21)	0.75	1.11	2.18	0.77 * (0.09)	0.86	0.93
Paper Pro	2668.99	1.64 (1.03)	0.17	1.84	4.94	0.50 (0.37)	0.13	1.83
Leather Pro	-1066.00	3.06 * (0.84)	0.52	1.51	-0.62	1.20 * (6.33)	0.52	1.55
Rubber Pro	-20776	8.41 * (3.90)	0.28	2.05	-5.39	1.79 (1.03)	0.13	2.09
Chemical Pro	2534.31	2.73 * (0.77)	0.47	1.35	2.56	0.84 * (0.23)	0.53	1.33
Non-Metallic	2840.04	1.75 (1.23)	0.14	0.83	4.01	0.62 (0.40)	0.17	0.89
Basic Metal	-1760.68	2.48 * (.89)	0.39	2.16	0.11	1.05 * (0.43)	0.33	1.95
Metal Pro	1004.38	1.75 * (.53)	0.48	2.09	2.13	0.82 * (0.26)	0.46	2.05
Machinery&Par	4308.38	1.64 (1.76)	0.07	1.90	3.07	0.75 (0.68)	0.09	1.93
Elec Machy	-3549.26	3.14 * (0.42)	0.82	3.06	-1.59	1.29 * (0.15)	0.86	3.03
Trans.Equip	-859.67	2.03 * (0.33)	0.75	2.14	-0.16	1.09 (0.17)	0.77	2.16
Total	-608.86	2.51 * (0.45)	0.72	1.93	0.36	1.06 * (0.19)	0.72	2.01

Note: Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

(4) Pattern of Employment:

The relationship between labour productivity and pattern of employment, measured as the ratio of non-production workers to production process workers, is examined by estimating the following regression equations;

Model-I $P^L_t = \alpha_0 + \alpha_1 Et + Ut$

Model-II $\ln(P^L_t) = \ln(\alpha_0) + \ln(\alpha_1 Et) + Vt$

where $P^L_t = (Vt/Lt)$, Et = Pattern of Employment, Ut and Vt are error terms. The results are presented in table 4.6.

It is evident from the table that the estimated values of the regression coefficients are not statistically significant for the aggregate manufacturing sector and for most of its individual industry-groups. The results were found to be significant only in few industry groups such as cotton textile products, jute, silk & wool textiles and wood products. But the overall goodness of fit was satisfactory only in wood products and not in the other two industry-groups. Such an indifferent relationship between labour productivity and pattern of employment may perhaps be due to the crude index employed by us or to the existence of non-linear relationship between the two variables.

Table 4.6

Summary Results of Regression Analysis of Labour Productivity on Pattern of Employment

Industry Group	Model I Inter cept	Reg Coeff	R^2	D-W Stat	Model II Inter cept	Reg Coeff	R^2	D-W Stat
Food Pro	5453.71	-7484.3 (10943.15)	0.03	0.26	7.68	-0.33 (0.65)	0.02	0.35
Beverage pro	7295.09	-9698.5 (12214.80)	0.05	0.58	8.3	-0.1 (0.47)	0	0.46
Cotton Tex	14593.72	-77958. ** (42981.26)	0.22	1.15	5.47	-1.45 * (0.79)	0.22	1.1
Wool,Silk&Ju	14070	-611.96 * (24687)	0.39	1.46	4.72	-1.94 * (0.77)	0.35	1.58
Textile Pro	1119.75	8485.93 (6392.67)	0.13	1.54	8.59	0.43 "(0.35)	0.25	2
Wood Pro	2702.4	-1049.0 * (179.18)	0.74	1.23	7.29	-0.33 * (0.05)	0.76	0.87
Paper Pro	6055.53	4918.35 (0.88)	0.06	1.47	9.25	0.27 (.24)	0.1	1.54
Leather Pro	5059.34	-3412.5 (8758.45)	0.01	1.3	8.16	-0.13 (.33)	0.01	1.32
Rubber Pro	35392.86	-45352. (59916.8)	0.04	1.92	9.28	-0.49 (1.01)	-0.06	1.89
Chemical Pro	7178.79	14140.4 (20953.2)	-0.0	1.46	9.73	0.33 (0.46)	0.4	1.38
Non-Metallic	-9040.97	6636.6 (31034.63)	0.28	0.58	11.8	2.11 * (0.90)	0.31	0.7
Basic Metal	9301.7	-14649. (28917.45)	0.02	1.7	6.4	-1.63 (2.27)	0.04	1.69
Metal Pro	8379.41	-6759.5 (1164.69)	0.03	1.01	8.35	-0.32 (0.51)	0.03	0.98
Machinery&Pa	20404.51	-2051.5 (23085.57)	0.06	1.67	8.8	-0.64 (0.75)	0.06	1.69
Elec Machy	9599.79	7832.68 (17659.3)	0.02	0.54	9.79	0.37 (0.49)	0.05	0.57
Trans.Equip	12135.29	-7491.4 (4948.68)	0.16	1.5	8.78	-0.34 (0.21)	0.17	1.5
Total	10278.54	-11764 (20587)	0.03	0.39	8.31	-0.42 (0.69)	0.03	0.4

Note: Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

Multiple Regression Analysis:

In the foregoing analysis, we have estimated the relationship between labour productivity and each of the determining factors independently. Now, we move on to examine the influence of all these factors simultaneously on labour productivity. The same four independent variables are considered in this analysis.

Model-I $P^L_t = \alpha_0 + \alpha_1 q_t + \alpha_2 I_t + \alpha_3 W_t + \alpha_4 E_t + U_t$

Model-II $\ln(P^L_t) = \beta_0 + \ln(\beta_1 q_t) + \ln(\beta_2 I_t) + \ln(\beta_3 W_t) + \ln(\beta_4 E_t) + V_t$

It is observed that for the aggregate manufacturing sector, the estimated regression coefficient is significant only in the case of value added for both the models. Value added alone explains more than 90 per cent of the variation in labour productivity. The same pattern is found in most of the individual industry group also. In certain individual industry group like beverage products, paper products, chemical products and basic metal products, value added and capital intensity are found to be significant in the case of Model I. In the model II, chemical products and basic metal products, three variables viz, value added, capital intensity and wage rate were found to be significant and only in few industry-groups, the pattern of employment is significant. These results reaffirm the overall conclusions earlier derived based on simple regression analysis. Of the two regression equations estimated, the first invariably gives a better fit to the data. The estimated value of R^2 suggests that the independent variables chosen together explain a significant portion (98 per cent in the case of model I and 87

per cent in the case of model II) of the total temporal variations in labour productivity.

Table 4.7

Summary Results of Regression Analysis of Labour Productivity on Value Added, Capital Intensity, Wage Rate and Pattern of Employment

Industry Group	Model I: Regression Intercept	VA	CI	WR	PE	R^2	D-W Stat	Model II: Inter cept	VA	CI	WR	PE	R^2	D-W Stat
Food Pro	-526.55	0.45*	0.30	0.73	214.39	0.96	1.03	-1.72	0.43*	0.28	0.52	-0.14	0.95	1.33
		(0.13)	(0.18)	(0.88)	(3153.35)				(0.16)	(0.34)	(0.30)	(0.25)		
Beverage pro	1264.20	3.04*	0.42*	0.25	-5947.96*	0.97	1.87	2.46	0.39*	0.55*	-0.20	-0.16	0.96	1.66
		(0.54)	(0.08)	(1.03)	(2591.85)				(0.08)	(0.15)	(0.58)	(0.12)		
Cotton Tex	6429.09	0.63*	-0.08	-0.73	-21318.45	0.86	1.82	4.84	0.91*	-0.11	-0.51	-0.35	0.87	1.67
		(0.12)	(0.09)	(0.63)	(28017.22)				(0.16)	(0.15)	(0.38)	(0.48)		
Wool,Silk&Jute	5284.60	6.09*	0.26	-0.73	-30467.44	0.66	1.11	3.14	0.81*	0.59*	-0.70	-0.25	0.85	0.80
		(2.16)	(0.16)	(1.13)	(25335.33)				(0.19)	(0.25)	(0.59)	(0.54)		
Textile Pro	-3252.61	1.57	0.14	3.61	3574.30	0.87	1.68	-7.28	0.13	0.39	1.63*	0.15	0.84	1.69
		(1.26)	(0.38)	(0.65)	(3738.59)				(0.18)	(0.48)	(0.31)	(0.22)		
Wood Pro	1243.78	7.83*	-0.18*	1.39*	-241.81	0.86	1.08	2.47	0.17	-0.25**	0.87*	-0.08	0.92	0.80
		(2.73)	(0.09)	(0.28)	(185.13)				(0.22)	(0.13)	(0.22)	(0.11)		
Paper Pro	5125.08	2.75*	0.05*	0.70	3565.32	0.90	1.78	5.20*	1.00*	-0.21*	-0.30	-0.30*	0.90	2.02
		(0.44)	(0.02)	(0.64)	(3194.79)				(0.15)	(0.06)	(0.23)	(0.16)		
Leather Pro	-828.55	1.73	-0.20	2.16**	7881.48	0.61	1.02	3.21	0.42	-0.35	0.80	0.29	0.61	1.07
		(1.30)	(0.16)	(1.11)	(8145.03)				(0.31)	(0.30)	(0.47)	(0.31)		
Rubber Pro	-1250.01	5.16*	-0.13	3.20	-21483.07	0.89	0.73	-0.87	0.96*	-0.17	0.52	-0.22	0.90	0.50
		(0.74)	(0.10)	(1.97)	(29270.2)				(0.13)	(0.18)	(0.46)	(0.46)		
Chemical Pro	5018.88	0.28*	-0.10*	2.85*	-11872.10	0.84	1.95	3.03	0.16*	-0.28*	0.91*	-0.24	0.88	1.85
		(0.07)	(0.03)	(0.49)	(8970.2)				(0.05)	(0.08)	(0.15)	(0.20)		
Non-Metallic Pr	-11705	1.7*	-0.20	1.12	50164.81	0.95	1.49	0.49	0.14	0.67*	0.65**	0.88	1.38	1.54
		(0.26)	(0.06)	(0.53)	(12332.85)				(0.09)	(0.20)	(0.20)	(0.34)		
Basic Metal	-6966.21	2.43*	-0.05*	2.26*	10835.88	0.95	2.07	-4.16	0.84*	-0.39*	1.42*	0.69	0.97	0.94
		(0.31)	(0.01)	(0.42)	(8792.65)				(0.07)	(0.08)	(0.18)	(0.53)		
Metal Pro	5907.13	-0.28	0.13	0.78	-8982.79	0.66	1.96	4.24	-0.09	0.19	0.36	-0.42	0.64	1.98
		(0.83)	(0.08)	(0.78)	(8053.89)				(0.15)	(0.12)	(0.37)	(0.36)		
Machinery&Part	20609.52	1.44*	-0.49	2.42	-53559.9*	0.57	1.65	-1.52	0.63**	-0.40	0.94	1.47**	0.52	1.35
		(0.56)	(0.27)	(1.73)	(22965.42)				(0.29)	(0.29)	(0.7)	(0.75)		
Elec Machy	5214.60	2.13*	0.18	0.28	-4739.36	0.97	1.69	2.68	0.37*	0.17	0.25	-0.13	0.97	1.99
		(0.54)	(0.16)	(0.55)	(5141.91)				(0.09)	(0.12)	(0.25)	(0.15)		
Trans.Equip	653.12	0.59	-0.31**	2.14*	-4830.77	0.84	2.04	-0.42	0.33	-0.35	1.13*	-0.27	0.85	1.98
		(0.33)	(0.15)	(0.36)	(3178.83)				(0.20)	(0.16)	(0.19)	(0.14)		
Total	5062.77	0.05*	0.04	0.40	-11604.68	0.92	1.40	1.26	0.38*	0.13	0.18	-5.00	0.91	1.50
		(0.02)	(0.06)	(0.56)	(7478.98)				(0.17)	(0.16)	(0.25)	(0.28)		

Note: Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

Determinants of Capital Productivity Growth

A wide range of factors are responsible for the growth of capital productivity in manufacturing industries, such as growth of output, changes in capital intensity, variations in capacity utilisation, changes in the rate of returns to capital, accelerated obsolescence and ageing of capital stock. The empirical analysis in the present study is confined to the first two factors, as reliable information relating to the others are not readily available. The framework of analysis followed here is more or less similar to the one used in the analysis of labour productivity growth, but the determinants are examined only for the total manufacturing sector and not for its sub-groups.

The relationship between capital productivity and value added are presented in table 4.8. Interestingly, the estimated values of the regression coefficients are negative (Model I), indicating an inverse relationship between capital productivity and value added, though the relationship is very weak. A comparative analysis of the long term trend growth rates of capital and value added shows that, commensurate with the growth of capital, there has been an increase in value added also, with capital having grown at a faster rate than value added. This phenomenon in the rates of growth of capital and value added may mainly be due to the long gestation lags of capital investments or under utilisation of the available capacity.

Table 4.8

Summary Results of Regression Analysis of Capital Productivity on Output

Industry	Model	Intercept	Regression Coefficient	R^2	D-W Stat
Total Mfg.	I	0.50	-1.46 ** (7.95)	0.22	1.35
	II	-7.30	0.92 * (0.21)	0.63	2.86
	III	1.15	-0.19 (0.11)	0.19	1.28

Note: Model I - Linear, Model II - Percentage change and Model III - Double log.
Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

The relationship between capital productivity and capital intensity are depicted in table 4.9. The regression coefficients estimated are negative (Model I) and statistically significant indicating that, with increase in capital intensity, capital productivity has declined substantially. The declining trend in capital productivity could be attributable to capital deepening process of industrialisation in the manufacturing sector.

Table 4.9

Summary Results of Regression Analysis of Capital Productivity on Capital Intensity

Industry	Model	Intercept	Regression Coefficient		R^2	D-W Stat
Total Mfg.	I	0.55	-7.54 (0.21)	*	0.53	1.56
	II	1.48	-0.48 (0.44)		0.10	2.48
	III	2.79	0.38 (0.10)	*	0.55	1.65

Note: Model I - Linear, Model II - Percentage Change and Model III - Double Log.
Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

The simultaneous interactive influence of the two independent variables on the dependent variable (multiple regression) are presented in table 4.10. The regression results suggest that the multiple correlation coefficients are highly significant. It is also observed that the two independent variables taken together explains around 75 per cent of the variation (Model II) in capital productivity and significant in all the three models[3].

Table 4.10

Summary Results of Regression Analysis of Capital Productivity on Capital Intensity and Value Added

Industry	Model	Intercept	Regression Coefficient V.A	C.I	R^2	D-W Stat
Total Mfg.	I	0.54	2.91 * (1.18)	-1.62 * (3.92)	0.69	1.26
	II	-4.88	0.93 * (0.19)	-5.1 * (0.25)	0.74	2.80
	III	2.53	0.35 * (0.14)	-0.75 * (-4.56)	0.55	1.65

Note: Model I - Linear, Model II - Percentage change and Model III - Double log.
Figures in parentheses represent standard errors
* Significant at 5 per cent probability level and
** Significant at 10 per cent probability level.

Section III

Trends in Total Factor Productivity Growth

We now discern the trends in 'total factor productivity'. This analysis assumes that any increase in output that has not been the result of increases in the factor inputs (labour and capital) can be attributed to a 'residual' combination of influences; this residual, then, represents the 'technological' factor. Total Factor Productivity is widely used to measure the overall efficiency with which factors are combined rather than pure technical progress. Total factor productivity has been estimated by various methods[4]. In the present study, the growth rate of total factor productivity is measured by using the Translog Index.

The Translog index, which is an approximation of the Divisia index to the discrete case is a description of the usual production function. The Divisia index represents a further advance in the estimation of the production function, having the advantages of symmetry and non-unitary elasticity of substitution. Its major property is that, in the discrete case as in the continuous, the "Divisia index of the Divisia indexes is a Divisa index of the components", meaning thereby that the weighted average of growth rates of individual components gives the growth rate of the aggregate[5]. The production function is given by:

$$\text{Log } Y = a^{\circ} + a_L \log_L + a_K \log K + a_t \log T + 1/2\beta_{LL}(\log L)^2 + 1/2\beta_{KK}(\log K)^2 + 1/2\,\beta_{tt}(T)^2 + \beta_{Lt}(\log L)T + \beta_{Kt}(\log K)T + \beta_{LK}(\log L)(\log K)$$

Here, a and β are the parameters and $\beta_T{}^T$ represents the rate of change of TFP change. With this measure, as factor inputs are no more constrained by the unitary elasticity of substitution assumed in the other function, there is freedom to diverge and the elasticity of output with respect to each factor input varies with the level of output.

The discrete approximation to the above production function, which gives a measure of TFP growth, is given by:

$$G^T{}_{L_A} = \text{Log } Y_t - \frac{(1-\beta)L_T + (1-\beta)L_{T-1}}{2} \text{Log } L_T - \frac{\{[1-(1-\beta)L_t] + [1-(1-\beta)L_t - 1]\}}{2}$$

where β is the income share of capital (hence, $(1-\beta)\text{XLog}K_T$ is income share of labour) and is equal to their output elasticities. Here, the total factor productivity growth is

obtained by deducting the weighted sum of the growth of labour and capital from the growth of value added. While this incorporates the additional facility of reacting to factor substitution, the limitations are that labour here does not incorporate the effect of improved skill and training, while with regard to capital, they pertain to measurement and variations in capacity utilisation.

The growth rate of TFP for the total manufacturing sector for the entire period and for the sub-periods are presented in table 4.3 below. The TFP growth for the manufacturing factory sector during 1973-74 to 1986-87 was insignificant. Apart from six industry-group all other individual industries recorded a negative growth in this period. The sub-period analysis shows that the high growth of total factor productivity in the first period was not maintained in the subsequent periods.

A clear trend pattern emerges out for most of the individual industries and also for the total manufacturing industries over the years and accordingly we can periodise. The first phase between 1973-74 and 1978-79, is marked by a high growth rate of 4.5 per cent for the entire manufacturing sector. Most of the individual industries (eleven industry-group) performed better than other industries, with retardation in total factor productivity growth in textile products, wood products, paper products, leather products, metal products and machinery & parts. The period between 1978-79 and 1982-83 reveals a declining total factor productivity growth for the aggregate

manufacturing industries. The third period between 1982-83 and 1986-87 was the period of marginal recovery. Along with the total manufacturing industry-groups, namely cotton textiles, wool, silk & jute textiles, textiles products, wood products, rubber products machinery and parts, electrical machinery and other manufacturing industries improved in their growth compared to the previous sub-period.

Table 4.11

Trends in Total Factor Productivity Growth

Industry Group	73-74 to 78-79	78-79 to 82-83	82-83 to 86-87	73-74 to 86-87
Food Products	4.04	4.31	1.38	3.31
Beverage products	1.82	5.28	-0.28	2.24
Cotton Textiles	0.14	-9.49	6.72	-0.80
Wool,Silk,Jute Texti	5.91	-13.73	4.64	-0.52
Textiles Products	-12.00	-2.82	3.34	-4.45
Wood Products	-3.03	-3.08	1.74	-1.58
Paper Products	-5.35	-3.51	-0.40	-3.26
Leather Products	-5.11	-0.96	-6.84	-4.37
Rubber Products	0.42	1.14	8.27	3.06
Chemical Products	3.90	2.97	-10.41	-0.79
NonMetallic Products	4.23	2.55	-4.11	1.15
Basic Metal Products	10.21	-15.22	-2.40	-1.49
Metal Products	-3.04	-2.53	-2.20	-2.62
Machinery & Parts	-5.32	-6.34	0.40	-3.88
Electrical Machinery	2.81	-1.84	0.53	0.68
Transport Equipment	1.00	-2.16	-3.77	-1.44
Other Manu. Ind.	9.67	8.77	4.94	7.94
All Industries	4.50	-2.01	-1.05	0.79

Note: Growth rates are averages of annual percentage changes.

Source: Same as table 3.5.

In the first sub-period, the acceleration in the output growth of the manufacturing sector was the result of high growth of partial productivities and total factor productivity growth.

The decline in the output growth of the manufacturing sector in the second sub-period could be attributed partly to the decline in total factor productivity growth and partly due to decline in partial productivities growth. And the recovery may be due to the growth in labour productivity.

The results above indicate that the manufacturing sector as a whole and certain individual industry-groups performed inefficiently during the second and third sub-periods. This is confirmed by the poor productivity of capital during this period. The growth in value added is a function of the contribution of various factor inputs. The efficiency with which the factors inputs are put to use consequently, have a bearing on output exogenous influences remaining constant.

Having noted the capital intensity of investments and productivity performance, the contribution of value added growth by the factors may now be analysed.

Section III

Contribution of Factors to Value Added Growth

This section examines the relative contribution of labour, capital and TFP to the growth in value added in the factory sector of Tamilnadu. Contribution of labour, capital and TFP for the total registered manufacturing sector as well as for its sub-sectors during the entire period of analysis and for the sub-periods are presented in the table 4.12.

Table 4.12

Contribution of Labour, Capital and TFPG to Value Added

Industry Group	Labour Contribution				Capital Contribution				TFPG Contribution			
	74-79	79-83	83-87	74-87	74-79	79-83	83-87	74-87	74-79	79-83	83-87	74-87
Food Products	19.33	26.57	-33.24	10.43	53.34	-29.47	104.11	49.62	27.33	102.90	29.13	39.95
Beverage products	2.73	16.41	0.00	-5.59	94.47	57.55	0.00	86.10	2.80	26.04	0.00	19.49
Cotton Textiles	67.32	0.00	6.70	50.09	33.30	0.00	27.43	63.49	-0.62	0.00	65.87	-13.58
Wool,Silk,Jute Textiles	41.56	-43.58	271.41	33.63	-1.95	-32.73	-18.18	89.18	60.39	176.31	-153.23	-22.82
Textiles Products	117.80	78.41	19.06	63.50	148.19	89.29	51.15	93.72	-165.99	-67.70	29.79	-57.22
Wood Products	41.40	67.67	108.57	-39.96	6.79	70.55	68.19	-288.43	51.81	-38.22	-76.76	428.39
Paper Products	63.55	0.00	9.06	20.19	350.44	0.00	93.42	142.90	-313.99	100.00	-2.48	-63.09
Leather Products	24.36	38.25	0.00	37.02	108.58	77.61	0.00	117.66	-32.94	-15.86	0.00	-54.68
Rubber Products	0.00	5.98	3.60	12.33	0.00	77.93	59.47	58.41	0.00	16.09	36.93	29.26
Chemical Products	28.98	19.69	0.00	28.40	44.80	39.86	0.00	80.85	26.22	40.45	0.00	-9.25
NonMetallic Products	22.51	22.95	6.43	18.97	11.87	56.01	192.25	63.63	65.62	21.04	-98.68	17.40
Basic Metal Products	8.93	-31.25	178.80	43.01	31.18	-23.47	14.42	97.27	59.89	154.72	-93.22	-40.28
Metal Products	72.87	21.77	119.43	28.93	81.87	108.09	-100.73	136.63	-54.74	-29.86	81.30	-65.56
Machinery & Parts	23.48	81.68	20.42	31.88	134.82	190.42	71.69	121.67	-58.30	-172.10	7.89	-53.55
Electrical Machinery	9.31	33.15	-5.96	14.50	28.35	87.81	100.58	74.50	62.34	-20.96	5.38	11.00
Transport Equipment	-11.42	36.06	127.32	36.68	66.47	86.45	194.98	93.00	44.95	-22.51	-222.30	-29.68
Other Manu. Ind.	23.69	15.65	-42.61	3.13	3.31	-26.98	57.87	5.56	73.00	111.33	84.74	91.31
All Industries	24.76	46.92	-0.19	22.05	34.65	107.93	126.70	69.24	40.59	-54.85	-26.51	8.71

For the period 1973-74 to 1986-87, about 69.24 per cent of the growth in value added by the manufacturing sector was the result of capital and about 22.05 per cent, the result of labour. Total factor productivity's share was only 8.71 per cent indicating that disembodied technology had played no part in the growth of value added by the industry. In other words, the growth has been primarily the result of increased investment with labour contributing to a small part of it. As evidenced in the earlier chapter (table 3.5), the rate of growth of capital has indeed been higher than that of labour.

From the period-wise estimation, we find that the labour, capital and TFP contribution to growth in value added followed different paths respectively. Though labour and capital contributions to manufacturing value added rose quite high, contribution of TFP ran into negative in the second and third sub-periods, particularly in the second period. A tentative conclusion would be that this negative contribution would have led to relative downswing in value added during this period. But for the period 1982-83 to 1986-87, labour contribution became negligible, with the rise of TFP contribution and capital contribution remaining at a high level.

At a dis-aggregated level, for manufacturing of food products and manufacturing of non-metallic products, labour contribution dropped to a lower level while TFP contribution rose and capital contribution remained at a high level. For manufacturing of beverages, tobacco and tobacco products labour and capital contributions grew and TFP contribution declined from the first phase to the second phase. Whereas in the third phase since there was no growth in the value added, the contribution of labour, capital and TFP was nil (zero). TFP remained almost same with the fall in labour contribution and rise in capital contribution in manufacturing of cotton textiles. For the industry groups such as wood products, manufacturing of chemical and chemical products, manufacturing of metal products, electrical machinery products and manufacturing of transport equipments and parts, TFP contribution fell over the years, where either the labour or capital contributed the most.

We may conclude on the basis of evidence available, that value added growth in the manufacturing sector of Tamilnadu has been influenced by various factors and no single factor explains its growth for the period under reference. On the whole, capital largely contributed to the growth. Capital as the overriding factor responsible for value added growth, obviously, follows from our earlier analysis of the rate of investment activity.

Notes

1. They command -- not only the conventional factors like capital and labour, but also human capital including managerial and technical talents, economies of scale, etc.

2. Besides the variables embodied in the above hypothesis, several other economic and non economic factors such as wage rate, capacity utilisation, managerial efficiency, working conditions, trade unionism, government regulations, work ethics, cultural and social values, etc. have also been identified in the literature as important determinants of labour productivity growth.

3. Radhakrishnan (1989)

4. Kendrick Index, solow Index, and Divisia Index-Translog etc. The Solow index, based on the Cobb-Douglas production function takes the following form:
$$A/A = Y/Y - [(1-\beta) L/L + \beta K/K]$$
where β is the income share of capital. In other words, the Solow index shows that the growth in total factor productivity is simply a difference between the rate of growth of value added and the rate of growth of weighted total factor input. It has limitations such as unitary elasticity of substitution between factors, constant returns to scale and payment to factors on the basis of their marginal productivity.

5. See Goldar (1981), pp.28-35.

Chapter V

REGIONAL DISPARITY IN THE INDUSTRIAL GROWTH

Introduction

In the last two chapters, we have examined the structural change and growth pattern of the manufacturing sector in the state as a whole. As the regional[1] spread of industries which reflects changes in the spatial concentration of industries within the State, is one of the important objectives of the industrial development, this chapter tries to examine the inter-district performance of the manufacturing sector with a view to understand the nature of the regional variation in the level of industrial development.

To analyse regional disparity in the state's structural growth pattern, we have used percentage shares and growth rates to interpret the dynamics of spatial change in manufacturing sector across the districts. Some of the inequality measures like coefficient of variation and Hirschman and Herfindahl Index, have been used to see the trend in the inter-regional inequalities over time. Some economic base study concepts like Location Quotient and Specialization Coefficient[2] have been employed to understand the industrial structure of the districts and the role of structural diversification in the level and growth of the industrialisation across space. The source of data for this chapter is the Annual Survey of Industries as made

available in the Statistical Abstract of Tamilnadu. In order to arrive at comparable figures for the selected 15 districts, necessary adjustment were made[3]. The analysis is mainly confined to such information like, number of factories, capital stock, industrial employment and value added relating to different industries in the ASI factory sector in different districts in the State. The study period is from 1975-76 to 1986-87. Like the earlier analysis, the study period is divided into three sub-periods viz. (1) 1975-76 to 1978-79, (2) 1978-79 to 1982-83 and (3) 1982-83 to 1986-87.

Table 5.1 gives the shares of various districts in value added, fixed capital, employment and number of factories in the manufacturing sector in the year 1975-76 and 1986-87. During the year 1975-76, in terms of number of factories the top positions were taken by the districts of Coimbatore, Tirunelveli, Salem, Chengalpattu and Madras. These five districts together accounted for nearly 65 per cent of total number of factories, in which Coimbatore alone accounted for 20 per cent of the factories. During the same time point, Madras was the most dominant district in its share of fixed capital and employment. It accounted for nearly 48 per cent of the total share of fixed capital and 23 per cent of the share in employment. The second position was taken by Chengalpattu which accounted for 17 per cent and 15 per cent share in fixed capital and employment respectively.

From table 5.1 we notice that the share of Tirunelveli with respect to number of factories had declined significantly

over the years i.e. from the second position in 1975-76 to seventh position in 1986-87. We also find a decline in its share in employment. On the other hand, the share of Ramanathapuram, Dharmapuri and Madurai increased marginally with regard to number of factories and employment. The shares of Chengalpattu, Madras and Coimbatore districts fell though marginally over the years, and they are still found to be the dominant ones.

Table 5.1

Percentage Share in Total No. of Factories, Fixed Capital, Employment and Value Added

Sl. No.	Districts	1975-76	1986-87	1975-76	1986-87	1975-76	1986-87	1975-76	1986-87
		Factories		Fix.Cap		Employment		Value Added	
1	Coimbatore	19.20	19.75	8.58	6.79	15.60	15.33	13.72	12.93
		(1)	(1)	(3)	(4)	(2)	(2)	(3)	(3)
2	Chengalpattu	11.01	10.54	17.38	15.65	14.73	13.72	27.60	24.15
		(4)	(4)	(2)	(2)	(3)	(3)	(1)	(1)
3	Dharmapuri	0.59	2.03	0.20	3.90	0.32	2.03	0.19	2.95
		(14)	(13)	(14)	(7)	(15)	(12)	(15)	(10)
4	Madras	10.53	11.26	47.75	41.60	23.25	20.08	21.14	22.72
		(5)	(3)	(1)	(1)	(1)	(1)	(2)	(2)
5	Madurai	6.45	8.34	2.36	2.60	5.91	6.29	5.13	4.66
		(7)	(6)	(10)	(10)	(5)	(5)	(7)	(7)
6	North Arcot	7.82	5.81	2.53	3.84	4.61	5.22	3.28	4.80
		(6)	(8)	(9)	(8)	(10)	(9)	(8)	(6)
7	Nilgiris	1.69	1.29	1.08	0.41	1.15	0.88	1.99	0.77
		(13)	(14)	(11)	(13)	(13)	(15)	(10)	(12)
8	Pudukottai	0.49	1.28	0.16	0.74	0.40	0.92	0.23	0.45
		(15)	(15)	(15)	(12)	(14)	(14)	(14)	(15)
9	Ramanad	5.04	8.82	2.71	2.67	5.03	9.43	2.81	3.90
		(8)	(5)	(8)	(9)	(8)	(4)	(9)	(9)
10	South Arcot	1.70	2.08	3.75	2.14	2.57	2.33	1.85	1.95
		(12)	(12)	(6)	(11)	(11)	(11)	(11)	(11)
11	Salem	11.73	12.32	4.57	5.96	5.80	6.22	5.29	4.20
		(3)	(2)	(4)	(5)	(6)	(6)	(6)	(8)
12	Thajavur	3.89	2.77	0.72	0.32	1.90	1.56	0.88	0.72
		(10)	(10)	(12)	(14)	(12)	(13)	(12)	(13)
13	Tiruchy	4.49	4.23	4.42	7.79	4.96	6.09	8.15	8.70
		(9)	(9)	(5)	(3)	(9)	(8)	(4)	(4)
14	Tirunelveli	12.97	7.27	3.39	5.45	8.57	6.10	6.91	6.63
		(2)	(7)	(7)	(6)	(4)	(7)	(5)	(5)
15	Kanniyakumari	2.39	2.20	0.40	0.14	5.19	3.80	0.57	0.46
		(11)	(11)	(13)	(15)	(7)	(10)	(13)	(14)

Source: Same as table 3.5.
Note : Figures in brackets indicate ranks.

It is also evident from the table 5.1 that there had been some reshuffling in the ranks of different districts in the industrial picture of the State economy but not significantly. In 1986-87, Coimbatore, Chengalpattu, Madras and Salem together accounted for 53.87 per cent of the total registered factories in the State. In terms of the total fixed capital invested Madras alone accounted for a lions share of 42 per cent, followed by Chengalpattu (16 per cent), Tiruchy (8 per cent) and Coimbatore (7 per cent). Madras, Chengalpattu and Coimbatore occupied a dominant share of around 50 per cent and 60 per cent in total industrial employment and value added respectively.

Thus, it could be observed from the table that the three districts viz., Coimbatore, Chengalpattu and Madras continued to occupy a central and commanding positions on the industrial map of Tamilnadu economy. We can find more concentration of industrial activities in these three districts of the State. Further, it can be noted that, in districts like Coimbatore, Madurai, Salem, Ramanad, Thanjavur, and Kanniyakumari the percentage share of fixed capital invested was significantly lower than that of the percentage share of number of factories and employment. This indicates that in these districts the industries seems to be more labour intensive than capital intensive. On the other hand in districts like Madras, Chengalpattu and Tiruchy the percentage share of the capital invested is relatively higher than the percentage share of number of factories and employment. This would indicate that in these districts the industries are more capital intensive than labour

intensive. The profile of major industries and their spread across districts is evident from the table 5.2.

We find that in the districts of Coimbatore, Madurai, Salem, Ramanad, Thanjavur and kanniyakumari the major industries are agro-based industries like food products, cotton textiles and textile products which have a relatively higher labour to capital ratio. The scenario is just the opposite in the districts like Madras, Tiruchy and Chengalpattu, where the capital intensive industries like chemical products, metal products, Machinery products and Electrical machinery accounted for the most. A point to be noted here is that these are the three districts where the major chunk of capital was being invested.

But the overall picture that emerges from the above discussion is that there is existence of regional disparities in the industrial economy of the State and it is observed that there is heavy concentration of industrial activities in the districts of Coimbatore, Chengalpattu and Madras in the year 1986-87. This lopsided nature of industrial activity and structure across the districts might be due to the extent of capital invested district-wise. But a paradox is noted at this juncture. Though relative capital investment in Tiruchirapalli was quite high resulting in growth of modern industries, the extent of industrial activity in this district was not high. It may be owing to the heavy investment in the capital intensive public sector investment (e.g., Bharat Heavy Electricals Ltd.) in relatively backward districts (see appendix). It is interesting

Table 5.2

District-wise and Major Group-wise Distribution of Factories in Tamilnadu: 1986-87

(in per cent)

Industry Group	Coimb-atore	Chengal-pattu	Dharma-puri	Madras	Madurai	North Arcot	Nilgi-ris	Puduko-ttai	Ramanad	South Arcot	Salem	Thanja-vur	Tiruchy	Tirunel-veli	Kanya-kumari	TAMIL-NADU
20&21	19.52	5.74	20.30	3.25	30.91	7.33	78.49	13.87	7.54	44.24	44.45	37.30	21.55	26.52	67.01	21.84
22	0.72	0.78	0.74	1.46	1.34	8.10	0.00	1.73	0.76	1.44	0.67	3.78	1.59	5.34	0.00	1.75
23	26.67	1.06	5.90	0.33	19.80	1.41	0.00	5.20	11.95	4.32	26.44	1.35	5.12	12.23	0.68	12.90
24	0.53	0.14	1.11	0.20	0.36	7.84	0.00	0.58	4.58	0.00	7.58	1.89	0.00	1.44	0.00	2.15
25	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.41	0.00	0.04
26	11.62	0.64	1.48	12.01	3.23	1.41	0.00	13.29	0.68	1.80	2.91	6.22	4.59	2.36	1.36	5.15
27	1.02	0.71	0.74	1.33	1.70	0.00	0.00	2.89	3.90	1.44	1.46	1.35	1.06	10.59	5.44	2.11
28	3.59	3.47	5.17	15.93	6.90	2.57	4.65	20.23	17.80	7.55	1.52	9.46	5.83	5.76	6.12	6.80
29	0.91	6.95	0.00	2.39	3.14	42.80	0.00	0.00	0.00	0.00	0.00	0.00	2.12	0.00	0.00	4.04
30	2.23	6.95	5.90	3.52	5.47	1.41	0.58	6.36	2.54	2.16	0.91	2.97	2.47	2.36	2.72	3.06
31	0.95	7.23	11.81	5.18	6.99	4.50	1.16	16.18	37.80	3.24	1.94	7.57	4.06	17.16	3.74	8.33
32	1.40	10.35	4.80	0.86	2.06	2.31	0.00	2.31	3.81	14.39	3.82	1.08	7.24	4.62	3.40	3.78
33	7.53	11.27	7.01	4.84	2.42	3.47	0.00	15.03	0.42	2.52	1.52	7.03	2.47	1.95	1.36	4.60
34	3.14	7.51	3.32	8.69	3.49	1.29	6.98	19.08	2.97	1.80	0.79	8.92	6.36	1.34	1.36	4.07
35	10.75	14.88	9.23	8.36	2.42	11.18	4.07	4.05	1.02	4.68	1.76	1.89	24.91	1.13	0.00	7.62
36	3.82	6.73	10.33	7.37	0.90	0.39	0.00	0.00	0.25	1.44	0.30	0.00	0.18	0.31	0.00	2.74
37	1.36	12.33	7.75	7.10	1.61	1.67	0.00	1.73	1.69	1.44	0.61	0.81	2.30	0.21	0.68	3.22
38	0.23	1.20	1.48	1.92	0.63	0.00	0.58	0.00	0.08	0.00	0.00	0.00	0.18	0.72	2.04	0.60
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Same as table 3.5

to note that public investment has failed in boosting industrial activity through linkage effect.

In 1975-76, Madras, Coimbatore and Chengalpattu were the top three districts in terms of value added. Even in 1986-87, the Status quo was almost maintained. Similarly in terms of fixed capital and employment these districts were industrial leaders. Though their absolute share experienced a decline overtime, the position remain almost unaltered except that some of the industrially backward districts like Dharmapuri and North Arcot also improved their position overtime. It is also interesting to note that, overtime, the districts with higher share lost in favour of the districts which had a relatively moderate share in 1975-76. Therefore, irrespective of the indicators used Coimbatore, Madras and Chengalpattu emerged as industrially developed districts.

In the light of the above discussion we make an attempt to understand the growth profile of the various regions between 1975-76 and 1986-87. The average annual growth rate of the indicators chosen in the various districts are presented in Table 5.3. A close look at the growth rates reveals that on an average the registered factories in the industrial sector of the State had grown at the rate of 4.68 per cent per year during the period of this analysis. Among the four variables chosen the growth rate of fixed capital was the highest, followed by growth in value added. We can find a very interesting pattern in the growth rate of these variables during the three sub-periods. The trends in the rate of growth of value added and fixed capital are

Table 5.3

Growth Rates of Industrial Employment by Districts of Tamilnadu

Sl. No.	Name of District	Growth Rate of Factories Period I	II	III	Total	Growth Rate of Fixed Capital Period I	II	III	Total	Growth rate of Employment Period I	II	III	Total	Growth Rate of Value Added Period I	II	III	Total
1	Coimbatore	6.06	6.9	2.14	4.94	9.21	7.09	2.68	6.06	5.6	3.01	-1.38	2.12	21.75	-1.39	3.6	6.73
2	Chengalpattu	2.13	4.52	5.69	4.29	1.27	9.51	9.43	7.24	-0.11	4.35	0.2	1.63	9.47	4.85	4.7	6.06
3	Dharmapuri	17.73	21.89	8.62	15.93	58.86	39.33	13.05	35.1	24.26	26.18	8.4	19.19	37.13	44.67	15.03	32.13
4	Madras	6.59	7.01	2.6	5.29	7.49	0.65	12.82	6.94	1.92	1.07	0.08	0.94	16.37	3.64	5.56	7.81
5	Madurai	6.33	6.49	8.04	7.01	15.68	2.82	10.35	9.07	3.46	3.68	1.5	2.83	16.01	-2.39	8.01	6.41
6	North Arcot	0.89	3.25	1.56	1.99	20.51	1.65	15.88	11.97	5.17	1.91	3.62	3.42	19.13	6.23	8.96	10.74
7	Nilgiris	1.67	2.01	2.6	2.13	8.43	-6.86	-1.02	-0.57	5.72	1.92	-6.67	-0.17	13.23	0.68	-14.46	-1.4
8	Pudukottai	8.94	20.97	9.57	13.54	2.84	41.56	16.97	22.06	12.01	14.12	3.8	9.79	25.14	7.94	10.81	13.67
9	Ramanad	14.14	12.46	3.79	9.77	20	7.05	0.1	8.06	14.02	9.03	2.39	7.98	22.29	9.3	2.88	10.25
10	South Arcot	4.79	3.56	10.73	6.5	1.55	-1.11	8.49	3.11	1.42	1.77	0.92	1.37	5.57	18.22	-1.11	7.74
11	Salem	8.27	6.68	1.23	5.13	10.75	-3.21	24.31	10.61	4.86	4.28	0.08	2.91	15.36	-5.4	8.1	5.17
12	Thanjavur	3.36	0.07	1.75	1.58	20.3	-6.46	-6.62	0.78	2.97	3.9	-4.73	0.51	25.49	-1.96	-2.03	5.5
13	Tiruchy	4.83	3.22	4.54	4.14	25.74	1.4	15.98	13.34	7.75	3.6	1.96	4.13	20.5	-2.97	9.23	7.87
14	Tirunelveli	-10.84	6.62	-0.08	-0.58	33.23	-5.72	15.21	12.51	-5.72	3.58	-1.54	-0.82	3.25	16.3	0.2	6.89
15	Kanyakumari	6.34	4.36	1.67	3.92	-8.22	7.16	-3.85	-1.04	2.11	5.75	-8.83	-0.55	1.88	15.89	-2.55	5.36
	State-Total	4.16	6.49	3.26	4.68	10.23	3.19	11.67	8.19	3.31	3.79	-0.02	2.27	15.11	3.67	4.99	7.27

Note: Period - I 1975-76 to 1978-79
Period - II 1978-79 to 1982-83
Period - III 1982-83 to 1986-87
Total - 1975-76 to 1986-87
Growth rates are averages of annual percentage changes.

Source: Same as table 3.5

observed to be following similar pattern and a contrasting pattern of growth was found in employment and number of factories.

The first period was the phase of acceleration were a high growth were found in all the four variables. A contradictory pattern emerges in the second period were the growth rate of fixed capital and value added declined on the one hand and there was an upshot in the growth rate of employment and number of factories on the other hand. Thus during this period there might be growth and spread of labour intensive industries in Tamil Nadu. In the third period growth rate of employment and number of factories recorded a decline whereas the growth rate of fixed capital and value added marked an increase.

The growth rate across the districts exhibits that, the district of Dharmapuri was the fastest growing district especially with respect to growth rate of fixed capital and value added, which was substantially higher than the State average. The second fastest growing district was Pudukottai followed by Ramanad during the entire period of analysis. It may be owing to the direct encouragement given to private investment in a backward district (see appendix). Interesting results emerges out from the period-wise estimation of growth rates across the districts. In terms of number of factories and employment Pudukottai, North Arcot, Dharmapuri and Tirunelveli followed the State pattern of growth. The upswing in the growth rate of the State during the second phase was mainly due to the remarkably high growth rate registered by Dharmapuri and Pudukottai. With respect to fixed capital and value added the districts which

followed the State pattern of growth during the second phase are Madras, North Arcot, Salem and Tiruchy.

The growth rate across the districts exhibits that, the district of Dharmapuri was the fastest growing district especially with respect to growth rate of fixed capital and value added, which was substantially higher than the State average. The second fastest growing district was Pudukottai followed by Ramanad during the entire period of analysis. It may be owing to the direct encouragement given to private investment in a backward district (see appendix). Interesting results emerges out from the period-wise estimation of growth rates across the districts. In terms of number of factories and employment Pudukottai, North Arcot, Dharmapuri and Tirunelveli followed the State pattern of growth. The upswing in the growth rate of the State during the second phase was mainly due to the remarkably high growth rate registered by Dharmapuri and Pudukottai. With respect to fixed capital and value added the districts which followed the State pattern of growth during the second phase are Madras, North Arcot, Salem and Tiruchy.

It is observed that, the districts with higher level of industrialisation are not necessarily the `high growth' ones. To the contrary these ar the less developed districts which, by and large, grew at a higher rate. For example Dharmapuri, Ramnad and Pudukottai, relatively less developed districts, grew at a higher rate, compared to the industrially developed districts like Madras and Coimbatore. Though the growth performance of the various districts differ according to the variables considered, the fastest growing regions invariably belong to the industrially

backward districts category, irrespective of the time periods and variables taken into account. It may be due to the low base on which the growth lies resulting in higher magnitudes.

Trends in the Inter-region Industrial Inequalities

Two inequality indices viz. coefficient of variation Hirschman Herfindahl Index[4] are computed in order to make an overall assessment about the trends in the inter-regional concentration of industry across districts. These indices are calculated for all the four variables over districts for all the years between 1975-76 and 1986-87. The results are presented in table 5.4 and 5.5.

Table 5.4:

Co-efficient of Variation across Districts

Year	Factories	Fix.Cap	Employment	V.A
1975-76	78.94	176.47	93.79	118.57
1976-77	76.69	154.50	94.79	119.43
1977-78	78.66	163.55	93.91	115.46
1978-79	79.24	158.47	90.18	113.26
1979-80	79.49	158.30	90.40	111.34
1980-81	80.59	157.87	88.68	111.17
1981-82	82.75	145.26	87.91	114.24
1982-83	80.46	146.67	83.32	110.19
1983-84	77.99	127.59	87.33	106.36
1984-85	76.73	133.01	84.59	109.59
1985-86	78.86	138.37	86.67	108.71
1986-87	76.43	151.50	82.75	110.30
Avg76/79	78.38	163.25	93.17	116.68
Avg79/83	80.82	152.03	87.58	111.73
Avg83/87	77.50	137.62	85.34	108.74
Avg76/87	78.90	150.96	88.69	112.39

The extent of inter-district disparity as measured by the coefficient of variation is greater in fixed capital than in

other variables. Over the years there had been a fall in the coefficient of variations for fixed capital, employment and value added, but the variation in number of units showed an increase (in the second sub-period) followed by a decline (in the third sub-period). The average decline in the sub-periods also indicate the same trend. From the above discussion we can conclude that though there is high degree of concentration, it had declined over the years.

Table 5.5

Hirschman-Herfindahl Index

Year	Factories	Fix.Cap	Employment	V.A
1975-76	10.82	27.43	12.53	16.04
1976-77	10.59	22.58	12.66	16.18
1977-78	10.79	24.50	12.55	15.55
1978-79	10.85	23.41	12.09	15.22
1979-80	10.88	23.37	12.11	14.93
1980-81	11.00	23.28	11.91	14.91
1981-82	11.23	20.73	11.82	15.37
1982-83	10.98	21.01	11.29	14.76
1983-84	10.72	17.52	11.75	14.21
1984-85	10.59	18.46	11.44	14.67
1985-86	10.81	19.43	11.67	14.55
1986-87	10.56	21.97	11.23	14.78
Avg76/79	10.76	24.48	12.46	15.75
Avg79/83	11.02	22.10	11.78	14.99
Avg83/87	10.67	19.34	11.52	14.55
Avg76/87	10.82	21.97	11.92	15.10

Hirschman Herfindhal Index had been used to measure the extent of Concentration. The indices constructed for the period 1975-76 to 1986-87 are presented in the table above. The indices indicate that there is decline in concentration, but the decline was significant in fixed capital invested. There was a very minimal decline in concentration of registered factories,

employment and value added. Comparing the two end years, 1975-76 and 1986-87 Hirschman Herfindhal Index exhibits a decline of 2.40 percent in number of factories, 19.90 per cent in fixed capital, 10.37 per cent in employment and 7.87 per cent in value added. Earlier we have found that the capital was concentrated in few districts of the state, the coefficient of variation across district and the Herfindhal Index confirms the result. The results show a clear trend towards reduction in the level of inter-regional industrial inequalities over the years which is observed irrespective of the index or variable considered. However, the trend is not completely smooth and some ups and downs do appear here and there.

From the above analysis, it may be concluded that it is not strictly possible to identify the district which is industrially developed or backward on the basis of any single indicator. In order to get a composite picture, certain characteristics such as investment, wages, output which have a direct relationship to value added are also to be taken into account in terms of per capita, and a general weighted composite index has to be worked out to identify the industrially developed districts.

Industrial Structure of the regional economies

Here we analyse the industrial structure/location structure of manufacturing activity in terms of districts' pattern of manufacturing activity and their industrial base and specialization. The industrial base or `structural base' of a

region is defined in terms of the industries in which a district has relatively higher level of activity i.e., more than proportionate share of the magnitudes, such as population, manufacturing, employment or income. We have tried to examine this aspect with the help of location quotients. The location quotient is a measure for relative regional concentration of a given industry compared to total state magnitude. The industries with high location quotients (lq≥1) will thus constitute the industrial base of the region. It is expressed as

$$L.Q. = (Vij/Vj)/(Vi/VN)$$

Where V = Value added,
i = ith industry,
j = jth region and
N = Nation.

Though the industrial structure of the various districts will vary according to the variable considered, we take value added as the best indicator. Other variables were employment or fixed capital are likely to present a biased picture depending upon the factor proportions in specific industry groups at the regional level. Moreover, value added is a net outcome of the contribution of all the factors of production and is expected to yield more reliable growth for our kind of analysis.

Table 5.6

Industrial Base of Districts in Tamilnadu in 1986-87

Districts	Industries with Lij > 1
Coimbatore	Food products (1.23), cotton textiles (2.38), wool, silk and jute textiles (4.42), textile products (1.09) and machinery & parts (1.01).
Chengalpattu	Beverage products (1.83), rubber products (1.66), chemical products (1.37), basic metal products (1.90), metal products (1.56), electrical machinery (1.69) and transport equipments (3.38).
Dharmapuri	Non-metallic mineral products (1.02), basic metal (1.77), machinery and parts (1.03), electrical machinery (4.92) and transport equipments (3.38).
Madras	Textile products (5.78), wood products (8.73), paper products (2.63), rubber products (3.45), metal products (4.20) and electrical machinery products (2.8)
Madurai	Food products (1.24), beverage products (1.04), cotton textiles (2.64), rubber products (1.97),
North-Arcot	Food products (1.25), beverage products (5.81), leather products (14.18), chemical products (1.33) basic metal products (2.00) and machinery & parts (1.58)
Nilgiris	Food products (13.83)
Pudukottai	Cotton textiles (2.15) and machinery &parts (3.24)
Ramanad	Cotton textiles (1.97), wool, silk and jute textiles (1.36), paper products (1.39), chemical products (2.67), non-metallic products (1.61)
South-Arcot	Food products (9.74), beverage products (10.38), non-metallic products (2.56)
Salem	Food products (1.82), cotton textile products (1.88), wool, silk and jute textile (2.08), chemical products (1.46), non-metallic products (2.17) and basic metal products (2.07)
Thanjavur	Food products (9.97) and chemical products (3.45)
Tiruchy	Paper products (3.43), non-metallic products (2.34) basic metal products (1.64) and machinery & parts (3.53)
Tirunelveli	Cotton textiles (1.83), chemical products (2.91) and non-metallic products (4.00)
Kanyakumari	Food products (11.21) and rubber products (3.52)

Figures in brackets are value of Lij.

Table 5.6 depicts the industrial base of the various districts in the year 1986-87. (see appendix table). This method of identification of the 'industrial base' is useful for a qualitative understanding of the structure of the regional industrial economy and also for inter-regional comparisons. In a multi-regional economies, a region would tend to specialise in those for which it has some comparative advantage over the other regions. Hence the industries with high location quotients (with value > 1) would constitute the industrial base of the region.

Majority of the districts have a set of resource based industries comprising their industrial base. Development of capital goods and demand based industries in confined either to some developed districts like Madras and Chengalpattu or where heavy public sector investment has been made like Tiruchy or where government incentives are given (Dharmapuri). The 'industrial base' of almost all regions is characterised by agro-based or intermediate goods industries. This type of traditional, primary-resource base is the basic characteristic of the industrial base of the regional economies. Except for few districts like Madras, Chengalpattu, Coimbatore, which besides specialising in resource-based industries, also specialise in capital goods.

The industrial base of Coimbatore, a relatively developed district, consists of mainly agro-based consumer goods industries, fibre-based (textiles), and to a lesser extent to capital goods industries. The industrial base of the districts

like Chengalpattu, Dharmapuri and Tiruchy is predominantly oriented to the metal-based industries and capital good industries which are of recent origin. Madras and North-Arcot has a relatively diversified base, tending to specialise in intermediate goods industries like paper and paper products, leather and leather products, and some mineral based and capital goods industries. The location quotient analysis thus shows the industrial base of almost all the districts is dominated by agro-based industries like food products. The industrial base of the regions, by and large, reflects resource endowment of the regions.

Coefficient of specialization has been used to examine the relative position of industrial diversification of the regions in Tamilnadu in 1977-78 and 1986-87. The coefficient of specialization for a district (S_j) is defined as

$$S_j = \sum_{i=1}^{n} \left| \frac{V_{ij}}{V_j} - \frac{V_i}{V} \right|$$

where V_{ij} = value added in ith industry in jth district
Vj = value added in all industries in jth district
Vi = value added in ith industry in the State
V = value added in all industries in the State

Given the values of the specialization coefficients of each region, it is possible for analytical purposes to group the regions broadly by their levels of diversification. Regions where S_j is found to be between 0 and 0.25, the districts' industrial structure is as diversified as that of the State and

when it is found between 0.25 and 0.50, can be grouped as 'middle level' diversified regions. Where S_j is between 0.50 and 1.00 industrial value added is highly concentrated in only one or a few industries.

When we classify the regions into three broad groups according to their levels of diversification, we find that in 1977-78, Madras was the only district which could be grouped in the 'middle level' of diversification. Rest of the districts were less diversified particularly Tiruchy. In 1986-87 Salem was the only district which could be regarded as 'middle level' of diversified region. Over the years few districts have diversified their industrial structure except Madras, South Arcot, North Arcot, Nilgiris, Chengalpattu, Tirunelveli and Kanyakumari where the tendency seems to be in opposite direction. During the period Coimbatore, Ramanad and Tiruchy show very little change in their level of diversification; while Dharmapuri, Pudukottai, Madurai, Salem and Thanjavur witnessed substantial diversification in their industrial structure. On the whole, there does not seem to have been any significant overall change in the relative level of regional industrial diversification over the period. The rank correlation between the series for 1977-78 and 1986-87 was 0.73, indicating the stability of the relative rank order of the states during these years.

Table 5.7

Industrial Diversification/Specialization of Districts in 1977-78 and 1986-87

Districts	1977-78	1986-87
Coimbatore	0.785	0.743
Chengalpattu	0.714	0.828
Dharmapuri	0.773	0.590
Madras	0.464	0.628
Madurai	0.891	0.770
North Arcot	0.733	0.793
Nilgiris	0.894	0.943
Pudukottai	0.802	0.611
Ramanad	0.593	0.548
South Arcot	0.815	0.978
Salem	0.529	0.441
Thanjavur	0.907	0.837
Tiruchy	1.000	0.968
Tirunelveli	0.623	0.659
Kanyakumari	0.856	0.863

An interesting feature of industrial diversification is that the nature of specialization varies with the level of diversification in a region. A comparative examination of the industrial base of the regions (table 5.6) and the degree of their diversification (table 5.7) reveals that the `less diversified' regions in general specialise in resource-based industries, while, `middle level' diversified regions have a wide range of industry groups including capital goods and demand oriented consumer goods industries. One interesting feature emerging from table 5.6 is that, in Tiruchy and Salem there is greater specialization in the capital goods industries compared to in the other regions at similar levels of diversification. This poses an exception to the generalisation made earlier about the relationship between level of diversification and structure of specialization. These regions have received a higher level of public sector industrial investment, mainly in capital goods industries.

To sum up, from the foregoing analysis the following observation could be observed:

(1) There is more concentration of industrial activity in a very few cetres of the State economy. The major centres are Madras and its sub-urb including Chengalpattu and Coimbatore irrespective of the indicators used.

(2) During the study period, there is no significant change in the relative position of the districts. The districts which occupied a predominant position in 1975-76 where found to be the same in 1986-87 also, though there was a absolute decline in their shares.

(3) The growth rate reveals that the fastest growing districts were the industrially backward districts and not highly industrialised districts.

(4) The inequality indices also shows that there is heavy concentration of industrial activity, but there is a tendency towards reduction in inequality during the study period.

(5) It could be found from the location quotient analysis that the industrial base of the districts were dominated by agro-based/resource based industries.

(6) Coefficient of specialisation shows that the industrial base of the regions are less diversified and there is high degree of specialisation.

Notes

1. A region can be defined on the basis of various criteria, for example, geographical, administrative, economic etc. Usually, the choice of a region in case of regional studies (especially in economics) is dictated by the availability of data. Since data are available only at district level in the present analysis districts are chosen as the spatial units for this study. A district is not necessarily a uniform economic or geographic region but, it being the basic administrative unit, data are mainly available only on a district basis. Therefore inter-district analysis is used as inter-regional analysis to examine the inter-regional disparities in the industrial growth of Tamil nadu.

2. See Yoginder K. Alagh, K.K.Subrahmanian & S.P.Kashyap (1971), T.S.Papola (1980), T.S.Papola et.al., (1979), and Dinesh N.Awasthi, S.P.Kashyap & Kiran Wadhwa (1988).

3. During the period of study certain districts were divided, therefore the data pertaining to those districts which were sub-divided, were combined together to arrive at comparable figures. Accordingly, Coimbatore includes Periyar (1981-82 onwards), Madurai includes Dindugal/Quaid-e-Milleth (1985-86 onwards) and Ramandhapuram includes Pasumpon Muthuramalinga Thevar and Kamarajar districts (from 1985-86 onwards).

4. The Index is given by (v2+1)/n, where v2 is the square of the coefficients of variation (in the share of the ith district in total value added/ fixed capital/ employees/ number of factories, in the respective totals) and 'n' the number of districts.

Appendix:

Reduction in regional disparities in the levels of development has been recognised as an important national objective especially after the Second Five Year Plan in India. Policies regarding issuing of licenses, availability of financial assistance, allocation of plan investments, etc, have been the major means to achieve the goal. This objective however, was not achieved to a socially desirable extent during the first 3 five year plans. At the beginning of fourth plan with renewed emphasis on regional balance the task of identifying industrially backward areas was taken up for the first time by the Planning Commission by appointing a Committee under the Chairmanship of Shri B.D.Pande. This Committee suggested certain criteria for identifying backward districts in backward States. These criteria were subsequently finalised by the Planning Commission in consultation with financial institutions for the purpose of demarcating backward districts in all the States. These criteria were per capita production of food grains/ commercial crops, per capita industrial output, factory employment, availability of infra-structure facilities per capita consumption of electricity etc. Only those districts, where the composite index was well below that of the state index in respect of the above indicators, were to be selected as backward. According to this criteria, in Tamilnadu, districts such as Dharmapuri, Kanyakumari, Madurai, North Arcot, Ramanadhapuram, South Arcot, Thanjavur and Tiruchirapalli were identified as industrially Backward Districts on the basis of the composite index and these eight districts were qualified for concessional finance from the financial institutions (As on 8th July 1974).

Simultaneously, the Planning Commission has also appointed another Committee under the Chairmanship of Shri.N.N.Wanchoo to suggest fiscal and financial incentives for industrial development in backward areas. This committee recommended in 1969 several special fiscal and financial incentives like higher development rebate, exemption from income tax, corporate tax, payment of imports duties and excise duties for a specified period, grant of financial assistance on concessional terms etc. to be offered by (1) Central Government, (2) State Governments and (3) Financial Institutions.

List of Industrially Backward Districts/ Areas selected to qualify under Central Governments Outright Grant or Capital subsidy scheme as on 31st January 1974 in Tamilnadu are:

Area No.1: Comprising of 10 Talukas viz: 1) Ramanadhapuram, 2) Madukulathur, 3) Sivaganga, 4) Parmakudi, 5) Thiruvadeni and 6) Tirupathur of Ramanathapuram district. 1) Melur of Madurai district, and 1) Thirumayam 2) Alangudi and 3) Kulathur of Tiruchirapalli district.

Area No.2: Comprising of 9 Talukas viz: 1) Dharmapuri, 2) Hosur of Dharmapuri district and 1) Tirupattur, 2) Vaniyambadi, 3) Vellore and 4) Walajapet of North Arcot district.

Area No.3: Comprising of 8 Talukas viz: 1) Aruppukottai, 2) Sattur and 3) Sriviliputtur of West Ramanathapuram districts. 1) Tirumangalam, 2) Usilampatti, 3) Nilakothai, 4) Dindigul and 5) Vedasandur of Madurai district.

Chapter VI

SUMMARY AND CONCLUSION

In India, since independence considerable emphasis has been laid on the industrial development for achieving rapid economic growth not only of the nation but also of the regions within the nation. But economic growth, by its very nature, is characterised by various types of imbalances. This phenomenon is more pronounced in the spatial dimensions of growth, which tends to get concentrated in certain regions within the economy. Therefore, along with industrial growth, regional dispersal of industries was also aimed at in the strategies of industrial development.

The review of the industrial growth pattern, structural change and regional dispersal of industries in chapter I indicates that there had been changes in the industrial structure from agro-based and intermediate goods towards capital goods. There is regional disparity across states and within the states which has been declining over the years. The review also highlighted the need for regional level studies to understand the industrial development of the economy. With this background, an attempt was made in the present study to examine the structural changes and growth pattern of the industrial economy of Tamilnadu with special emphasis on the spatial dimension of the growth process.

As a prelude to the main analysis, an overview of the historical pattern of the industrial development has been traced in chapter II. It mainly aims at capturing the trends in the process of evolution of the modern industrial structure during, both the pre and post independence period. With the exception of a few for the textile factories, initiated by the Europeans, industrialisation in the true sense had hardly commenced till the beginning of the present century. It was the depression and later the Second World War which provided an impulse for heightened industrial activity in the region.

The history of industrial development may be conveniently divided into three phases. The first phase from 1900 to 1929, hardly witnessed any growth of industries. However during the period between 1930 and 1950 there was a phenomenal growth of industries particularly cotton textile industry, and there was broadening of the structure of industries in the late 1950s. Till then, the manufacturing sector was dominated by a few major industries like cotton textiles, sugar, cement and leather which were concentrated in a few regions of the State particularly in Coimbatore and Madras. It was after 1950s, that rapid industrialisation took place, when the state started playing a major role in the development of industries by encouraging private investment through loans, financial and technical aid, by providing facilities for importing plant and machinery etc. The industrial base widened and deepened, with basic and capital goods coming into prominence and changes has been towards a more complex structure conforming to a higher levels of industrialisation.

Though the State was deficient in basic raw materials and natural resources, the state through careful planning, and by exploiting the various favorable factors available, like trained manpower, transport facilities, a well-developed power grid, a progressive entrepreneurial class and a stable administration, was able to build up, over the years, a strong and effective infrastructure for providing stimulus for industrial growth. Tamilnadu is today counted among the most industrially advanced States in the country occupying an important position in the industrial map of India.

An analysis of the sectoral composition of the Tamilnadu economy, revealed that there was a steady decline in the share of the primary sector with a moderate rise in the share of the secondary and tertiary sector, which was in consonance with that of the national economy. But a distinguishing feature of the Tamilnadu economy was the growing prominence of the secondary sector which was in sharp contrast to the stagnant growth of industrial income in rest-of-India. The industry wise analysis revealed that the rate of growth of capital stock was relatively higher than the growth rate of value added and employment for the aggregate manufacturing sector. It was also observed from the sub-period growth rates that there was a continuous rise in the growth rate of capital in sharp contrast to the decline in the growth rate of employment. Analysis of growth performance of the value added revealed a cyclical pattern, with acceleration in growth followed by deceleration and recovery during the three sub-periods. Tentatively it should

therefore be possible to infer that the industrialisation process in Tamilnadu was capital deepening and labour displacing.

It was observed from the disaggregated analysis that the largest share in terms of number of factories was accounted by food products. Whereas, cotton textiles occupied the dominant position in terms of capital investment, employment and value added. The growth rate of value added and that of capital stock were found to be significantly associated in the industry groups like jute, wool & silk textiles, wood products and chemical products. In industry groups such as food products, rubber products, non-metallic mineral products and electrical machinery and parts, the growth in value added was faster than that of capital and in all other industry groups the relationship was in the reverse viz., the capital grew faster than the value added. Similarly, an association between growth in value added and growth in employment was found to be significant in industry groups such as, wool, silk & jute textiles, wood products, basic metal and alloy products, paper products, metal products, rubber products, non-metallic mineral products and machinery and parts. Though food products registered the highest growth in value added, the employment did not grow in equal phase. In contrast, cotton textiles and transport equipment accounted for a higher growth rates in employment and a low growth in value added.

Our productivity analysis indicated that the manufacturing industries were largely capital-intensive: in the sense that, the growth of capital far exceeded than that of labour; however, it did not show spectacular growth in factor

productivities. Productivity growth, however, was negative for capital and positive in the case of labour. The divergence between the rates of growth of capital intensity and capital productivity simply meant that the rate of addition to output was lower than the rate of addition to capital invested to produce them. The results of the total factor productivity growth indicates that the manufacturing sector as a whole along with certain industry-groups performed inefficiently (particularly during the second and third sub-periods) which was due to the poor productivity of capital. The contribution to value added growth was largely the outcome of capital accretion. The role of labour was marginal.

The inter-regional disparity of growth was analysed by using district level data for the period 1975-76 to 1986-87. It was observed that the regions which occupied a dominant position in the 1970s were found to be the same in late 1980s also. In terms of number of factories Coimbatore occupied the first position, whereas in terms of fixed capital and employment Madras occupied the first position. The 'economic base' analytical typology, viz., estimation of location quotient and specialisation co-efficient for each of the 15 districts identified as regions, revealed that the industrial base of the regional economies in Tamilnadu was characterised by primary-resource-oriented industries. Development of capital goods industries was confined to few developed districts such as Madras and the neighboring district of Chengalpattu. Specialisation coefficient revealed that there was not any significant change in the relative levels of regional industrial diversification over

the period. Concentration of industrial activities were found in districts like Coimbatore, Madras and Chengalpattu. Dharmapuri, Kanyakumari, Pudukottai, Thanjavur and Ramanathapuram were industrially backward districts.

In brief, our study revealed that the industrial sector of Tamilnadu witnessed a higher growth as compared to rest-of-India. But, this growth was not accompanied by any substantial changes in its structure. In other words, it was not sufficient enough to set in motion a process of dynamic structural change both in terms of composition of industries and other associated characteristics including spatial dimension.

So far as composition of industries was concerned traditional industries continued to dominate. While, there has been a growth of reasonably diversified modern industrial complex in the recent past, yet as a process it has not been strong enough to alter the pre-existing industrial structure. Consequently, there was no significant structural linkages and agglomeration in the industrial development. This had adverse implications on the factor-use efficiency. As revealed by our productivity analysis, there was no significant growth in the Total Factor Productivity. It was also found that the major source of growth of industrial output was provided by capital. This was also evident from the continuous rise in growth rate of capital-intensity, connoting a capital deepening process. As could be expected from such a growth process, the study highlighted the limited labour absorption capacity of the manufacturing sector.

The regional level analysis indicated that the industrial growth observed in the state was spatially concentrated in the traditional industrial centres like Coimbatore, Madras and Chengalpattu, the latter was a case of spillover from Madras. The emergence of few new industrial centres (Dharmapuri, Tiruchirapalli, Salem, etc.) have not brought about any significant change in the spatial concentration of industries.

To conclude, our study unfolds several shortcomings such as lack of diversification in product-mix, inefficiency in factor-use, limited labour absorptive capacity, and spatial concentration in the process of industrialisation of Tamilnadu in recent years. All these, which are connected with lack of dynamism in the structural change, are matters of serious concerns and in the context of the present strategy of industrial development of the state call for necessary policy intervention.

BIBLIOGRAPHY

Ahluwalia, I.J. (1985) : Industrial Growth in India: Stagnation Since Mid Sixties, Oxford University Press, New Delhi.

----------(1988) : "Industrial Policy and Industrial Performance in India", in EB Lucas and G.F. Papanek (eds) The Indian Economy: Recent Developments and Future Prospects, Oxford University Press, Delhi.

Alagh,Y.K., Kashyap,S.P., Jayshree,V. & Awasthi, D.N. (1983) : "Indian Industrialization: Regional Structure and Planning Choices", Man and Development, Vol.5 No.1 March.

Alagh,Y.K., and Pathak, P.G. (1973) : "Industrial Development in Gujarat Regional Structure and Policies", Artha-Vikas, Vol.9, No.1-2.

Alagh,Y.K., Subrahmaninan,K.K., and Kashyap, S.P. (1971) : "Regional Industrial Diversification in India", Economic and Political Weekly, April.

Albin, Alice (1988) : Manufacturing Sector in Kerala: A Study of Scale Structure and Growth, MPhil dissertation submitted to the Jawaharlal Nehru University, New Delhi, Centre for Development Studies, Trivandrum.

Awasthi, D.N. (1989) : "Trends in the Regional Industrial Inequalities in India: 1961-78, Anvesak, Vol.19, No.12.

-------, Kashyap,S.P. and Wadhava (1988) : Analysis of Regional Growth Patterns in India, Sardar Patel Institute of Economic and Social Research, Ahmedabad.

Bagchi, A.K. (1972) : Private Investment in India 1900-1939, Cambridge University Press.

--------- (1975) : "Some Characteristics of Industrial Growth in India", Economic and Political Weekly, February.

Bhagwati, J.N. & Desai, P. (1970) : India, Planning for Industrialisation, Oxford University Press.

Bajpai, B.K. (1985) : "Inter-Regional Industrial Disparities in India" in Mishra, G.P. (ed), Regional Structure of Development and Growth in India, Ashish Publishing House, New Delhi.

Baker, C.J. (1984) : An Indian Rural Economy: 1880-1955 The Tamilnad Countryside, Oxford University Press, New Delhi.

Bharathan, K. (1980) : Changes in the Composition of Industries in Tamilnadu, 1960 to 1970: A Study of Factory Sector, Dissertation submitted for the Degree of Master of Philosophy of the University of Madras (unpublished).

---------- (1983) : The Cotton Handloom Industry in Tamilnadu: Some Characteristics and Aspects of Change from Post-Independence Census Data, Working Paper No.34, MIDS (mimeo).

---------- (1984) : "Industrial Development in Tamil Nadu", Bulletin, Madras Development Seminar Series, Vol.XIV No.10.

----------(1986) : "Industrial Licencing: Has Tamil Nadu been Differentiated Against? Bulletin, Madras Development Seminar Series, MIDS, January.

Bhardwaj, Krishna (1982) : "Regional Differentiation in India: A note", Economic and Political Weekly, Annual Number.

Bhogendrenath,N.C. (1957) : Development of Textile Industry in Madras upto 1950, Economic Series, 9, University Press Madras.

Chandrasekhar, C.P. (1988) : "Aspects of Growth and Structural Change in Indian Industry", Economic and Political Weekly, Special Number, November.

Chenery, H. and Syrquin, M. (1975) : Development Patterns 1950-1970 Oxford University Press (for World Bank), London.

---------, H.B. (1979) : Structural Change and Development Policy, Oxford University Press, New York.

Chenery, H. (1981) : Structural Change and Development Policy, Oxford University Press, New York.

Chenery, H.B., S.Robinson and M.Syrquin, (1986) : Industrialisation and Growth: A Comprative Study, Oxford University Press, New York.

---------- (1989) : Three Decades of Industrialisation The World Bank Economic Review, Vol.3 No.1.

Clark, C. (1940) : Conditions of Economic Progress, Macmillan, London.

Dhar, P.N. and Sastry, D.V (1969) : "Inter-State Variations in Industry 1951-61", Economic and Political Weekly, March 22.

Dholakia, H.R. (1979) : An Inter-State Analysis of Capital and Output in the Registered Manufacturing Sector, Indian Journal of Industrial Relations No.15.

--------, H.R. (1989) : "Regional Aspects of Industrialization", Economic and Political Weekly, November 18.

Dutta Roy Choudhury, U. (1990) : Regional Pattern of Development in India, Working Paper No.3, National Institute of Public Finance and Policy, New Delhi.

----------, and M.Mukherjee (1984) : National Accounts Information Machmillan, New Delhi.

Godbole, M.D. (1978) : Industrial Dispersal Policies, Himalaya Publishing House, Bombay.

Goldar, B.N. (1983) : "Productivity Trends in Indian Manufacturing Industry:1951-1978, Indian Economic Review, Vol.18.No.1.

----------(1986) : "Import Substitution, Industrial Concentration and Productivity Growth in Indian Manufacturing", Oxford Bulletin of Economics and Statistics Vol.48. No.2.

---------- (1987) : "Productivity and Factor-use Efficiency in Indian Industry", Paper Presented at the Seminar on Indian Industrialisation, Centre for Development Studies, Trivandrum.

---------- and Seth, V. (1989) : "Spatial Variations in the Rate of Industrial Growth in India", Economic and Political Weekly, Vol 24, June 3.

Government of India : Estimates of State Domestic Product, Central Statistical Organisation, Ministry of Planning, New Delhi. (various issues)

---------- : National Accounts Statistics, Central Statistical Organisation, Ministry of Planning, New Delhi. (various issues)

Government of Tamilnadu : Annual Statistical Abstract of Tamilnadu, Department of Statistics, Madras. (various issues)

---------- : Industrial Profile of Tamilnadu, Department of Statistics, Madras. (Various issues)

Hema, R. (1989) : "An Input-Output Framework for the Manufacturing Sector in Tamilnadu", Bulletin, Madras Development Seminar Series, MIDS, Madras, Vo.19, No.12 December, 1989.

Hilton Brown (1954) : Parry's of Madras, Madras.

Holland, S. (1976) : Capital Versus the Regions, The Macmillan Press Ltd. London.

Ishikawa, S. (1987) : "Structural Change", in J. Eatwell (ed.), The New Palgrave Dictionary of Economics, Macmillan, London.

Kaldor Nicholas (1970) : "The Case for Regional Policies" Scottish Journal of Political Economy, Vol.17, November.

Kaur, K. (1983) : Structure of Industries in India Deep and Deep Publications, New Delhi.

Kumar, A. (1985) : "Industrial Development - A Need for Different Thrust, Southern Economist, April.

Kurien, C.T. James J.(1979) : Economic Change in Tamilnadu 1960-1970, A Regionally and Functionally Disaggregated Analysis, Allied Publishers Private Limited, New Delhi.

Kuznets, S. (1966) : Modern Economic Growth, Yale University Press, New Haven.

-------- (1971) : Economic Growth of Nations, Cambridge University Press, Cambridge.

-------- (1972) : Modern Economic Growth: Rate, Structure and Spread, Oxford and IBH, New Delhi.

Madras Institute of Development Studies, (1988) : Tamilnadu Economy, Performance and Issues, Oxford and IBH Publishing Co.Pvt. Ltd. New Delhi.

Mahadevan, R. (1987) : "Conflict and Dependence: Some Aspects of the Evolving Relationship between indigenous and Foreign Capital in Colonial Madras" Paper Presented at the Seminar on Indian Industrialisation, Centre for Development Studies, Trivandrum.

---------- (1991) : The Pattern of Industrial Control in Colonial Madras: Some Critical Observations on the Relative Position of Indian and Foreign Capital 1930-50, Oxford University Press. (Forthcoming)

Mitra Arup (1988) : Structural Aspects of Growth: A State-Level Analysis, Institute of Economic Growth, Working Paper No.E/135/88, Delhi.

Mukhopadhyay, D. (1989) : "Inter-District Variation in Industrial Employment: Its main Causes", A Case Study of West Bengal, Artha Vinjana December.

Mundle, S. (1989) : "Growth Acceleration and Fiscal Constraint",Mainstream, September.

Myrdal, Gunnar (1964) : Economic Theory and Underdevloped Regions, Duckworth, London.

Nath, V. (1970) : "Regional Development in Indian Planning", Economic and Political Weekly, Annual No, Special No. January.

Palsapure, P.Z. (1975) : Regional Study of Industrial Development of Vidarbha, Popular Prakashan, Bombay,

Paranjape, Jyotsna (1988) : "Inducing Industrial Incentive in Backward Regions, A study of Maharashtra and Gujarat", Economic and Political Weekly, Feburay 13.

Papola, T.S., Mishra, V.N., Verma, H.S., Sinha,R.G. and Joshi, A. (1979) : Studies on Development of Uttar Pradesh, Giri Institute of Development Studies, Lucknow.

------, T.S. (1980) : Spatial Diversification of Industries, A Study of Uttar Pradesh, Industrial Development Bank of India,

Pandit, M.L. (1985) : Industrial Development in Punjab and Haryana, B.R. Publishing Corporation, Delhi,

Pratap, Rana (1985) : Growth and Regional Pattern of Industrial Complexes, A Case Study of Bihar, Concept Publishing Compny, New Delhi,

Radhakrishnan, N. (1989) : Growth, Structure and Productivity of Indian Manufacturing Industry: An Econometric Analysis, published Ph.D Thesis Submitted to University of Kerala.

Raj, K.N. (1976) : "Growth and Stagnation in Indian Industrial Development", Economic and Political Weekly, November 26.

Raj Krishna (1981) : "The Centre and the Periphery: Inter State Disparities in Economic Development", Socaial Action, Vol.31, No.1.

Rao, R.T. (1989) : "Some Aspects of Transformation of the Manufacturing Sector in India, The Journal of Income and Wealth, Vol.11, No.1, January.

Rao, V.K.R.V. (1983) : India's National Income 1950-1980-An Analysis of Economic Growth and Change, New Delhi, Sage Publications.

Ray, R.K. (1979) : Industrialization in India Growth and Conflict in the Private Sector Oxford University Press.

Rostow (1960) : The Stages of Economic Growth, Cambridge University Press, Cambridge.

Roy, Tirthankar (1984) : Interstate Variation in Industial Growth in India, 1960-1979, MPhil Dissertation submitted to the Jawaharlal Nehru University, New Delhi, Centre for Development Studies, Trivandrum.

Sekhar, A.U. (1982) : "Trends in Inter-State Disparities in Industrial Development in India 1961 to 1975", Indian Economic Journal, October-December.

Sharma, B.U. (1981) : "Indian Industry Performance and Guidelines", Southern Economist, September.

Sharma, J.N. (1966) : "Balanced Regional Development; It it Possible", Economic and Political Weekly, January.

Shetty, S.L. (1978) : "Structural Retrogression in the Indian Economy Since the Mid-Sixties", Economic and political Weekly, Annual No., Feburary.

-------- (1982) : "Industrial Growth and Structure, As Seen through Annual Survey of Industries", Economic and Political Weekly, Vol. XVII,No.40, October.

Singh, Harpool (1987) : Regional Disparity in Industrial Growth, Anmol Publications New Delhi.

Singh, Surjeet (1989) : "Study on Industrial Structure: An Overview", in High Power Committee Report on Strategy for Industrial Development in Eight Five Year Plan, Vol.II, Government of Rajasthan.

Sivasubramanian (1986) : "Changes in the Industrial Structure of Tamilnadu 1960-980", Bulletin, Madras Development Seminar Series, Vol. XVI, No.7.

Subrahmanian, K.K. and Papola, T.S. (1972) : "Regional Differnces in Profitability and Growth", Economic and Political Weekly, April 15.

Sumdrum, R. M. (1987) : Growth and Income Distribution in India-Policy and Performance since Independence, New Delhi, Sage Publications.

Swaminathan, P. (1988) : "State Intervention in Industrial Development: A case Study of the Madras Presidency",Paper Presented to the Seminar on South Indian Economy c.1914 - c.1945, Centre for Development Studies, Trivandrum.

---------- (1991) : State Intervention in Industrialisation: A Case Study of the Madras Presidency South India, Working Paper No.99, MIDS, Madras.

Tewari, R.T. (1988) : "Inter-regional pattern of Industrialisation in India 1971-1981", The Indian Economic Journal Vol.36, No.2, October-December.

Thangamuthu, C. (1983) : "Industrial Structure and Change in Tamilnadu", Southern Economist, September.

Tyabji, N. (1988) : "State Aid to Industry: Madras 1921-1973" Economic and Political Weekly, Review of Political Economy, Vol. 23, No.31.

---------- and Swaminathan, P. (1989) : "Recent Trends in Industrialization in Tamilnadu", Bulletin, Madras Development Seminar Series, November.

Taylor (1969) : "Development Patterns a Simulation Study", Quartely Journal of Economics Vo.83, No.1