

**EFFICIENCY IN CENTRAL PUBLIC SECTOR
ENTERPRISES IN KERALA:**

**AN ANALYSIS OF CAPACITY UTILISATION,
PROFITABILITY AND PRODUCTIVITY**

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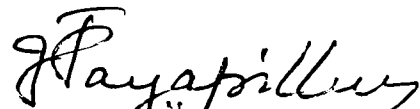
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C E R T I F I C A T E

This is to certify that the thesis "Efficiency of Central Public Sector Enterprises in Kerala : An Analysis of Capacity Utilisation, Profitability and Productivity" is a bonafide record of research work done by Shri. Antony M.T. under my supervision and guidance. The thesis is worth submitting for the award of the degree of Doctor of Philosophy in Economics.



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C O N T E N T S

LIST OF TABLES	iv - vi
LIST OF FIGURES	vii

<u>CHAPTERS</u>	<u>PAGE NO.</u>
I. INTRODUCTION	1 - 23
Definition of Public Enterprise	2
Objectives of Public Enterprise	5
Rationale of Public Sector	6
Genesis of Public Sector Enterprises in India	9
(a) Departmental Undertakings	10
(b) Statutory Corporation	11
(c) Government Company	12
Scope of the Study	15
Significance of the Study	17
Objectives of the Study	18
Hypotheses of the Study	18
Methodology	19
Data and Variables	21
Scheme of the Study	22
II. CRITERIA OF EFFICIENCY : A REVIEW	24 -40
Performance Evaluation Agencies in India	37
Memorandum of Understanding	39
III. EFFICIENCY OF PUBLIC ENTERPRISES	41 - 100
Efficiency and Productivity	42
Efficiency and Profitability	43
Efficiency and Efficacy	43

A.CAPACITY UTILISATION	44
Definition of Capacity	45
Approaches to Capacity Utilisation	46
Impact of Underutilisation	54
Capacity Utilisation and Economic Growth	55
Methods of Calculating Capacity Utilisation	56
Capacity Utilisation in Public Sector Enterprises	64
Factors Effecting Underutilisation of Capacities in Public Sector Enterprises	66
Factors Leading to Better Utilisation	71
B.PROFITABILITY	72
Concept of Profit	73
Concept of Profitability	73
Profit and Efficiency of Public Enterprises	74
Measurement of Profitability	85
C.PRODUCTIVITY	88
Kendrick Measure of TFPG	92
Solow Measure of TFPG	93
Translog Measure of TFPG	95
Comparison of the Three Measures of TFPG	96
Measurement of Variables	98
Measurement of Capital Input	98
 IV.GROWTH OF PUBLIC SECTOR IN INDIA	 101 - 132
Autonomy and Accountability	111
Industrialisation of Kerala	117
Central Public Sector Enterprises in Kerala	121
 V.CAPACITY UTILISATION OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA	 133 - 181
Extent of Underutilisation of Capacity in CPSEs in Kerala	135
Capacity Utilisation in FACT Ltd.	135
Causes responsible for Underutilisation	139
Capacity Utilisation in Cochin Shipyard Ltd.	143

Capacity Utilisation in Cochin Refineries Ltd.	151
Capacity Utilisation in Hindustan Latex Ltd.	154
Capacity Utilisation in Travancore Cochin Chemicals Ltd.	154
Capacity Utilisation and Employment Generation	159
Employment Generation of CPSEs in India	161
Employment Generation of Selected Enterprises in Kerala	166
 VI. PROFITABILITY OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA	182 - 207
Profitability of CPSEs in Kerala	188
 VII. PRODUCTIVITY OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA	208 - 251
Productivity of Selected Enterprises in Kerala	212
Cochin Refineries Ltd.	214
Cochin Shipyard Ltd.	219
Fertilisers and Chemicals Travancore Ltd.	221
Hindustan Latex Ltd.	227
Travancore Cochin Chemicals Ltd.	229
Cobb-Douglas Production Function	240
 VIII. CONCLUSION AND RECOMMENDATIONS	252 - 262
Conclusions	253
Conclusions Regarding Capacity Utilisation	253
Conclusions Regarding Profitability	255
Conclusions Regarding Productivity	257
Recommendations	260
 APPENDIX	i - viii
BIBLIOGRAPHY	ix - xxi

LIST OF TABLES

<u>TABLE NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
4.1	Investment in Public and Private sectors during five year plans	103
4.2	Growth of Sales in Public Enterprises in India	106
4.3	Investment in Central Government Enterprises (under five year plans)	107
4.4	Ten Top Profit Making Enterprises : 1988-89 (profit before tax)	112
4.5	Inter-state Disparity in Levels of Industrialisation	120
4.6	Central Sector Companies, Capital, Employment and Capital per labour employed	122
4.7	Investment in Kerala in terms of Gross Block of the Central Public Sector Enterprises as on 31st March of the Year	124
4.8	Central Investment in Various States (1979-1989) as on 31st March of the Year	125
4.9	Central Investment in Various States (1979-1989) in percentage as on 31st March of the year	126
5.1	Capacity Utilisation in Public Enterprises in India	134
5.2	Estimated Loss of Production due to Underutilisation of capacity (for manufacturing enterprises only)	136
5.3	Capacity Utilisation in Fertilisers and Chemicals Travancore Limited.	137
5.4	Capacity Utilisation in Cochin Shipyard Limited.	145
5.5	Capacity Utilisation in Cochin Refineries Limited.	153
5.6	Capacity Utilisation in Hindustan Latex Limited.	155

5.7	Capacity Utilisation in Travancore Cochin Chemicals Limited.	156
5.8	Installed Capacity and Production in TCC from 1977-78 to 1988-89	158
5.9	Employment Generation in Public Enterprises in India	162
5.10	Growth of Employment, Emoluments and Employees Satisfaction Ratio (1977-78 to 1988-89)	164
5.11	State-wise Distribution of Employment of Central Public Sector Undertakings in India	165
5.12	Employment and Emoluments in CRL	168
5.13	Employment and Emoluments in CSL	170
5.14	Employment and Emoluments in FACT	171
5.15	Employment and Emoluments in HLL	173
5.16	Employment and Emoluments in TCC	175
5.17	Employment and Per capita Emoluments - A comparison	177
6.1	Profitability Profile of Public Enterprises	183
6.2	Profit/Loss Making Central Public Enterprises in India	185
6.3	Groupwise Net profits/losses of Public Enterprises	186
6.4	Profits of Public Sector Enterprises in Kerala (as on March 31 of the year)	189
6.5	Profitability Profile of Cochin Refineries Ltd.	196
6.6	Profitability Profile of Cochin Shipyard Ltd.	197
6.7	Profitability Profile of FACT Ltd.	199
6.8	Profitability Profile of Hindustan Latex Ltd.	200
6.9	Comparative Profitability (1977-78 to 1988-89)	202
6.10	Profitability of Travancore Cochin Chemicals Ltd.	204
7.1	Productivity Indices of CPSEs in India (from 1977-78 to 1988-89)	209
7.2	Total Factor Productivity of CPSEs in India (from 1977-78 to 1988-89)	211
7.3	Value Added and Gross Fixed Assets of Cochin Refineries Ltd.	215
7.4	Productivity Indices of Cochin Refineries Ltd. (from 1977-78 to 1988-89)	216

7.5	Value Added and Gross Fixed Assets of Cochin Shipyard Ltd.	220
7.6	Productivity Indices of Cochin Shipyard Ltd. (from 1977-78 to 1988-89)	222
7.7	Value Added and Gross Fixed Assets of FACT Ltd.	225
7.8	Productivity Indices of Fertilisers and Chemicals Travancore Ltd. (from 1977-78 to 1988-89)	226
7.9	Value Added and Gross Fixed Assets of Hindustan Latex Ltd.	230
7.10	Productivity Indices of Hindustan Latex Ltd.	232
7.11	Value Added and Gross Fixed Assets of TCC Ltd.	234
7.12	Productivity Indices of Travancore Cochin Chemicals Ltd.	236
7.13	Capital Intensity of CPSEs in Kerala	239
7.14	Capital Labour Ratios of CPSEs in Kerala	241
7.15	Estimates of Cobb-Douglas Production Function	243
7.16	Output-Labour Ratio and Marginal Productivity of Labour in CPSEs in Kerala	247
7.17	Output-Capital Ratio and Marginal Productivity of Capital in CPSEs in Kerala	248

LIST OF FIGURES

<u>FIGURE NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
5.1	Capacity Utilisation in CPSEs in Kerala (1978 to 1989)	160
5.2	Employment Generation in CPSEs in Kerala (1978 to 1989)	176
6.1	Profits of CPSEs in Kerala (1977-78 to 1988-89)	203
7.1	Productivity of CPSEs in India (from 1978 to 1989)	213
7.2	Productivity of CRL (from 1978 to 1989)	218
7.3	Productivity of CSL (from 1978 to 1989)	223
7.4	Productivity of FACT Ltd. (from 1978 to 1989)	228
7.5	Productivity of HLL (from 1978 to 1989)	231
7.6	Productivity of TCC Ltd. (from 1978 to 1989)	235
7.7	Marginal Productivity of Labour in Selected Enterprises	245
7.8	Marginal Productivity of Capital in Selected Enterprises	246

Chapter 1

INTRODUCTION

Public enterprises occupy an important place in the national economies of most countries of the world irrespective of their political orientation. The causes leading to the emergence and popularity of these enterprises were, however, not the same everywhere. In the developed free enterprise economies of the West, the emergence of public enterprises was the result of the growing realisation about the unworkability of the laissez faire policy and the widespread social tensions created by capitalism in its unbridled form. These countries retained their basic capitalistic character and used public enterprises only to reform not replace , and to supplement not supplant the private enterprise system. As against this, in communist countries, public enterprises were the result of an ideological commitment to liquidate capitalist system and private enterprise. The ownership, control and management of the instruments and means of production in those countries were transferred to the state which functioned through its agency, chiefly public corporations. In most developing countries, on the other hand, a network of public enterprises was created in the post World War II period as a matter of economic necessity rather than of any ideological commitment.

In the developing countries, the national governments found themselves under strong pressure to bring about rapid economic advance and social progress. The people in these countries were eager to telescope the progress of centuries to a period of a few decades. These countries however lacked the necessary conditions to exploit the urge of the people for rapid economic development. They had extremely low levels of savings and investments, a practically non-existent capital market, underdeveloped economic infrastructure and basic industries, and a dearth of technical, managerial and entrepreneurial talents. Under these circumstances, the governments in these countries were left with no alternative but to assume a greater economic role which was mainly promotional and entrepreneurial in nature. It is interesting to note that while in the developed countries of the West the emergence of public enterprises was the result mainly of nationalisation of the existing units in the private sector, in the developing countries public enterprises were the product, in most cases, of the entrepreneurial role of the state. Sheer economic necessity rather than any political ideology was the driving force behind the formation of public enterprises in these countries.

Definition of Public Enterprise

There are many definitions of public sector enterprise reflecting its different aspects. A definition which seemed most

comprehensive to us was evolved at a meeting of experts held in Tangiers in December 1980 at the initiative of the International Centre for Public Enterprises in Developing Countries and of African Training and Research Centre in Administration for Development. According to them, an enterprise is public when the state or any other national, regional or local authority holds at least 50% of its capital; it is under state control and reports to the state; and its objectives are of a public or multi-dimensional nature. This multi-dimensional aspect presupposes financial investments, marketing of products and services, financial returns, a system of business accounts, and a social return which the enterprise must account for".¹

In an expert group meeting at the International Centre for Public Enterprises (ICPE) in Yugoslavia, a conceptual definition of public enterprises was formulated as follows:- "A public enterprise is an organisation which is owned by public authorities including central, state or local authorities, to the extent of 50 per cent or more ; is under the top managerial control of the owning public authorities, such control, including, inter alia, the right to appoint top management and to formulate critical policy decisions; is established for the achievement of a defined set of public purposes which may be multi-dimensional in character; and is consequently placed under a system of public

¹ Dietrich Carstern Bruning, "Public Enterprises in France and Germany", State Enterprise, SCOPE, New Delhi, Vol.II, No.2, April-June 1983, p.147.

accountability; is engaged in activities of a business character; involves the basic idea of investment and returns; and which markets its output in the shape of goods and services".²

This definition reflects the complex nature of the organisation described as public enterprises. The idea of investment and returns could be interpreted either as financial returns in the commercial sense or as social returns.

The Speaker of the Lok Sabha in 1962 defined Public Undertaking as "an organisation endowed with a legal personality and set up by or under the provisions of a statute for undertaking on behalf of the Government of India, and enterprise of industrial, commercial or financial nature of special service in public interest and possessing a large measure of administrative and financial autonomy"³. This definition deals with the Public enterprises of the Union Government only. A more comprehensive definition is "by state undertakings is meant the industrial, commercial economic activity carried on by the central government or by a state government or jointly by the central government and state government, and in each case either solely or in association with private enterprise so long as it is managed by a self contained management"⁴.

² Dr.S.M. Patil and Dr. Raj K. Nigam, We and the Public sector, Documentation Centre for Corporate & Business Policy Research, New Delhi, 1988, p.5.

³ Directions by the Speaker under the Rules of Procedure and Conduct of Business in Lok Sabha, New Delhi, Lok Sabha Secretariat, 1962, p.68.

⁴ S.S. Khera, Government in Business, Asia Publishing House,

Companies Act 1956 has defined a public enterprise as follows: "A government company is one in which not less than 51% of the paid up share capital is held by the central government or by any state government or governments or partly by the central government and partly by state government or governments" (Section 617, Indian Companies Act 1956). The subsidiary of such a company is also a government company.

The public sector undertakings are not restricted to any one country, and their importance is realised throughout the world in bringing about socio-economic development. In fact, Hanson expressed the view that 'the whole process of development might be described as public enterprises'.

Objectives of Public Enterprise

The major objectives of public enterprises could be summarised as follows:

- (i) to help in the rapid economic growth and industrialisation of the country and create the necessary infrastructure for economic development.
- (ii) to earn return on investment and thus generate resources for development.
- (iii) to promote redistribution of income and wealth.
- (iv) to create employment opportunities.

Bombay, 1963, p.24.

- (v) to promote balanced regional development.
- (vi) to assist the development of small scale and ancillary industries and,
- (vii) to promote import substitution, and to save and earn foreign exchange for the economy.

Rationale of Public Sector

Increasing intervention by state in the economic field has been a characteristic feature of this century, particularly during the recent past. The extent of this increased state activity is tremendous. Therefore it seems to be worthwhile to consider the rationale of the public sector. To the question 'why should be a public sector at all', S.S.Khera⁵ gives the following reasons:

1. Modern economy has inevitably to be a planned economy. The concept of planned economy necessarily leads to the government, the state, participating in the actual management and not merely the regulation of commerce and industry. This is so because the answers to the problems which arise cannot normally be found unless the government and the government agencies have direct experience of managing and controlling such enterprises. In any case, one finds that in fact any country which proceeds either upon the hypothesis, or upon the conclusion of needing a planned

⁵ Khera S.S., Government in Business, National Publishing House, New Delhi, 1977, pp.18-23.

economy moves irresistibly towards the entry of the government into active participation in and management of many kinds of undertakings.

2. In a country where the industrial base has not been built up sufficiently, and the capital investment funds still need a great deal of building up and garnering, state intervention becomes imperative. Private enterprise naturally tends to calculate its risks and its returns over a comparatively short term and to hedge its outlays accordingly. It tends, on the whole, to be incapable of taking into account the total needs of the country, which require a rather different calculation of risk and a rather different kind of hedging against the risk. Private enterprise tends to be bound by what are commonly known as market studies which are, even for its limited purposes, not quite dependable. The dependence upon market studies may result in under-planning. Therefore, it is necessary for government to step in when others are hesitant, unwilling, timid, or unable to provide the entrepreneurship, the planning initiative, the ability to assess the requirements of the country and to establish the capacity to meet those requirements.

3. A government which is committed to the objective of socialist society is increasingly compelled to enter directly into industrial and commercial activities. If the objectives of socialist society were denied, there might still be some room for debate, but with the postulate of a socialist society, state participation follows inevitably. Hence the increasing

participation of the state in industrial and commercial enterprises is inevitable, irresistible and compulsive.

4. The considerations which apply in deciding upon what undertaking is to be established, how it should be run, where it should be established, and how its products would be priced and distributed, all these and others are influenced by the policy to which the government is committed. For instance, government must consider not so much what the likely demand is going to be according to market projections, but may in fact have to decide as to what the demand should be, and take steps to influence the demand, either to build it up or to pare down or to vary it. If the country is to achieve a certain pace of development, if certain standards of living are to be attained, certain demands must be created otherwise the whole pace of development will slow down; it will not be adequate to reach the targets which the nation has set before itself. A private enterprise cannot cope with this feature.

5. The functions of government which were originally limited to the maintenance of law and order have considerably expanded. Most of the states have had laid upon them the responsibility for the total socio-economic welfare of the people. In this context, taxation can no longer be solely depended upon, and in fact has proved inadequate, for the task of raising the total revenues the states now need for their multifarious activities. By active participation in business the states have sought to tap the gold mines of industry and commerce for the funds needed to discharge

the new and heavier burdens they now shoulder.

6. Finally, large scale participation by government in industrial and commercial activities is bound to augment the national dividend. The income from these enterprises goes into the common pool and is available for redistribution and reinvestment. The larger the pool of wealth that can be dealt with as a homogenous whole, the more valuable it is. This is a physical law. It applies to power, water and a host of other things. Government participation in industry and commerce in a large way helps to provide this pool which may be used as means of equitable division of the national dividend. Unless government does all this, the dividend the government has to pay may take the form of a division of poverty, not a division of wealth.

Genesis of public sector enterprises in India

The question of selecting a suitable form of organisation for public enterprises came up for the consideration of the government soon after independence when a policy decision was taken to expand the public sector. The choice had to be made out of the three principal forms of organisation which were prevalent in various countries, namely departmental management, public corporation and company. The government's attitude in this regard was made known through the Industrial Policy Resolution of 1948 which stated that management of state enterprises will, as a rule, be through the medium of public corporations under the statutory control of the central government, who will assume some

powers as may be necessary to ensure this. Pursuant to this, a number of statutory corporations, such as the IFCI, DVC, Air India, Indian Airlines, SBI, LIC and ONGC were set up by the year 1955. The enthusiasm for public corporations, however, proved to be short-lived and the government showed a marked preference for companies in later years to run public enterprises. The company has thus emerged as the most popular form of organisation for public enterprises in India, while the departmental organisation and the public corporation are reserved for certain specified areas of activity only.

In sum, the institutional frameworks under which the public sector enterprises in India are functioning can be classified into departmental undertakings, statutory corporations and government companies.

a) Departmental Undertakings

Departmental form of organisation is the oldest among the three principal forms mentioned above. In India, some of the older public enterprises, such as railways, post and telegraph, overseas communication services, ordnance factories, mints, security and currency presses etc. have been organised as departmental undertakings. More recently, the atomic power projects, multipurpose river projects, electricity undertakings, dairies and milk schemes etc., have also been organised under this form. The departmental form is commonly employed "when the main

purpose is either to provide revenue or to control consumption".⁶ A departmental undertaking is directly subordinate to a ministry or department, derives funds from the annual appropriations from the treasury, pays its revenues into the treasury, and is subject to accounting and audit controls applicable to other government activities. The staff of such an undertaking consists of civil servants whose conditions of service and recruitment procedure are generally the same as of other civil servants. The chief advantage of this form of organisation is that it permits the maximum degree of control by the government and Parliament. However, it is hardly conducive to taking initiative and quick decisions which are a must for a business enterprise. Because of this drawback, a departmental form of organisation is used only sparingly for public enterprises.

b. Statutory Corporation

A public or statutory corporation is a body corporate, created by a special Act of legislature which defines its powers, functions, relationship with the government etc. Ordinarily, it is fully owned by the government, possesses its own funds and employees, works on business principles, is not subject to the budget, accounting and audit laws applicable to government departments, and is immune from parliamentary enquiry into its

⁶ Das N., The Public Sector in India, Asia Publishing House, 1966, p.55.

day-to-day working as distinct from the matters of policy. Because of these characteristics a public corporation possesses a much greater degree of operating and financial flexibility than is possible in the case of a departmental undertaking, and permits full measure of accountability without ministerial and parliamentary interference in managerial decisions and day-to-day operations. However, in practice, much depends on the type of relationship between the Minister and the Board of the Corporations. Experience shows that the autonomy of the corporations as also the ministerial and parliamentary interference can be taken to extreme limits. We, in India, are no exception to this sour experience.

c. Government Company

A government company is that in which not less than 51% of the paid-up share capital is held by the Central Government or by any State Government or Governments, or jointly by the Central and one or more State Governments.⁷ A subsidiary of a government company is also a government company. Like a public corporation, a government company is also a body corporate having its own rights and responsibilities and enjoying exemption from the personnel, budget, accounting and audit laws and procedures applicable to government departments or agencies. In most cases

⁷ Section 617, The Indian Companies Act, 1956.

it is wholly owned by the government and is hardly distinguishable from a public corporation. First, unlike a public corporation which is created and governed by a special Act of legislature, a government company is governed by the Companies Act. Secondly it is created by an executive decision without the specific approval of legislature and is, therefore, easy and convenient to form.

The government company combines maximum public control with the necessary freedom of action to the management. Its board of directors is nominated by the concerned ministry which can write and revive its Articles of Association as and when necessary. The parliament also exercises control through its debates and the Committee on Public Undertakings. The government, being the single or majority shareholder, has complete control over the policies and working of a government company. In fact, this control is so stringent and complete that it is sometimes alleged that a government company is autonomous only in law, but merely an adjunct to the concerned ministry in fact. Side by side this control, a government company enjoys the necessary freedom of action also. For example, unlike a government department, it does not have to recruit its personnel through Public Service Commission, nor has it to procure its supplies through the Director General of Supplies and Disposals. Its construction work need not be entrusted to the CPWD, nor has it to follow the rules and procedures of financial control prescribed for government agencies. Again, the company form permits the association of non-officials with the management work, enables formal delegation

of functions and assignment of resources, and encourages the management to adopt and adhere to sound commercial practices. It was because of these that the government took the position that the company form was advantageous in that it allowed the flexibility and autonomy necessary for the successful operation of commercial enterprises and also provided for parliamentary control under the special provisions of the Company's Act.⁸

In view of the above, government companies have been increasingly used by the government since 1956 to run public enterprises of industrial and commercial nature. They appear to have found special fervour with the government also because they obviate the need to repeatedly approach the parliament for setting up a very large number of projects under the plans. The sour experience of the government with the Damodar Valley Corporation also appears to have weighed with the government in deciding to depend almost exclusively on government companies.

Government companies may be classified into several categories on the basis of their ownership and nature of business. We have companies owned wholly by the central government or a state government or jointly by the central government on the one hand, and a state government, a foreign party, or an Indian party, on the other. We also have multi-purpose companies, multi-project companies, trading companies and development companies among our

⁸ Estimates Committee, Third Lok Sabha, 56th Report, p.4.

government companies.⁹

The performance of the public sector enterprises, both financial and physical, has been the subject-matter of considerable discussion, criticism and controversy, because their performance have been mixed and varied. There are a number of enterprises, whose performance cannot, by any standard, be called as satisfactory. On the other hand, there are a few public sector enterprises which can be compared with many well-run enterprises in the private sector. The difference in the performance of the various public enterprises indicates that the public sector in itself is not inefficient and there is great scope for the improvement of the inefficient enterprises. For this improvement, it is essential that the performance of different public enterprises should be carefully evaluated and corrective measures should be taken, wherever necessary.

Scope of the Study

An important characteristic of this study is that of an almost exclusive focus on the central government public enterprises and does not take into account companies owned by the state government. The study concentrates on the industrial and commercial undertakings in the public sector organised as companies. It excludes autonomous corporations set up under

⁹ S.S. Khera, Government in Business, New Delhi, National Publishing House, 1977, pp.137-152.

central or state laws, departmental undertakings and financial, promotional and developmental concerns. The autonomous and departmental undertakings are engaged mainly in providing the economic infra-structure, while the promotional and financial concerns do not function strictly on business principles. In other words, this study covers only the operating, non-financial manufacturing companies in Kerala owned by the Central Government.

In order to study the efficiency of central public sector enterprises in Kerala all the four companies that have been registered in Kerala are identified. They are Fertilisers and Chemicals Travancore Ltd. (FACT), Cochin Refineries Ltd. (CRL), Cochin Shipyard Ltd. (CSL) and Hindustan Latex Ltd. (HLL).

An attempt is also made to compare the efficiency of the central public sector enterprises in Kerala to that of its counterpart in the state sector. For this purpose Travancore Cochin Chemicals Ltd. (TCC) is identified as the comparable representative state enterprise.

Earlier the study was planned to concentrate on all the 13 central public sector enterprises in Kerala excluding five units managed by National Textile Corporation (NTC). But the present study is confined to four central public sector enterprises registered in Kerala only, such as Fertilisers and Chemicals Travancore Ltd., Cochin Refineries Ltd., Cochin Shipyard Ltd., and Hindustan Latex Ltd. All other central public sector

enterprises in Kerala are only units of multi-unit companies. Some of them refused to give the unit level data. So they are excluded from the present study.

A generalisation based on the above four companies may not be fully justified. There are many criteria of efficiency of public enterprises. Here efficiency of the public enterprises is evaluated on the basis of productivity, profitability and capacity utilisation. So this evaluation will be partial to the extent of the criteria selected for evaluation.

Significance of the study

Kerala is an industrially backward state compared to other states in India. Almost all studies on the manufacturing sector of Kerala endorse industrial stagnation in the state.¹⁰ This essentially calls for industry-specific studies to highlight the underlying problems and prospects of various industries or of industries under various institutional frameworks such as private

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- ¹⁰ a) K.K. Subrahmanian and P. Mohanan Pillai, "Kerala's Industrial Backwardness : Exploration of Alternative Hypothesis", Economic and Political Weekly, Vol.XXI, No.14, 1986, pp.577-592.
- b) K.K. Subrahmanian, "Development Paradox in Kerala : An Analysis of Industrial Stagnation", Economic and Political Weekly, Vol.XXV, No.37, 1990, pp.2053-2058.
- c) Alice Albin, "Manufacturing Sector in Kerala : Comparative study of its growth and structure", Economic and Political Weekly, Vol.XXV, No.37, pp.2059-2070.

sector and public sector which comprises of both the state and central public sector enterprises. There are a few studies¹¹ relating to the performance of the state public sector manufacturing enterprises in Kerala. But there is hardly any comprehensive study on the enterprises owned by the central government in Kerala. Thus, in the present study, we attempt to evaluate the efficiency of central public sector enterprises in Kerala.

Objectives of the Study

The objectives of the study are:

1. To analyse the trends in the capacity utilisation of the central public sector enterprises in Kerala.
2. To study the employment generation in these enterprises.
3. To evaluate their profitability trends.
4. To study their productivity performance and,
5. To find out the cause of the underutilisaion of capacity in these enterprises.

Hypotheses of the study

The major hypotheses of the study are the following:

1. The profitability of the companies depends to a considerable

¹¹ V.Gangadharan Pillai, State Enterprises in Kerala, Kerala Academy of Political Science, Kariavattom, Trivandrum, 1970.

extent on the degree of capacity utilisation.

2. Capacity utilisation of the central public sector enterprises in Kerala is very low.
3. Higher rates of utilisation of capacity lead to greater employment opportunities.

Methodology

The changes in pattern of growth of variable are analysed through trends in growth. Growth rates are estimated by exponential trend method.

The analysis of efficiency of central public sector enterprises in Kerala has been made in terms of productivity, capacity utilisation and profitability. (for a detailed discussion on these methods see chapter 3)

For the study of productivity, partial and total factor productivity (TFP) indices are constructed. Three important total factor productivity measures that have been estimated are Kendrick, Solow and Translog.

For the study of capacity utilisation indices are formed mainly by two methods. First by installed capacity method and secondly by the minimum capital output ratio method.

A modified version of minimum capital output ratio method is also used in the study taking only the value of plant and machinery as capital. From observation it is found that major share of the gross block is in plant and machinery. So instead of

taking the gross block, investment in plant and machinery is taken for the modified version of minimum capital output ratio method.

Profitability is analysed by means of ratio analysis. The important measures that have been estimated are gross profit as percentage to sales, gross profit as percentage to capital employed, net profit as percentage to net worth, gross margin as percentage to capital employed, gross margin as percentage to sales, gross margin as percentage to net worth, gross profit as percentage to net worth and net profit as percentage to capital employed.

An explanation will be provided for variations in profitability among the public sector enterprises by regression analysis. Studies show that factors such as capital labour ratio, capital output ratio, percentage of capacity utilisation etc. affect the profitability. The dependence of profitability on the degree of capacity utilisation can be explained by two ways viz., better utilisation of existing capacity reduces cost and wastage due to underutilisation of existing capacity, which in turn, other things remaining the same, would result in a higher profitability and vice versa; and lower rate of capacity utilisation generally reflect a slackening of demand and, therefore, would be associated with lower price cost margins, other things being equal. The opposite will be true when higher demand results in better capacity utilisation. Based on these factors, a theoretical regression equation is constructed:

$$P = \alpha + \beta_1 K/O + \beta_2 K/L + \beta_3 Ut + \mu$$

where P = Profitability (gross margin as percentage to capital employed)

K/L = Capital labour ratio

K/O = Capital output ratio

Ut = Capacity utilisation rate

α , β s and μ refer to constant, coefficient and error terms respectively.

The regression analysis will be applied to the data of the central public sector enterprises in Kerala using the ordinary least square method.

Data and variables

For the analysis of productivity, capacity utilisation and profitability the data relating to the manufacturing central public sector enterprises in Kerala have been collected from the published annual reports of the companies, public enterprises surveys of Bureau of Public Enterprises (BPE), Economic Review of State Planning Board (SPB) and statistical review of central government enterprises by Centre for Monitoring Indian Economy (CMIE). Primary data have been collected by conducting personal interview with the high and middle level executives.

For the purpose of our estimations, gross fixed capital has been deflated by appropriate deflator. Value added figures

have been prepared by deflating the gross value added by appropriate deflator. Total persons employed has been taken as employment and total emoluments as wages. The period of analysis is from 1977-78 to 1988-89, i.e. for a period of 12 years.

Scheme of the study

The thesis has been organised into eight chapters. The first chapter deals with the introduction, objectives, methodology, scope and limitations of the study.

The second chapter provides a brief review of literature on the criteria for efficiency evaluation of public enterprises.

The third chapter is divided into three parts. Each part deals with a theoretical analysis of the criteria selected for evaluation of efficiency such as capacity utilisation, profitability and productivity.

The fourth chapter gives a sketch of the growth of public enterprises in India and their autonomy and accountability. A brief discussion on the industrial backwardness of Kerala and an account of the central public sector enterprises in Kerala are also given in this chapter.

The fifth chapter gives an account of capacity utilisation in public sector enterprises in India. The extent of underutilisation of capacity in the selected public enterprises in Kerala is given with the reasons for the underutilisation of capacity.

Profitability of public enterprises is given in the sixth chapter. Some important financial ratios of the selected enterprises are analysed in this chapter.

The seventh chapter analyses productivity of the selected central public sector enterprises in Kerala.

And the conclusions and recommendations are given in the final chapter.

Chapter 2

CRITERIA OF EFFICIENCY : A REVIEW

The basic problem in measuring the efficiency of public enterprises is that the criteria of efficiency of the private sector cannot be directly applied to public enterprises.¹ Sargent Florence and Gilbert Walker rightly remark : "The capitalist test of the efficiency of an undertaking is profit. Stated in skeleton outline profit is the difference between aggregate revenue and aggregate costs. In state trading, a surplus or avoidance of loss when subtracting aggregate costs from the aggregate of prices (i.e. 'covering costs' or 'breaking even') seems to us the primary test of efficiency".²

The measurement of operational efficiency of public enterprises is not a simple task. Chester has explained the position in the following words: "were some simple economic criteria available the task would be simpler. But the fact that most of these industries are complete monopolies greatly reduces the value of the normal economic tests of profits or of receipts and expenditure breaking even. Can a board which does not make a loss be graded automatically as efficient or should other tests be

¹ David Coombes, The Member of Parliament and Administration, George Allen and Unwin Ltd., London, 1966, p.95.

² P.Sargent Florence and Gilbert Walker, "Efficiency under Nationalisation and its Measurement" in W.A. Robson (ed.) Problems of Nationalised Industry, Cambridge University Press, Cambridge, 1952, p.195.

applied and, if so, what other tests ? Though many feel that other tests are necessary, nobody has the simple answer".³ Sargent Florence and Gilbert Walker have given a number of alternative tests of measuring efficiency of nationalised industries besides the above-mentioned primary test of breaking even. The alternative tests suggested by them are as follows:⁴

1. The growth in productivity
2. Growth in staff employed
3. Industrial morale and goodwill, and
4. Keeping out of trouble.

Paul H. Appleby, a distinguished authority on public administration, has suggested that the efficiency of public enterprises should be measured according to the criterion of 'citizen satisfaction'. In his own words : " certainly it is true that the efficiency criteria for the public enterprise are not to be satisfied appropriately by efficiency engineer's reports on work flow arrangements, waste elimination, the results of incentive bonuses, as any other similar measures... Measurement of efficiency in any activity for which government is responsible is citizen satisfaction".⁵ Though the citizen satisfaction is an

³ Chester D.N., "The Nationalised Industries", The Banks Review, No.16, 1952, pp.38-40.

⁴ P.Sargent Florence and Gilbert Walker, op. cit., pp.195-199.

⁵ Paul H. Appleby, "Efficiency in the Public Sector", in

important criterion for determining the efficiency of public enterprise, it cannot be the sole and the only criterion. Any suitable criterion may be used for the efficiency measurement but it must be related to such objectives as a public enterprise pursues.

The Herbert Committee appointed by the British Government in 1956 to inquire into the organisation and efficiency of the Electricity Supply Industry is of the view that the decisive criteria for judging the efficiency of a public sector industry are economic. Other matters are peripheral. The committee writes, "we attach great importance, therefore, to the industry being run on business lines. It should have one duty and one duty alone: to supply electricity to those who will meet the costs of it and to do so at the lowest possible expenditure of resources consistent with the maintenance of employment standards at the level of the best private firms".

Thus it is obvious from the discussion that there is a great deal of controversy about the alternative criteria for the evaluation of the efficiency of the public enterprises. This controversy is but natural as the criteria, to a large extent, depend upon the objectives of the enterprise under study and the approach that one follows. Bakul H. Dholakia is right when he remarks, "the controversy regarding the alternative criteria for

Ramanadham V.V. (ed.) Pricing, Labour, and Efficiency in Public Sector, Asia Publishing House, Bombay, 1962, p.77.

evaluating the efficiency of public enterprises stems mainly from the fact that the 'performance' of public enterprises can be viewed from several angles. The choice of an appropriate criterion for assessing the performance of the public enterprises would obviously depend on the approach that is adopted for looking at the so called 'performance'".⁶ If the performance is viewed from the narrow commercial angle then the appropriate criterion would be the net profit earned by the enterprise. But the performance of the public enterprise should not, then, be viewed only from a narrow commercial angle. It should be viewed from a wider social angle. Keeping this wide view in mind, twenty years ago, Om Prakash gave the following approaches for the evaluation of operational efficiency of the public enterprise:⁷

1. Profit and loss account approach

This is the conventional approach which is employed by the shareholders in privately-owned corporations as they are concerned with immediate profits and dividends rather than with long term prosperity. But in public enterprises, where the equity is owned by the nation, the profit and loss approach may be too narrow keeping in view the objectives of these enterprises. Besides this, profitability and inefficiency may co-exist on many occasions.

⁶ Bakul Dholakia H., The Changing Efficiency of Public Enterprises in India, Somaiya Publications Pvt. Ltd., Bombay, 1980, p.3.

⁷ For detailed discussions see Dr. Omprakash, The Theory and Working of State Corporations in India, George Allen and Unwin Ltd., London, 1962, pp.183-89.

2. Balance sheet approach

Here the balance sheets of an enterprise at two different dates are compared. Thus we may be able to form such idea of the progress of that enterprise during the intervening period.

3. Fiscal approach

The efficiency of an enterprise can be judged by calculating the aggregate contribution made by it to the state exchequer in the form of dividend on shares held by the Government; interest on loans advanced by the Government; taxes realised from the enterprise; excess profits paid to the Government and benefits of lower prices enjoyed by government organisations.

The savings in foreign exchange resources effected by the enterprise would be another criterion for India and the underdeveloped countries whose economic progress has suffered on account of imbalance in foreign trade relations.

4. Employment approach

In a country like India, where unemployment is a serious problem, this approach is of special significance. The performance of a public enterprise is judged by its ability in providing employment, enforcing reasonable standard of wages, providing better conditions of work and living, and arranging for a high standard of welfare facilities.

5. Productivity approach

The public enterprises may be expected to economise the relatively scarce factors of production or maximum utilisation of scarce factors with the ultimate objective of increasing productivity. They should make every effort to increase the productivity of capital. The productivity per worker may be compared from year to year to judge the performance of such enterprises.

6. Cost accounting approach

An analysis of cost per unit in various departments and processes at various stages of manufacturing and marketing will enable the public undertakings to find out the weak points which may otherwise remain hidden behind the attitude of complacency. It does not necessarily mean that only those activities will be conducted by the public enterprises which are profitable, but it definitely means that they will not be in the dark when they conduct any activity. The desirability of conducting loss-incurring functions will be dictated by social considerations rather than ignorance.

7. Development and stability approach

An assessment has to be made whether a public undertaking has succeeded in fulfilling its statutory obligations of developing a particular industry or service to the best advantage of the society. Certain objective tests may be applied for the purpose:

- (a) achievement of planned output and improvement in its quality
- (b) trend of revenue contributed towards its own development or of other undertakings
- (c) participation of private entrepreneurs and the promotion of new units
- (d) stability in the prices of commodities
- (e) developing suitable public relations.

In a seminar at Asian Centre for Development Administration, Kuala Lumpur, Malaysia in 1976, a framework of the Asian white paper on public enterprises policy has been discussed by the experts. In this the performance criteria of public enterprises are summarised as follows:

- (a) profitability as a criterion should be used along with other measures such as contribution to general revenues of the state, surplus generation, self-financing, its linkage to performance evaluation and managerial motivation and morale.
- (b) the performance targets cover measures of achievements in terms of targets such as output targets, return targets, export targets, and non-financial targets like industrial peace etc. The achievement of targets established by the government may also provide a measure of the performance.
- (c) The other criteria for evaluation of performance of individual enterprises are, financial ratios, capacity utilisation, sales revenues, costs of production, inventory control, development of indigenous skills, growth of ancillaries, import substitution and foreign exchange savings etc.

(d) the measure of social profitability varies with the class of enterprises.

(e) review of relative rates of return of public and private sectors as a whole as well as individual enterprises in the same group is also one of the best methods of evaluating the performance of public enterprises.

Recently, Om Prakash in his article on 'Public Sector Performance Evaluation' has suggested the two ways of measuring and judging the operational efficiency of public enterprises:⁸

A. Quantitative Evaluation and

B. Qualitative Evaluation.

For quantitative evaluation he has suggested to work out:

- i) Financial resource utilisation
- ii) Physical resource utilisation and
- iii) Market/product development/diversification.

For qualitative evaluation he has suggested to work out:

- i) Level of customer satisfaction
- ii) Level of employee satisfaction
- iii) Level of public satisfaction
- iv) Acquisition of talent/social/organisational change and

⁸ Dr. Omprakash, "Public Sector Performance Evaluation", The Economic Times, New Delhi, 20th June, 1981.

v) The pattern of economic growth.

Dholakia ⁹ has suggested that the following are the three broad objectives to be pursued by public enterprises.

1. Public enterprises should make a significant contribution to financing plan outlays for the attainment of further economic development by generating commercial surplus.

2. Public enterprises should accelerate the growth rate of the economy and improve the economic efficiency of resource utilisation.

3. Public enterprises should effectively contribute to the fulfilment of long term socio-economic objectives.

The broad criteria of performance evaluation that would correspond to each of the above-mentioned objectives are:

- (a) The criterion of financial viability.
- (b) The criterion of factor productivity.
- (c) The criterion of socio-economic benefits.

⁹ Dholakia H.B., "Performance Evaluation of Public Enterprises : Some issues relating to evaluation criteria and information needs", in T.L. Sankar (ed.) Public Enterprises in India, Himalaya Publishing House, Bombay, 1983, p.16.

It is actually the total profit making potential and not the reported net profit which measures the contribution made by the enterprise in the financing of plan outlays. The surplus generating potential of the enterprise should include, besides the net profit, contributions in the form of excise duties and other taxes actually paid and the net subsidy involved in the price of the inputs purchased by a given enterprise and also in the prices of the output supplied by it. Dholakia contends that in the context of the growth of the national economy, the index of Total Factor Productivity is the most appropriate criterion for evaluation, for it indicates the overall efficiency of resource utilisation by economic units over a specified time period. Regarding the criterion of socio-economic benefits, Dholakia points out that it would be necessary to develop a set of specific performance indicators and some research effort is required to integrate them with the other major criteria of financial viability and factor productivity.

A high level committee was set up by the Government of India in 1984 to review and suggest policies for improving the performance of public enterprises under Arjun Sengupta. The committee suggested some general criteria which can be grouped into four:

1. Financial performance
2. Productivity and cost reduction

3. Technical dynamism, and
4. Effectiveness of project implementation.

According to the committee, the criteria for financial performance are the most important in that, public enterprises are expected to play an important role in the mobilisation of resources and they can do so only if they are financially viable. It recommends three basic criteria:

- (a) Gross margin on assets
- (b) Net profit on net worth
- (c) Gross margin on sales

The standards against which financial performance have to be evaluated will have to vary for the enterprises. Enterprises in the core sector are generally subject to price control and their financial performance is affected by this fact. However, some normative rate of return is often implicit in price fixation procedures and can provide a standard for comparison. The rate of net profit, after allowing for distortion induced by lags in price adjustment, should be at least a stipulated per cent fixed for each enterprise at the beginning of the year. The gross margin should be improving over time. For enterprises in the non-core sector, which generally operate in a competitive environment with a substantial private sector presence, the criteria for comparison should be the industry average; for

service enterprises it may be necessary to focus attention on the direction of change in the gross margin on sales, in the loss making units the gross margin should be positive, so that they are at least covering operating costs.

The committee suggested a simple monitoring of productivity and costs by examining the direction of change in indicators like capacity utilisation, raw materials costs per unit of output, value added per rupee of wages etc. The third group of performance indicators suggested relate to technology development. The Report mentioned that since a simple quantitative indicator is difficult to define, a rough indication can be provided by the number of product or process innovations introduced or patents introduced during the year. The fourth set of performance indicators relates to project implementation. In the case of core sector enterprises performance could be assessed in terms of (a) percentage utilisation plan funds (b) average slippage in ongoing projects (c) percentage cost revision for the approved investment programme relative to the previous year.

The Economic Advisory Council (EAC),¹⁰ in drawing up the 'performance evaluation system for Public Sector Enterprises' identifies that the basic aim of the public sector units is to achieve:

¹⁰ Economic Advisory Council, "Performance Evaluation System for Public Sector Enterprises", New Delhi, 1986, p.34.

- (1) efficiency in the use of resources
- (2) efficiency in the project implementation, that is, investment efficiency
- (3) contribution to growth in productivity and international competitiveness, and
- (4) contribution to the social objectives.

The committee opined that since many of the public sector enterprises are under administered price regime it is necessary to supplement the financial indicators with key asset utilisation index as capacity utilisation. According to the Report, an overall indicator for measuring dynamic efficiency is the growth of total factor productivity, which takes into account the contribution of all input in the total growth of output. Recommending for the evaluation of investment efficiency, the Report has also suggested the need for some kind of social audit to evaluate their contribution to different objectives as :

- (1) Development of ancillaries
- (2) Indigenisation
- (3) Export
- (4) Energy conservation
- (5) Environmental impact
- (6) Promoting employment of SC & ST categories
- (7) Development of domestic technology through R & D.

From the above brief survey of literature available in the field of the criteria for judging the efficiency of the public

enterprises certain conclusions emerge. They are :

1. The criteria for judging and measuring the efficiency should not be lopsided or viewed only from a narrow commercial angle.
2. Instead of a single factor criterion the multi factor criteria should be used.
3. The objectives of the public enterprises are multiple and these objectives, thus, are not common for all enterprises. Therefore, it is not possible to evolve a uniform set of criteria applicable to all the enterprises in the public sector.
4. A researcher, by and large, has to choose some of the important criteria according to the needs of his own field of study and the main objectives of the enterprise/s under study.

Performance Evaluation Agencies in India

Performance of public enterprises in India is looked in by several agencies like the Parliament, the Bureau of Public Enterprises (BPE), the administrative ministries, the Audit Board, the Reserve Bank of India (RBI), the Planning Commission and so on. However, the prominent and the popularly known evaluation of public enterprises is carried out by the Parliament and the Bureau of Public Enterprises.

Parliament undertakes this responsibility not only through debates and discussions of issues relating to the efficiency of the public enterprises, but also through a

Parliamentary committee - popularly known as the Committee on Public Undertakings (previously this work was entrusted to the Public Accounts Committee and the Estimates Committee). This parliamentary committee is expected to look at the public enterprises affairs from the point of view of whether they have been managed prudently and efficiently. It can call for any kind of information and can conduct special studies. The reports of this committee are presented to the Parliament and later to the public at large.

The Bureau of Public Enterprises carries out its evaluation mainly through its annual report on the working of the industrial and commercial undertakings of the central government. This annual report covers issues like financial performance, employment, pricing policies, ancillarisation, contributions to the exchequer, contributions to the society, and so on. In addition, this report also presents a number of financial and management ratios. It has also designed a management information system through which actual performance is expected to be monitored by the concerned administrative ministry and the managers of the enterprises themselves. Recently it has also tried an exercise of target setting in both the financial and the physical terms for these enterprises. However, the results of this exercise in terms of evaluating the actual performance against the set targets, is not known. Some public enterprises after negotiating with the concerned administrative ministry have signed a memorandum of understanding (MOU) in the recent past.

Memorandum of Understanding (MOU)

The concept of MOU is not entirely new to India. It was at the end of December 1984 that the Arjun Sengupta Committee recommended the formation of Holding Companies (HC) for groups of public enterprises engaged in similar activities and the signing of MOUs between them and the government. It took the government quite some time to take a decision on the recommendation. Following the recommendation of the Arjun Sengupta Committee Report, the government decided to adopt the system of Memorandum of Understanding in 1986. The first Memorandum of Understanding with any public sector enterprises was signed in May 1986 between the ONGC and the government, followed subsequently with the SAIL, and recently with the BHEL and NTPC. The system was designed to improve the performance of the public sector by giving them operational autonomy and by enforcing accountability commensurate with authority. The focus of the system was to make the public sector more effective and efficient by providing a clear direction for growth and achievement. The Memorandum of Understanding is supposed to be a freely negotiated performance agreement between the government acting as the owner of the company and the public sector enterprises in which both parties clearly specify their intentions, commitments and responsibilities. The public sector enterprises will be judged only on the basis of pre-agreed set of criteria which are included in their respective Memorandum of Understanding. Thus it is an objective evaluation system through

which performance improvement is sought and obtained. Here a set of performance criteria is selected. Weightages are given to each criterion on the basis of relative importance. Then on the basis of the criteria performance is evaluated good or bad.

The first set of Memorandum of Understanding was signed in 1988-89 by 11 public sector enterprises. In 1988 MOU documents emphasised what may be called static operational efficiency. It contained mostly the financial targets of the enterprises. The 18 Memoranda of Understanding signed in the year 1989-90, however, underwent major improvements over the last year's set of Memoranda of Understanding. Those Memoranda of Understanding had weights i.e. priorities so that the chief executives could concentrate their attention on what was more important and what was less. It also had the targets (value) on a five point scale so that one could judge with a lot more accuracy what was the level of achievement which was committed and actually achieved. At the same time these Memorandum of Understanding had, apart from the financial criteria, some qualitative criteria/indicators.

The most important feature of the Memorandum of Understanding is that this will enable the government to compare performance of essentially dissimilar enterprises. While the list of commitments for each public enterprise is different and cannot be certainly comparable especially when such commitments have been negotiated on the basis that there must be an improvement on current levels of performance in the next year.

Chapter -3

EFFICIENCY OF PUBLIC ENTERPRISES

There is universal acceptance of the need for public enterprises to function efficiently. However, there is lack of agreement about the meaning of efficiency and its measurement in the case of a public enterprise.

In any sphere of activity efficiency is the ratio of the result achieved to the means used. It is the ability of an individual or organisation to produce the desired effects with the minimum of efforts, expenses or wastes. It is the shortest way or the cheapest means towards the desired goal. When one says that something is efficient, one means by this that it is capable of producing a desired effect and that it is not unequal to a task. Action without delay is the secret of efficiency. In most situations, efficiency is a relative concept. There cannot be a state of efficiency without someone having declared a standard or a target. The efficiency can be seen only in relation to the set standards or performance, or the previous experience or the experience elsewhere at the same point of time. The state of operational efficiency shows the quality of skills and the degree of success achieved in the performance of different operations and management of an enterprise.

There are a number of terms which are used synonymously for efficiency. Therefore, it will be useful to distinguish them at the beginning of this discussion.

a) Efficiency and productivity

The concept of 'efficiency' is sometimes considered as synonymous with 'productivity', but there is a clear distinction between the two. Productivity may be defined as the ratio between the production of a given commodity or service measured by volume, and one or more of the corresponding input factors, also measured by volume. Efficiency, unlike productivity, is expressed not in absolute, but in relative terms. It is the ratio of actual output that should be obtained with those resources in the same time period. The relation between an individual input factor and production is termed as the productivity of that individual factor. But when overall productivity of an organisation is measured, it is called efficiency.

It is thus obvious that the term 'efficiency' has a wide coverage, because it is not concerned with the productivity of a single input factor alone, but it is concerned with the overall productivity of all the input factors. It may also be mentioned here that the productivity or efficiency of an individual input factor is not very significant. The overall efficiency of an enterprise and that of the whole economy are more important from the social viewpoint.

b) Efficiency and Profitability

'Profitability' is also not synonymous with 'efficiency', though as an index of efficiency it is regarded both as a measure of efficiency and management guide to greater efficiency. No doubt profitability is an important yardstick of efficiency of an enterprise, but the extent of profitability cannot be taken as a final proof of efficiency. Sometimes satisfactory profits can mask inefficiency and conversely a proper degree of efficiency can be accompanied by an absence of profit. The net profit figure simply reveals a satisfactory balance between the value received and the value given. The change in the operational efficiency is merely one of many factors on which profitability of an enterprise largely depends. Between cost and profitability there are many other factors besides efficiency. For example, profitability may have been inflated due to current scarcity and monopolistic market situation, while there may be no change in the efficiency level.

c) Efficiency and efficacy

The terms 'efficiency' and 'efficacy' are not interchangeable. In case of public enterprises the efficacy reveals the fact as to how far the enterprise has achieved its various stated objectives and at what cost. If a public sector enterprise has achieved its major objectives within the reasonable costs, it can be said that the efficacy of the enterprise is quite sound. On the other hand, efficiency reveals the overall

productivity of the enterprise. The enterprise may be an efficient one, but unable to achieve its set objectives because these may be very high or unrealistic. Contrary to this, the enterprise may be an inefficient one when the objectives have been kept very low or when the enterprise has achieved them at a very high cost. In all such cases, the efficacy of the enterprise will be termed as a poor one.

For the evaluation of efficiency in CPSEs in Kerala, this study is limiting efficiency into physical and financial criteria in terms of capacity utilisation, profitability and productivity measures. Since these measures are not unambiguous a theoretical treatment on the methods of measurement are dealt with in detail in the remaining part of this chapter.

A. Capacity Utilisation

"Production can be considered as the joint resultant of many forces which facilitate production such as the setup, men, machines, tools, customer orders, in-process inventory, spare parts, raw materials and machine operator".¹ In such a complex production process, production can be held in waiting by anyone of the above factors. Such waiting erodes the capability of the system and inevitably leads to underutilisation of capacity. The efficient working of an enterprise depends upon the maximum

¹ Solomon Morris J., Better Plant Utilisation in India : A Blueprint for Action, Asia Publishing House, Bombay, 1963, p.13.

possible utilisation of capacity.

In a developing country the need for optimum utilisation of industrial capacity can hardly be overemphasised. Generally speaking, growth is said to be associated with new investment which should contribute the maximum possible yield to the economy. Through better utilisation of installed capacity, the economy should improve the capital output and capital labour ratios and should, consequently, result in more employment, more income and more competition in export markets without additional capital investment.

Definition of Capacity

A precise definition to 'capacity' meets with many difficulties as different concepts and interpretations are in vogue. It is, therefore, necessary to examine the meaning of 'capacity' in detail. According to Morris Budin and Samuel Paul, capacity in the broadest sense refers to "the potential output per unit of time that a plant can yield under given processes and conditions".² Maximum capacity as defined by micro level studies computes total capacity on the basis of "total amount of productive time available per year on capital equipment".³ Bergstorm estimates maximum capacity of a manufacturing facility

² Budin Morris and Samuel Paul, "The Utilisation of Indian Industrial Capacity (1949-59)", Indian Economic Journal, Vol.IX, No.1, July 1961, p.20.

³ Solomon Morris J., op. cit., p.15.

using linear programming technique. He says that capacities must be defined with reference to product lines and technical characteristics as well as interrelationships among different groups.⁴

Capacity utilisation means that proportion of the total capacity which has been gainfully utilised for production of required goods and services. It is, thus, a ratio usually expressed as percentage of actual production to the 'capacity' and is mathematically expressed as:

$$\text{Capacity Utilisation (in percentage)} = \frac{\text{Actual Production}}{\text{'Capacity'}} \times 100$$

Approaches to capacity utilisation

There are at least two meaningful approaches to the concept of capacity that are worthy of consideration.⁵ They are based on the engineering and the modified engineering definitions. In its broadest sense, capacity refers to the potential output per unit of time that a plant can yield under given processes and conditions. Although capacity is usually defined in terms of potential output as if it were an objective and a fixed amount, it must be remembered that the operating managers' view of available

⁴ Bergstorm G.L., Resource Utilisation in Indian Manufacturing: A Mathematical Analysis, Progressive Corporation Private Ltd., Bombay 1973, pp.7-11.

⁵ Vijay K. Seth, "Concepts and Measures of Capacity Utilisation", The School of Economics, Vol.2, No.1, Sept. 1986, p.46.

installed capacity may differ. It may reflect a variety of considerations such as the quality of the management staff and the availability of repair and replacement parts, all of which tend to modify the simpler engineering estimates of plant capacity based on machine potentials. The operating manager is generally more concerned with the utilisation of the potential capacity which provides us with a far more complex set of parameters.

The engineering approach is in terms of the capacity potential of the equipment of the firm, generally built up from estimates of the speeds of the major machines, and finally assessed in terms of the limitations set by the slowest equipment. The analyst may consider the time allowances for machine maintenance, and possible shut-downs if they are regularly expected events. For single product operations this is a relatively simple calculation as the maximisation would generally assume a single process. For a multi-product plant in which processes could be used on a number of different products, the computation is somewhat more complex but capacities can be estimated within an operational error of estimate. It is likely that such estimates are based on the major equipment units of the plant and the analyst assumes that the smaller 'fit' production units will be avoidable.

The modified engineering approach takes into consideration the limitations of the other factors of production eg., the quantity and quality of available labour and management, the quality of raw materials and the regularity of delivery

schedules of inputs for the plant. The more significant differences between this estimate and the pure engineering estimate probably lie in the consideration given to the influences of management capabilities and the established patterns of operation which include the effectiveness of plant layout, supervisory controls over labour, and the methods and time dimensions of work activity in terms of the actual average plant situations.

Another concept of capacity is that of economic capacity that has emerged in the theory of firm. The full-capacity output is defined here as the level of output associated with the long-run equilibrium of the firm under perfect competition. In a perfect market, a firm is said to be in equilibrium in the long-run when the marginal cost is equal to marginal revenue, and average cost equal to the average revenue. This point emerges when there is no incentive for the entry of new firm in the industry, because there are no abnormal profits.

For a single firm this point will be the lowest point at the 'U'shaped cost curve. The advantage of this concept is that it relates capacity with optimum utilisation of resources in the welfare theoretic sense. Chamberlin evolved this concept of capacity to show why under imperfect market conditions there emerges excess capacity. However this concept of capacity faces insurmountable problems associated with the estimation of cost functions.

It could be observed that the economists' concept of capacity is more concerned with the problem of cost-minimisation. Therefore, in the short run the capacity output is related to the cost of variable inputs and in the long run with the costs of fixed capital because all the factors of production are variable in the long run.

While actual production of goods and services is tangible and is easily seen and understood 'capacity' is a concept which is not yet fully and clearly understood. A plethora of prefixes are available to qualify 'capacity' such as 'rated', 'licensed', 'installed', 'potential', etc., indicating different facets of the term. Here a clarification of the misconception behind these terms is required to build a framework of concepts for measuring industrial capacity.

Licensed capacity

Licensed capacity is the capacity for which a firm has obtained a licence from the issuing authorities. Industrial Development and Regulation Act of 1951 requires every medium or large industry to obtain a licence from the government for setting up a new firm or for substantial expansion of existing capacities.

Designed Capacity

After the licence is obtained the job of erection or supply of the plant is given to a manufacturer or supplier who designs a plant for certain capacity. Designed capacity of the plant is a technical factor and, therefore, may not be equal to

licensed capacity.

Installed Capacity

When the plant is erected the manufacturer and management, after satisfying themselves that plant is properly installed according to specifications, declare the installed capacity of the plant. This is the maximum possible output which can be produced by that plant. This installed capacity may or may not be equal to licensed or designed capacities.

Rated Capacity

Rated capacity refers to the maximum production which a given plant is capable of producing under conditions prevailing in a country. Though, generally, rated capacity is equal to the installed capacity, yet due to climatic conditions or any other factor, it may not be possible to achieve with a given plant, that level of output, which it is capable of producing in a different country or under different set of conditions. Rated capacity is the ideal capacity under given conditions. Generally, the distinction between installed and rated capacity is not maintained in India and firms equate the rated capacity with the installed capacity.

Attainable Capacity

Though rated capacity is the output which can be

produced under ideal conditions existing at the time when plant is installed and capacities rated, certain unforeseen and uncontrollable factors may cause a shift in these ideal conditions. If these factors are of a permanent nature, and the rated capacity of the plant can never be achieved (unless the whole plant is restructured) the capacity of the plant will have to be re-rated. The maximum possible output under the changed circumstances is called the attainable capacity. The factors which may cause this change in the capacity can be, for instance, ageing of the plant as it approaches its useful life, or deterioration in the quality or availability of certain feed stocks. Just as attainable capacity can be lower than the rated capacity due to certain unfavourable changes in conditions of production, increase in the levels of efficiency or technical progress or availability of better feed stock can lead to an increase in attainable capacity.

Available Capacity

However, even attainable capacity may not be available for certain period of time due to factors such as nonavailability of power, feed stocks, spares etc. Fall in output in one part of the plant may also constrain the capacity available in the main plant. These factors are of a temporary nature and may exist for a few months or even few years. But they do not permanently reduce the capacity of the plant, which can be attained the moment supply of above inputs is restored. But, till then, the available capacity will be much less than the attainable capacity.

Available capacity is the maximum output that can be produced in a particular period within a given set of conditions.⁶

Actual capacity utilisation may also not be equal to available capacity for reasons beyond the control of management. Shortfall in capacity utilisation due to lack of demand for products can be termed as excess capacity in an industry or firm. Thus excess capacity of a plant may be a permanent feature if the capacity installed was much higher than the actual demand. It may also be a temporary phenomenon due to periodic fluctuations on the demand side.

It is interesting to note that while production is generally equal to the attainable capacity, in certain cases, capacity utilisation can be more than 100 per cent. May be the industry had certain hidden capacities which were not declared either by the suppliers when the plant was installed, or by the management when capacities were assessed. It also implies that the unit, which claims to be working above full capacity, might as well be revealing underutilisation of capacity. The other reason could be that after attainable capacities were assessed, there has been improvement in the efficiency of labour, quality of raw materials etc., leading to a situation where the actual utilisation is higher than the attainable capacity.⁷

⁶ Meena Gupta and M.J.K. Thavaraj, "Capacity Utilisation and Profitability: A case study of fertiliser units", Productivity, Vol. XVI, No.3, Oct.-Dec., 1975, p.27.

⁷ Navin Chandra Joshi, "Perspectives on Capacity Utilisation" Log

It is essential that the time horizon over which utilisation of capacity is determined should be long enough. A figure based on shorter time horizon could be grossly misleading. It is not enough that utilisation of capacity of a plant is outstandingly good only for a day or a week, but it should be a sustained performance at high level over a long period. This will make the capacity utilisation figure reliable and meaningful. Usually most of the business and industrial operations are reported over a period of one year. The time horizon for determination of capacity should necessarily be extended over a year in order to fit with other business parameters.⁸ The time horizon for capacity utilisation calculations should, therefore, be one year.

In the modern complexity of manufacturing activity there is hardly any single-product enterprise. Production facilities are as different as are the different stages of production. The individuality of equipment also leads to unavoidable capacity imbalances in different sections. Therefore, even when the detailed project reports envisage a certain product-mix, it will be incorrect to presume that the meaning of capacity would continue to remain the same throughout the life of the enterprise. The concept, as such, is dynamic for the reason that capacity can be extended by better management and it can also deteriorate.

Udyog, Vol. XIX, No.8, 1985, p.38.

⁸ Kale V.T., "Industrial Capacity : concepts and measurement", Productivity, Vol. XVI, No.3, Oct.-Dec., 1975, pp.841-847.

The unit chosen for capacity is generally such that a physical measurement of the unit is convenient and accurate under industrial operating conditions. It will also depend upon the type of product, i.e., whether it is solid, liquid or gaseous, whether it is to be measured in tonnes, kilograms, litres, m³ or simply numbers.

Impact of Underutilisation

The problems of capacity utilisation appear to be the crux of a number of the pressing problems of underdeveloped regions. Broadly speaking, the lack of utilisation reflects imbalances in growth, the quantity and quality of management and the acute problems of governmental administrative decisions in determining the allocations of foreign exchange and the licensing of new investments. In view of Reghunath K.Koti, "it is well known that economic development results from utilisation of resources, both men and material. The pace of development is higher if the rate of resource utilisation is better, other things remaining the same. When it comes to utilisation of capital, it gains tremendous importance because all the theories of economic development from Marx through Harrod-Domar to Chenery stress the role of capital accumulation in economic development, and any underutilisation of accumulated capital stock will retard economic

development".⁹ An increase in capacity utilisation leads to larger employment, higher income, greater investment and higher growth of the economy. There are conclusive evidence to the effect that low utilisation of capacity does not bring about a proportionate reduction in costs. Since fixed costs account for a significant proportion of the total cost in basic and intermediate goods industries, higher utilisation could bring about considerable reduction in the cost per unit of output in this respect.

Further, underutilisation of capacity has a spiral effect on the entire economy of the country. Most of the industrial and economic activities are deeply interlinked. Non or under supply of raw materials, goods, and services can adversely affect operation of all interlinked units and industries. Mother and captive units are equally affected and they play havoc with downstream units. Supply less than demand will result in increase of prices and goods will go out of reach of the common man. Imports become necessary to meet the gap in demand straining further country's scarce foreign exchange resources getting diverted to non-priority sectors.

Capacity utilisation and economic growth

There is tremendous scope for raising the growth rate of the economy by improving the level of capacity utilisation. In

⁹ Reghunath K. Koti, "Capacity Utilisation and Factors Affecting it in Certain Industries 1966-67", mimeograph, No.2, Gokhale Institute of Economics and Politics, Pune, 1967, p.35.

fact, an improvement in the rate of utilisation of capacity will result in more than a one-shot increase in output. It will cause the rate of growth of output to rise in subsequent periods because of the interdependence of current output, saving and investment with the capital stock and output of the future. In the process of growth, an increase in capacity utilisation might act as a substitute for permanent reductions in the rates of consumption. Alternatively, it could accelerate growth by increasing capital productivity or effectively reducing the capital-output ratio. These are the two routes by which improved capacity utilisation quickens the pace of economic growth.

Methods of Calculating Capacity Utilisation

Some of the important methods of calculating capacity utilisation are given below :

1. Installed Capacity Method

In the installed capacity method the maximum output that a plant is capable of producing is established on the basis of the number of operable shifts appropriate to the industry concerned. It represents the optimum level of utilisation of the plant. When a plant is erected the manufacturer and the management after satisfying themselves that plant is properly installed according to specifications, declare the installed capacity of the plant. The extent of underutilisation is then taken to be indicated by the difference between this level of output and the actual output.

There are some fundamental grounds on which the installed capacity approach is to be preferred to the trend-through-peaks method. We shall state briefly a few of these arguments.

a) When the level of peak output itself is low in spite of the availability of large installed capacities the peak output cannot be taken to represent the 'optimal' output. Excess capacity based on this concept of industrial capacity will then be an underestimation.

b) If the earlier peak production level is not exceeded and replaced by new higher levels of peak production, even when the installed capacity is increasing, an incorrect impression is created that new investments are not taking place in these industries.

c) In the case of industries whose production schedules are not on a monthly basis, a monthly peak does not have much significance as representing industrial capacity. It is possible that the finished product may come out in a particular month though it has been in the process for several months. Peak output take account of the finished output of the month. In such cases monthly peak output may not reflect real capacity of the industry and only installed capacity approach can be helpful.

2. Trend-through-peaks method

This method was developed by Klein and Summers¹⁰ of the

¹⁰ see L.R.Klein and Summers, The Wharton Index of Capacity Utilisation, University of Pennsylvania, 1966.

Wharton School. In this method the peaks are located from the time series on output. The peak outputs are taken to be equal to the capacity outputs for the corresponding periods. The capacity outputs for years between the peaks and after the last peak are determined by extrapolating it. For any period, the ratio of actual output to capacity output, thus estimated from the trend-through-peaks, measures capacity utilisation.

This is a useful rough and ready measure which requires only knowledge about the time series on output. The limitations of this method are:

- a) Peak output may represent less than full capacity output.
- b) If investments are subject to cyclical ups and downs, actual capacity may have a time profile quite different from a trend-through-peaks curve.

The estimates of capacity and capacity utilisation derived by this procedure correspond to the technical concept of capacity. Since factors of production other than capital may restrict actual output, the method implies the synthetic variant of the technical capacity output.

3. Minimum Capital Output Ratio Method

The National Industrial Conference Board and the Federal Reserve Board of the USA estimate capacity on the basis of minimum capital output ratio. Fixed capital output ratios are estimated in terms of constant prices. A benchmark year is then selected on the basis of the observed lowest capital output ratio. In

choosing the benchmark year other independent evidence is also taken into consideration. The lowest observed capital output ratio is considered as capacity output. The estimate of capacity is obtained by dividing real fixed capital stock by minimum capital output ratio. The utilisation rate is given by actual output as a proportion of the estimated capacity.

Thus

$$U = \frac{O}{\hat{C}} \times 100$$

$$\hat{C} = \frac{C}{(C/O) \text{ Min}}$$

where U = capacity utilisation

O = real output (gross value added)

\hat{C} = estimate of capacity

C = real fixed capital (gross block)

(C/O) Min = minimum capital output ratio

Although this is a useful alternative measure of capacity utilisation, the problems of capital measurement are formidable. Capital is even more difficult to measure than capacity. Needless to say the usefulness of this method depends critically on the accuracy of the measurement of capital.

4. Survey Method

Another measure is based on the survey method. The survey provides a measure of the extent to which businessmen could increase their output with given questions regarding capacity in

terms of physical volume, rate at which the companies were actually operating at the end of the year and at the rate at which the companies would prefer to operate. In India the Gokhale Institute¹¹ and National Council of Applied Economic Research¹² conducted surveys for estimating the rate of utilisation of capacity in Indian industries.

All these surveys take the form of questionnaires filled in by businessmen and hence inevitably rely on subjective judgements of industrialists regarding 'normal' or maximum capital output. These surveys suffer from the following limitations:

- (a) Poor response rate
- (b) Firm size bias
- (c) Inappropriateness for multi-product firms
- (d) Cyclical bias i.e. respondents might ignore some idle capacity when estimating capacity during slack period, and counting it when the firm is using the equipment during better period.

5. The RBI Index Method

The Index of potential utilisation which is estimated by the RBI is a modified version of the Wharton School measure of capacity. However, some differences exist between the two

¹¹ see R.K. Koti, Utilisation of Industrial Capacity in India 1967-68, Gokhale Institute of Politics and Economics, Pune, 1968.

¹² NCAER, Underutilisation of Industrial Capacity, New Delhi, 1968

measures. The important ones are:

- a) The RBI Index makes use of monthly output indices for locating peaks, unlike the the Wharton measure where quarterly series are considered.
- b) Such monthly peaks are treated as potential output for each year in the RBI Index. In other words, no attempt is made here to connect successive peaks by linear interpolation as is done in the case of the Wharton Index. Such monthly peaks, if connected over the respective years, would look like a discrete stepwise function
- c) The RBI monthly indices of output are not deseasonalised. In the case of industries like sugar, tea and salt annual peak is considered to indicate potential output rather than the monthly index to take account of seasonality.

Despite these differences, the RBI Index of potential utilisation is very much in the intellectual tradition of the Wharton School procedure.

Apart from the methods mentioned above, economists have evolved econometric techniques of production and cost functions to estimate the extent of utilisation. In the case of cost functions it has been suggested that the point of minimum average cost represents the full-capacity output. This idea is based on the assumption that the cost curve is U-shaped. The U-shaped cost curves have been questioned by various scholars on theoretical and

empirical grounds. Hence cost functions are not suitable for measuring capacity utilisation. In the production function technique, the capacity output is defined as the weighted sum of the contribution of several inputs working at the full employment level. The methods to estimate the index of utilisation with the help of production function have been evolved by Ball and Smolensky, Schoufeld, Klein and Preston and Briscoe et al. The use of production function for estimating the extent of capacity utilisation is more satisfactory from the analytical point of view. The strength of this method lies in that it can analyse the influence of more than one input on the capacity output; and it allows for lags in the adjustment to equilibrium.

In some recent studies, capacity utilisation has been measured with the help of variations in the operating time of plant and equipment, instead of measuring it with the help of capacity output. This approach has been termed as time-intensity approach.¹³

The survey of the alternative measures of capacity suggests that these measures have different conceptual base, as well as different data requirement. Therefore, the choice of appropriate measure of capacity utilisation depends on the purpose of the study and the availability of the set of data in a given situation.

¹³ see Gordon C. Winston, "Theory of Capacity Utilisation and Idleness", Journal of Economic Literature, Vol. 12, No.4, 1974, pp.1301-1320.

However there are certain limitations in the use of capacity utilisation as a measure of efficiency. If the product is of a standard variety, such as basic steel, cement or fertiliser, it is clear that higher capacity utilisation will be cost-effective. This does not necessarily apply to the more complex case of industries where a given set of inputs can give rise to alternative possibilities of product-mix. Since the outputs themselves can be varied and can have different market values, it is not so much the total physical production in terms of numbers or tonnage of products. When the productive capacity is created with a flexibility for producing a variety of items, the selection of a product-mix is a factor of the productive capability of the enterprise and also a factor of the marketability of the products. If higher utilisation of capacity is achieved without reference to the practical possibilities of marketing the products, it will be an exercise in futility. The use of capacity utilisation in strictly tonnage terms might prove to be counter-productive. Capacity is also affected by the ageing process. When the normal productive efficiency of machines is over, their capabilities run-down. It is therefore wrong to assume that installed capacity remain constant. After a period of time, there is need to reassess the capability of the equipment and to 'derate' it. It is the derated capacity which can then form a more realistic basis for the evaluation of capacity utilisation.

Capacity Utilisation in Public sector Enterprises

Capacity utilisation is an important indicator of efficient running of enterprises. As the very philosophy of the public sector derives from two fundamental considerations, namely, the creation of a sound industrial infrastructure and the stimulation of balanced regional development, utilisation of installed capacities in the public sector production enterprises, is perhaps, the largest single important indicator of their operating efficiency.¹⁴

This aspect has been realised and reiterated at various levels in the Government and Parliament. A number of high level committees have studied the subject and have drawn attention to the need to maximise utilisation of installed capacities in public sector production enterprises.

The Committee on Public Undertakings (1978-79) in its 28th report in April 1979 observed that unless the public sector enterprises contribute to the rapid growth of GDP and generate substantial internal resources for future investment the country cannot move forward quickly. What ails the public sector is an unusually long gestation period, very low level of production or

¹⁴ Bazle Karim and B.T.Bhide, "Capacity Utilisation in Public Sector Enterprises : Problems and Prospects", Productivity, Vol.XVI, No. 3, Oct.-Dec.,1975, p.45.

underutilisation of assets created and the consequential escalation of cost of projects and their products. With increasing investment in the public sector, these observations assume greater significance. Quoting again from the report of the committee on Public Undertakings "the underutilisation of production capacities not only led to locking up of scarce resources, but also resulted in widespread repercussions in linked industries and heavy avoidable inputs. It had also the effect of inflating the cost of production and adversely affecting the financial results of the undertakings. Besides it meant that, the plant and machinery might become obsolescent and even unprofitable because of technological development before fuller utilisation of investments had been derived".¹⁵ Serious concern has been expressed in various quarters as improper and underutilisation of country's resources resulted in restraining smooth and quicker growth of country's economy, industrialisation, employment potential, increase in prices due to lesser availability of goods and services and all-round inflation.

While ushering in the 20-point programme, our late prime minister Mrs. Indira Gandhi laid emphasis on the capacity utilisation stating "profit must come through better utilisation of plant capacity and resources by greater efficiency and

¹⁵ Tandon G.L., Improvement in Capacity Utilisation", Lok Udyog Vol. XVIII, No. 4, July 1984, p.43.

productivity using better co-operation of labour".¹⁶ It is also observed that public sector undertakings, for a variety of reasons, have not been able to utilise their full capacity which have been installed. The low capacity utilisation is one of the reasons why they have been making losses. Since 1982 the quantum of production and supply of basic raw materials have shown improvement, though the level of capacity utilisation continues to be low in several enterprises.

Factors effecting underutilisation of capacities in Public Sector Enterprises

With the foregoing background considerations in view, we may now examine as to what are the major factors which cause underutilisation of installed or rated capacities among the Public Sector Enterprises. While we discuss the factors which lead to the underutilisation of capacities we must not forget one important point, i.e., any investment decision which we make, whether in the private or in the public sector, has an element of risk attached to it. While we must take all precautions to see that this element of risk is held to minimum, we must, all the same, accept a probability that some of our investment decisions may run into unforeseen difficulties. From this point of view the business risk involved in public sector investments is in no way different from the general business risk. In particular, in a

¹⁶ Kajipet Omprakash, "Capacity Utilisation : A Measure of Efficiency in Public Enterprises", Southern Economist, Vol.24, No.18, Jan 15, 1986, p.15.

developing economy like ours, where there is need to acquire more and more sophisticated technology in order to make up the technological gap, this risk is rather greater. We may now examine causes which tend to underutilisation of capacities in public enterprises in some detail.

a) Rated capacity is wrongly calculated

This can arise on account of the complex nature of capacity. In certain cases, changes in product mix have had considerable influence on the calculation of rated capacity. In certain other places, where a definite figure of installed or rated capacity is not available on account of the plant being old, and subsequently taken over by the government or on account of a series of additions which might have been made to the plant and machinery there may be difficulty in correct assessment of the rated capacity.

b) Incorrect choice of technology

Experience shows that this is, by far, the largest single reason which leads to perpetual problems of underutilisation of capacity. There are instances where newly developed technology which was still to be conclusively proven elsewhere in the world was purchased by this country without careful analysis with reference to the working environment, the quality and quantity of available raw materials, the level of skills and other technical support to sustain the plant etc.

Under these circumstances the plants enter problem areas which are very difficult to solve subsequently. An examination of the enterprises which have yet to cross a respectable level of capacity utilisation in the public sector would reveal that many of them suffer the scars of incorrect choice of technology. The experience gained in the past years has enabled the government and the public sector to place considerable emphasis on a thorough examination of technology of the plant.

c) Inadequacy of demand

Planned development is dependent not only on certain assumptions, but more importantly on their realisation. Planned development is also conditioned by capital scarcity. Under these circumstances, there are certain public sector enterprises or units which suffered from lack of demand for their product on account of nonavailability of capital for investment into projects for which these plants were supposed to supply the materials and equipment. There are certain cases in the public sector enterprises, where inadequacy of demand arising out of such factors has resulted in underutilisation of capacities. In order to counter these tendencies, efforts are being made by the government and public sector enterprises to diversify, to the extent possible, into other production lines.

d) Inadequacy of raw materials

Inadequacy of raw materials may arise on account of

natural shortage of raw materials in the country or alternatively, the inability of feeder industries to supply raw materials in adequate quantities. It may, however, be said that, by and large, public sector enterprises have ever since overcome inadequacy of raw materials.

e) Inadequacy of power

The power famine in the country has seriously hampered the performance of public sector enterprises. Even though many public sector enterprises do not get a priority treatment as regards power allocation from the state on account of the vital nature of their products, there are examples where underutilisation of capacities is traceable to power shortage.

f) Lack of balancing equipment

There are certain public sector enterprises where lack of balancing equipment has led to underutilisation of capacities. Such cases are being studied and are being rectified.

g) Industrial relations

Over the years labour unrest in the country has been increasing and industrial relations as a whole have become a major cause for concern in all the public sector units. This has been mainly due to lack of delegation to the units or company

managements and frequent intervention by central agencies.¹⁷ In spite of the amenities offered by the public sector units to their employees, they have been unable to get the best out of their workers. This matter requires to be looked into. This factor has greatly influenced capacity utilisation and efforts towards achieving rated or installed capacity.

h) Managerial shortcomings

Of utmost importance, however, is underutilisation of capacity attributable to managerial shortcomings and this is an area where there can be absolutely no excuse on the part of the public sector enterprises for capacity utilisation. The public sector enterprises are indeed faced with a formidable managerial gap on account of the fact that adequate number of managerial personnel are just not available even today in the country to man the enormous investments in the public sector. The government and the public sector enterprises have, however, been making constant efforts to improve the various facets of operational management in order to overcome underutilisation of capacities on that account. In this connection, emphasis is being laid on proper structuring of organisations, better maintenance of equipment to avoid downtime leading to underutilisation of capacities, better

¹⁷ Abstract from the final reports on "Capacity Utilisation in Public Sector Undertakings", presented to Bureau of Public Enterprises by the National Productivity Council, New Delhi, 1978.

production planning and control systems, better inventory management, better management of available resources using modern industrial engineering or productivity techniques and better motivation of man through well designed incentive schemes. The public sector enterprises are also laying greater emphasis on long range and corporate activity integrated with organisational and management development plans.

Factors leading to better utilisation

Some of the public sector enterprises need to be complimented for their creditable performance in achieving utilisation beyond their designed capacity and increasing the plant capacity beyond the design figure indicated by their collaborators. The factors that have made this possible are:

1. A dynamic management team and a genuine concern for industrial relations;
2. Plant modifications and removal of hurdles in the efforts for improving capacity;
3. Quicker decision-making process to solve the plant level problems;
4. Research and development activities for plant improvement and production development; and

5. Constant endeavour towards increasing the working efficiency through adherence to better operating and maintenance practices.

It is by no means suggested that capacity utilisation should be treated as the sole indicator of operating efficiency of the manufacturing public sector enterprises or units. It is recognised that for commercial and business operation, profitability, returns on investment, and build up of reserves are equally important criteria. The fact remains however that in the context of the needs of the national economy, capacity utilisation in manufacturing public sector enterprises is a very important efficiency indicator, much as the body temperature is a significant indicator of the health of a normal person. We view capacity utilisation from this point of view and the public sector enterprises at large are quite conscious of the fact that many a managerial improvement would follow in the wake of recognising the paramount importance of the need to utilise fully the installed capacity.

B. Profitability

Lord J.M. Keynes remarked that profit is the engine that drives the business enterprises. It is the unalterable *raison d'être* and hence it is considered to be the primary and ultimate objective of an enterprise. In case an enterprise is unable to make profits, capital invested is eroded and in due course of time

the enterprise ultimately ceases to exist. An enterprise can discharge its obligations to the various segments of the society only through profits. Hence profits are the soul of business without which it is lifeless.

"Profit is not the explanation, cause or rationale of business behaviour and business decisions but the test of their validity. The problem of any business is not the maximisation of profit but the achievement of sufficient profit to cover the risk of economic activity and thus to avoid loss".¹⁸ Profit is the acid test of the individual firm's performance. In other words it is the fulcrum around which the entire business activity rotates.

Concept of Profit

The excess of output over the input factors expressed in monetary terms is called profit. Thus it is the excess of income over costs. The term has several connotations and each concept has been treated as the business income shown in the income statement by an accountant according to the various accounting policies, practices and assumptions applied for computing such an income.

Concept of profitability

Profitability is the profit making ability of an enterprise. It is mainly based on the concept of profit. The

¹⁸ Peter F. Drucker, quoted in The Management Accountant, Calcutta, January 1967, p.8.

goal of an enterprise should not be the maximisation of profit, but the maximisation of profitability. Profitability is a relative concept, and to measure it, profit is to be related to some variables affecting the profit or relating to profit in some form or the other.

Profits and efficiency of Public Enterprises

There is one school of thought which says that the public sector exists not for profit but for public welfare with a motive of service to the community. Against this there is another school of thought which clearly says that the public sector has profit as an objective.

In a private enterprise, guided by the objective of profit maximisation, profits provide the most important criterion of efficiency. But in the case of public enterprise, not guided entirely by the profit motive, financial profits cannot serve as a sound index of its efficiency. The financial profits have the following limitations:

- 1) The prime motive of a public enterprise is not to maximise profit, but to maximise social welfare.
- 2) A public enterprise is guided more by the social purpose than by the financial profits.
- 3) In addition to efficiency, the financial profits are affected by a number of other factors, viz, intensity of capital structure, scale of operation, location, imperfections of

market, changes in demand, fiscal and taxation policies, inflationary conditions, cyclical fluctuations, etc. All such factors should be taken into consideration while measuring the efficiency of a public enterprise.

- 4) Though the profits are an important yardstick of efficiency, nevertheless the extent of the financial profits cannot be taken as the final proof of efficiency. Sometimes satisfactory profits can mask inefficiency and conversely, a high degree of efficiency can be achieved in the absence of the profits.
- 5) A public enterprise is more constrained on the one hand by low prices of its output due to the administered price policy of the government and on the other hand high burden of social overheads.

Thus it can be concluded that the financial profits cannot be treated as a criterion of efficiency for a public enterprise to that extent as it is in the case of a private enterprise.

Many theories have been propounded and put forward, and the profit as a criterion of judging the efficiency of a public enterprise has been questioned. But after an overall critical analysis of different views and theories put forth in this regard one can safely conclude that profits are by no means less important indicators of efficiency of a public enterprise. The objectives which a public enterprise has to fulfil, besides

accounting for the special considerations, will have to take the generation of surplus into their account for the growth and successful operation of the enterprise. The earning of profits cannot be sacrificed as an objective of these enterprises since profits of public enterprises are the propellers of socialist administration.¹⁹

The Taxation Enquiry Commission observes: "Public purpose rather than profit should be the guiding factor in the operation of public undertakings but the antithesis is more apparent than real. In the public sector, profit is not necessarily, inconsistent with public purposes, on the other hand, it may itself constitute public purpose even if it remains secondary".²⁰

Pleading in favour of public enterprises making profits, Rao states that the pricing policy "should be such as to promote the growth of national income and the rate of growth ... public enterprises must make profits and the larger the share of public enterprises in all enterprises, the greater is the need for making profits. Profits constitute the surplus available for savings and investment on the one hand and contribution to national social welfare programme on the other, and if public enterprises do not make profits the national surplus available for stepping up the rate of investment and the increase of social welfare will suffer

¹⁹ Omprakash, The Theory and Working of State Corporations in India, George Allen and Unwin Pvt. Ltd., London, 1962, p.177

²⁰ Government of India, The Taxation Enquiry Report, New Delhi, p.202.

a corresponding reduction ... Hence the need for giving up the irrational belief that public enterprise should by definition, be run on a no profit basis".²¹

Professor Galbraith while speaking in the context of efficiency for publicly owned corporations in a developing country, remarked that "If I had to lay down a measure for performance of the publicly owned corporations in a developing country, it would be the earnings that it is able to put into its own expansion...the most successful firm will be the one which by its efficiency and drive finds the earnings that allow it the greatest growth. Perhaps there are other goals that might be urged but what is vital is that the goal whatever it is, be specific, measurable, known to all and firmly enforced".²²

S.S.Khera is of the opinion that the "Public enterprises have to play a more positive role in the economic development of a country like India, which is suffering from an acute shortage of capital for investment and where, therefore, much of the developmental activities, have of necessity to fall on the state".²³

The Menon Committee on Parliamentary Supervision over State Undertaking also holds the view that "Government companies

²¹ V.K.R.V. Rao, "The Public Sector in India" in V.V. Ramanadham (ed.) Pricing, Labour and Efficiency in the Public Sector, Institute of Public Enterprise, Hyderabad, 1962, p.3.

²² Prof. J.K. Galbraith's address on 'Public Administration and the Public Corporation' at New Delhi on 25, August 1961.

²³ S.S. Khera, Government in Business, Asia Publishing House, Bombay, 1963, p.235.

should not only pay their way but make legitimate profits".²⁴ The public enterprises should not lag behind the rest of the economy in capital formation. To achieve a rapid rate of economic development, it is very essential to ensure that the capital is accumulated at every convenient point of activity and there is no leakage of investible funds into current consumption.

Profits are necessary if the enterprises are to self finance their growth following the path of successful private enterprises which quite often meet a major portion of the expansion costs from their profits. A policy of profits is necessary to build up adequate reserves which are essential to meet unforeseen contingencies.²⁵

A policy of profits will be necessary to provide funds for improvement and modernisation.²⁶ Public enterprises usually perform essential public services and in such cases, the quality is no less important than the cost. It could, therefore be desirable that the public enterprises create a surplus for improving the quality of service or that of products.

Every economic activity must prove its eligibility to the share of national productive factors it seeks to employ in the performance of its work. The justification for the use of

²⁴ All India Congress Committee Report of the Sub-committee on Parliamentary Supervision over State Undertaking, New Delhi 1959, p.33.

²⁵ R.L. Varshney, 'Price Policy in Public Enterprises', AICC Economic Review 15, Sept. 1959, p.17.

²⁶ R.L. Varshney, "Pricing Policy under Public Enterprises", Indian Journal of Commerce, March 1958, p.48.

economic resources in an economic activity depends primarily on the profits which it can earn under conditions of demand and cost of production. Shifts in resource allocation must take place in response to changes in the relative profitability of different industries or industrial units. Unless the public enterprises make profits comparable to those made by the private sector, there tends to develop a disparity in the criteria of resource allocation as between the two sectors.²⁷ There is the risk of an excessive allocation to and development of industries in the public sector. Excepting industries, the development of which is considered socially necessary irrespective of the financial return, the public sector should not be exempted from the normal criteria of expansion or investment. The industries in the public sector should be guided, like the private enterprises, by the prices that consumers are ready to pay for their products. If they lead to high profits, additional investment would be justified by consumer preference. The low profits, in contrast, would indicate that the consumers do not desire an expansion of the industries.

Upholding the test of profit in public enterprises lessens the possibilities of the investment decisions being subject to political pressures. It also safeguards against inefficiency in management. "To set a positive target of profit and indicate bias in favour of the maximal principle in working

²⁷ V.V. Ramanadham, The Structure of Public Enterprises in India, Asia Publishing House, Bombay, 1961, pp.92-94.

towards it is not only a guarantee of efficiency, but a contribution to the sense of pride on the part of the managers of public enterprises who have no personal gain to seek out of their operations. The maxim of 'no profit no loss' is therefore inadequate because apart from other economic reasons, it falls short of the dictum of efficient administrative organisation".²⁸

Unless the public enterprises follow a deliberate policy of profits, it is feared that they may disturb the pattern of government revenues.²⁹ In the first place, nationalisation by the state governments reduce the income tax receipts of the central government. Secondly, in case of some public enterprises there may be pressure from the state or central legislators for subsidised or non-profit prices. For them this may be the very purpose of states's replacing private enterprise. This would lead to a decline in receipts of the government from taxation. Thirdly, many public enterprises have suffered losses which eat into government resources collected from other sources. Fourthly, if it assumed that private enterprise is more effectively inspired than public enterprise towards profit maximisation, the tax receipts based on profits, probably also those based on sales, would be lower under public enterprises. If the decline in government revenue is to be avoided, it is necessary either to

²⁸ V.V. Ramanadham, 'Pricing in the Public Sector' in V.V. Ramanadham (ed.) Pricing, Labour and Efficiency in the Public Sector, Institute of Public Enterprise, Hyderabad, 1961, p.15.

²⁹ V.V. Ramanadham, The Structure of Public Enterprises, Asia Publishing House, Bombay, 1961, pp.89-91.

devise an appropriate system of taxes on public enterprises or to direct them to earn profits.

Because of the increasing participation of state in economic activities and the adoption of welfare-state principles in many developing countries, there has been a steep increase in government expenditure. This has necessitated a substantial increase in government expenditure. All this increased revenue cannot come from direct taxes and an increasing proportion has to come from taxes on the products of or profits from public enterprises. While advocating a policy of profits, care should, however, be taken that public enterprises do not indulge in profiteering or use their power to follow a price based on a narrow criteria of maximisation of profits on the model of private enterprise.³⁰

The Rangoon Seminar on "Organisation and Administration of Public Enterprises in the Industrial Field" held under the auspices of ECAFE came to the conclusion that public enterprises should make a profit. Since the underdeveloped countries suffer from a shortage of capital resources, a portion of this surplus should be made available for industrial development in the country as a whole, while the other portion should be ploughed back into the industry itself for its further expansion.

Most of the states have before them the goal of building a socialist society. Socialism basically implies equal

³⁰ V.K.R.V. Rao, op. cit. p.4.

opportunity for advancement for the children of the poor classes, who cannot meet the cost of bringing up and education of their children at a level enjoyed by the children of the richer classes, will have to be taken by the state which requires huge funds. There is however, a strict limit to which funds can be collected by levying taxes without adversely affecting incentives to work, save and invest. The profits of public enterprises will have to be an important source of funds required for the building of a socialist society. Om Prakash remarks "...socialist industrialisation rests on the profitability of public enterprises. They provide a less cumbersome source of public finance".³¹

One of the suggestions made at the Prime Minister's Round Table Conference on public sector held on 14-15 June, 1966 was that profit should be recognised as an index of efficiency and this was not inconsistent with the broad objectives of the socialist pattern of society. It was suggested that if an undertaking was not able to earn 20 per cent gross on total capital (equity plus free reserves) then the affairs of an undertaking deserved a special study; if, on the other hand, the pricing policy recommended by it gave very high profits, the question of reducing the price for the benefit of consumers would need consideration.³²

³¹ Omprakash, op. cit. p.182.

³² Bureau of Public Enterprises, Lok Udyog, Vol.7, No.2, New Delhi, March 1967, p.57.

Hanson has rightly said that "the justification for profit making is simply that it constitutes a direct and convenient method of contributing towards national capital formation".³³ The surplus in the public sector is not only an index of the quality of its performance but more significantly it can contribute more substantially for the resource mobilisation for investment in planned economy.

Besides this, if a public enterprise does not earn profit when it is in a position to do so, then its further capital requirements have to be obtained either by new loans or new grants. This will lead to higher taxation on the increasing weight of interest payments and capital repayments which it has to make to private individuals who have advanced money to them.

It is true that the state should think in terms of public good and promoting and sustaining economic and social welfare. But it should not at the same time seek to depart from the normally accepted business and commercial principles, and it should be prepared to have its efficiency judged by the normal criterion of profit by which the efficiency of a private sector undertaking is judged.

V.K.R.V.Rao expressed the same view: "Public Enterprise must be carried on a profit making basis, not only in the sense that public enterprise must yield an economic price... but must

³³ A.H. Hanson, Public Enterprises and Economic Development, Routledge and Kegan Paul, London, 1960, p.42.

also get for the community sufficient resources for financing a part of the investment and maintenance expenditure of government. Increasingly the share of the profits of public enterprises in financing the investment and maintenance expenditure of government must keep on increasing... The theory of 'No profit no loss' in public enterprises is particularly inconsistent with a socialist economy, and if pursued in a mixed economy, it will hamper the evolution of the mixed economy into a socialist society. The sooner, therefore this theory of 'No profit no loss' in public enterprises is given up and the policy accepted of having a price and profit policy for public enterprise such as will make the state increasingly reliant on its own resources (as distinguished from taking the personal incomes of its citizens), the quicker will be the evolution of socialist society".³⁴

The importance of profit and profitability for public enterprises is more significant in case of developing countries. In a developing country profits earned by public enterprises may, to a considerable extent, bring down the rise in prices and thus check the excess of inflation. Profits of public enterprises may also help in balancing revenue and expenditure. They can also make the enterprises strong to stand on their own feet and be in a position to finance their own expansion and modernisation.

³⁴ V.K.R.V. Rao, "Prices, Incomes, Wages and Profits in a Socialist Society", in All India Congress Committee, Planning Sub-committee, Ooty Seminar, May 30-June 5, 1959 (papers discussed) New Delhi, p.176.

The above discussions lead us to the conclusion that public enterprises should be run on profits and this is to be treated as one of the most important criteria for judging the efficiency of such enterprises and particularly the industrial and commercial ones.

Measurement of Profitability

Profitability is a concept based on profits but since it is a relative concept, profits are to be expressed in relation to some other variables. Several ratios can be computed to measure the extent of profitability in quantitative terms. The profitability ratios are calculated to measure the operating efficiency of an enterprise. The profits can be related mainly to sales and investments to determine profitability. If sufficient profits are not generated through sales, it becomes problematic for the enterprise to cover the operating costs and the interest burden. The evaluation of profitability in terms of investment is essential since the investors desire a satisfactory return. Moreover, inadequate returns threaten the very survival of the enterprises.

Some of the important financial ratios which are used in the analysis of profitability are as under:-

1. Operating profit margin

This is the ratio of operating profit to operating revenue. A low ratio may indicate the inability of management to develop sales volume, limitation of fares and freights as compared

to the cost of operations. On the other hand, an increase in the ratio may reflect an increase in operating revenue without a corresponding or proportionate increase in operating costs.

2. Net profit margin

The ratio of net surplus to operating revenue has been taken to be the net profit margin. A reasonable operating profit margin is necessary to earn adequate net surplus. This ratio is the overall measure of the firm's ability to turn each rupee of sales into net surplus. The enterprise cannot achieve satisfactory return on owner's equity in case the net margin is not adequate. The firm's capacity to withstand adverse condition is also indicated by this ratio.

3. Operating ratio

It is the ratio to match operating costs with operating revenue. If the operating ratio is subtracted from 100 the operating profit margin is arrived at. A higher operating ratio will leave a very small margin of operating profit to meet interest and other financial obligations. The operating efficiency should be used with caution. There are a number of variables affecting the ratio, some of which are not controllable by management e.g. fuel price hike, increase in pay and allowances etc.

4. Return on investment

The profitability can be measured by putting the profits

in relation to investment. 'Investment' has several connotations, each used in a different objective context. "The return on investment is one of the most successful and simple techniques to aid the investment decision and performance valuation".³⁵ Three important concepts have been taken here, namely, the capital employed, net worth and equity capital.

a) Return on capital employed

Capital employed is used by different authorities in different ways. Here we have adopted the net capital employed concept as the base, meaning thereby, the net block of fixed assets, capital work in progress, investments and the net current assets (net capital employed = gross block of fixed assets - depreciation + capital work in progress + investments + net current assets). The return has been computed here on the basis of the operating profit to the capital employed, net surplus before the interests and taxes to the capital employed and net surplus before the taxes to the capital employed. The return on capital employed is the indicator of how well management has used the funds in the business supplied by creditors and owners.

b) Return on net worth

It has been computed by expressing net surplus after tax as a percentage to net worth. The net worth denotes the total

³⁵ R.M. Bhandari, "Profit Planning in the Public Sector", Lok Udyog, April 1967, p.17.

equity share capital and reserves and undistributed surplus. The ratio is indicative of the return expected by or available to the proprietors.

c) Return on equity capital

The dividend is declared on the equity capital and the net surplus after tax expressed as a percentage to equity capital shows the degree of availability of current profits to equity shareholders. This ratio indicates how well the enterprise has used the owner's capital.

C. Productivity

The resources available to any nation for economic development are limited. Hence it has to economise the use of the resources, and determine priorities for developmental effort. Economy in the use of scarce resources is vital to any developmental effort whether in industry or output of goods and services out of the available input of resources. In modern terminology this concept is known as 'productivity'.

Productivity, once merely a tool of the economist, has acquired new significance to the worker, employer, soldier and statesman. The rehabilitation of shaken economies, the necessity of balancing imports and exports, the formulation of employment and wage policies and the pursuit of high level of production, all have thrown light upon the vital importance of productivity. Productivity may be considered to be the corner-stone of the

economy of the future. According to John W.Kendrick, "the chief means whereby humanity can raise itself out of poverty to a condition of relative material affluence is by increasing productivity. Productivity is the relationship between outputs of goods and services and the inputs of basic resources--labour, capital goods and natural resources".³⁶

Regarding the term 'productivity' ILO wrote as follows: "Few words have risen to favour quite as quickly as productivity. As soon as peace was restored and men could concentrate on economic progress once more, it had such a vogue that its original sense--the ability to produce-- was virtually lost sight of, and for masses 'productivity' became a somewhat hazily understood panacea for achieving the happiness of mankind, materially at least".³⁷

But productivity is not growth, nor expansion, nor economic progress, nor all at once, although all these notions are closely inter-related. Their relationship is neither simple, automatic nor unilateral. While productivity is not the vague, irrational elusive concept that some people imagine, it is more complicated than may appear when its connections and economic and social determinants are taken into account. Productivity should

³⁶ Kendrick, J.W., Understanding Productivity : An Introduction to the Dynamics of Productivity Changes, The John Hopkins University Press, Baltimore, London, 1982, p.12.

³⁷ ILO, International Labour Review, July 1969, p.26.

not be confused with profitability either although the two may run parallel.³⁸

Productivity is, in general, defined as a measure of efficiency of transforming inputs into outputs. In fact it is the ratio of output to input/s reflecting efficiency (or saving) in factor use. The ratios of output to particular inputs are termed as partial productivities, whereas the ratio of output to a weighted sum of all the inputs used in the production process is defined as Total Factor Productivity (TFP). The partial productivities are simply the average products of the respective inputs, of which the simplest and most commonly used measure is labour productivity. However, partial productivity has the limitations that it does not measure the overall productive efficiency due to the influence of substitution effect which gets cancelled out in the estimation of TFP.³⁹ Moreover, Gold⁴⁰ argues that the output per man-hour measures neither the efficiency of production as a whole nor that of labour's own efforts. Hence in order to measure overall productive efficiency, TFP is being widely used.

³⁸ Denis Cepede and Pierre Gonod, The Concept and Measurement of Productivity, Cambridge University Press, 1978, p.27.

³⁹ see Kendrick, J.W., Productivity Trends in the United States, NBER, Princeton University Press, 1961.

⁴⁰ Gold, B., "Technology, Productivity and Economic Analysis", Omega Vol.1, No.1, 1973, pp. 5-24

Two versions of TFP are in the literature: one is TFP, a static concept, and the other TFP growth, a flow concept. The former explains the level of productivity at a point of time and the latter measures change over time (hereafter TFPG). Since TFPG is the most commonly used concept in empirical analysis, its interpretations are given below:

Kendrick (1961) defines it as, "the ratio of a change in output to a weighted sum of changes in all inputs," whereas Domar⁴¹ defines it as "an increase in output that is not accounted for by increases in all factor inputs". On the other hand, Solow⁴² interprets it as "the rate of shift in production". He calls it as 'technical change', a short hand expression for any kind of shift in the production function. In his later paper⁴³ he admits that the time shift in the function is a confession of ignorance rather than a claim to knowledge. Therefore, the various interpretations of TFPG implicitly or explicitly assume certain production functions.

Various measures of TFPG used in the empirical analysis are:

⁴¹ Domar, E.D., "On the Measurement of Technical Change", Economic Journal, December 1961, p.13.

⁴² Solow, R.M., "Technical Change and the Aggregate Production Function", Review of Economics and Statistics, August 1957, p.45.

⁴³ Solow, R.M., "Investment and Technical Progress" in Arrow, Karlin and Supplis, (ed.) Mathematical Methods in Social Sciences, Stransford University Press, 1960, p.76.

- (1) Kendrick measure
- (2) Solow measure
- (3) Domar measure
- (4) Tornqvist divisia measure
- (5) Exact index measure; and
- (6) Translog measure

Among them, only three of them most commonly used, are taken for detailed analysis.

Kendrick Measure of TFPG

The earliest and extensively used measure of TFPG is an arithmetic index developed by Kendrick. It is constructed using the neo-classical theory of income distribution based on Euler's theorem. It implicitly assumes a homogeneous production function. It is the ratio of change in output to weighted sum of change in labour and capital, weights being the base year average factor prices, labour and capital. Kendrick measure of total factor productivity is defined by:

$$A_1 = \frac{Y_1 / Y_0}{w_0 L_1 + r_0 k_1} - 1 \quad (1)$$

Here the subscript 1 stands for the current period and the subscript 0 for the base period. Further A, Y, L, k, w and r refer to TFPG, real output, labour, capital, average wage rate and average rate of return to capital respectively. To estimate

directly TFPG at discrete points of time, the modified version of (1) is used which is given below:

$$\frac{\Delta A}{A} = \frac{(Y_1 / Y_0)}{SL_0 (L_1/L_0) + Sk_0 (K_1/K_0)} - 1 \quad (2)$$

Where

$$SL_0 = \frac{W_0 L_0}{Y_0} \quad \text{and} \quad SK_0 = 1 - SL_0$$

Nadri⁴⁴ points out that the Kendrick measure of TFPG assumes the constant elasticity of substitution production function, if the weights are permitted to change over time.

Solow Measure of TFPG

Solow has estimated TFPG from homogeneous production function using appropriate method of aggregation over inputs. The Solow measure of TFPG (for complete derivation, see Solow 1957) assumes constant returns to scale and is derived as follows:

$$Y_t = A_t f(K_t, L_t) \dots \dots \dots (3)$$

Where A_t measures the cumulative effects of the shifts in the production function over time which is defined as:

$$A_t = A_0 e^{\mu t}$$

Where A and μ are constants; so that (3) becomes

⁴⁴ Nadiri, M.I., "Some Approches to the Theory and Measurement of Total Factor Productivity: A Survey", Journal of Economic Literature, Vol.VIII, December 1970, pp.45-56.

$$Y_t = A_0 e^{\mu t} f(K_t, L_t) \dots \dots \dots (4)$$

Differentiating (4) partially with respect to t, we have

$$\frac{\delta Y}{\delta t} = \mu Y_t ; \quad t = 0, 1, 2, \dots, T.$$

Where $Y_t = A_t f(K_t, L_t)$ Hence

$$\frac{(\delta Y / \delta t)}{Y_t} = \mu$$

Thus 'μ' measures the equi-proportionate change in output over time when input levels are held constant. Solow attributes it to the disembodied technical change.

Differentiating (3) totally with respect to time and dividing throughout by Y and rearranging the terms, we get

$$\frac{(\delta A / \delta t)}{A} = \frac{(\delta Y / \delta t)}{Y} - SL_t \frac{(\delta L / \delta t)}{L} - SK_t \frac{(\delta K / \delta t)}{K} \dots \dots (5)$$

Where SL_t and SK_t imply shares of labour and capital during the period t. Under the conditions of constant returns to scale and marginal productivity theory, the share of capital is computed by

$$SK_t = 1 - SL_t$$

The discrete form of (5) is,

$$\frac{\Delta A}{A} = \frac{\Delta Y}{Y} - SL \frac{\Delta L}{L} - SK \frac{\Delta K}{K} \dots \dots (6)$$

Translog Measure of TFPG

This measure developed by Christensen, Jorgenson and Lau⁴⁵ is derived from explicitly specified Translog Production Function. The Translog Functional form provides a second-order approximation to an arbitrary twice-continuously-differentiable production function and also accommodates varying elasticity of substitution ranging from zero to infinity. In fact, it is a discrete approximation to the continuous changes in division quantity index of total factor productivity.⁴⁶ Its specification with two inputs is

$$\begin{aligned} \ln Y = & \alpha_0 + \alpha_k \ln K + \alpha_l \ln L + \alpha_t T \\ & + 1/2 \beta_{kk} (\ln K)^2 + \beta_{kl} (\ln K \ln L) \\ & + 1/2 \beta_{ll} (\ln L)^2 + \beta_{kt} (\ln K) T \\ & + 1/2 \beta_{tt} T^2 + \beta_{lt} (\ln L) T \dots \dots \dots (7) \end{aligned}$$

where $\ln Y$, $\ln K$ and $\ln L$ refer to natural logarithms of output, capital and labour respectively and T denotes time trend as a proxy for technical change.

By imposing assumptions of constant returns to scale, perfect competitive equilibrium, Hick's neutral technical change and differentiating (7) totally with respect to time and

⁴⁵ Christensen, L.R., Jorgenson D.W. and Lau L.J., "Transcendental Logarithmic Production Frontiers", Review of Economics and Statistics, February, 1973, pp.95-102.

⁴⁶ for derivation see Goldar B.N., Productivity Growth in Indian Industry, Allied Publishers Pvt. Ltd., New Delhi, 1986, p.36-45.

rearranging the terms, we have

$$A_t = [\ln Y_t - \ln Y_{t-1} - 1] - S_1 \times [\ln L_t - \ln L_{t-1}] - S_k \times [\ln K_t - \ln K_{t-1}] \dots\dots\dots(8)$$

where

$$A_t = [\ln A_t + \ln A_{t-1} - 1]/2$$

$$S_1 = [S_{1t} + S_{1t-1} - 1]/2$$

$$S_k = [S_{kt} + S_{kt-1} - 1]/2$$

The expression in (8) is the average rate of technical change for the period (T-1, T). It is the difference between successive natural logarithm of output minus a weighted average of the differences between successive logarithms of inputs, the weights being the corresponding average value shares.⁴⁷ Moreover, sources of growth of output is computed as follows:

Contribution of labour to output growth is

$$[S_1 \times (\ln L_t - \ln L_{t-1})] / \ln Y_t - \ln Y_{t-1}$$

Contribution of capital to output growth is

$$[S_k \times (\ln K_t - \ln K_{t-1})] / \ln Y_t - \ln Y_{t-1}$$

Contribution of TFPG to output growth is arrived at the residuals of the contributions of labour (L) and capital (K) to output growth.

Comparison of the three measures of TFPG

A comparison of the above three measures of TFPG shows that three behavioural restrictions of constant returns to scale,

⁴⁷ Diewert, W.E., "Exact and Superlative Index Numbers", Journal of Econometrics, Vol. 4, 1976, p.56.
96

perfect competition, factors being paid their marginal product are similar for all across the three measures. However, the improvement in productivity measurement lies primarily in the development of new production functions with particular emphasis on two assumptions: elasticity of substitution and the nature of change. The restriction on elasticity of substitution is completely relaxed in Translog unlike unity in Solow and constant in Kendrick. Technical change has been taken into account in both the TFPG measures of Solow and Translog but is assumed to be Hick's neutral.

However, the Kendrick and Solow measures of TFPG have some advantages in one way or other in the empirical analysis. Kendrick measure is very easy and handy to estimate productivity change. Solow measure merits over Kendrick measure in overcoming the additive form of aggregation problem and takes into account the technical change, though it is of Hick's neutral type.

When compared to these measures of TFPG, Translog measure has some more advantages on the application part, because its functional form allows elasticity of substitution to vary.

Moreover the assumption of Hick's neutral technical change alongwith variable elasticity of substitution enable the function to disentangle the effects of substitution from the effects of TFPG on output growth. Thus, Translog measure is being widely used to estimate TFPG.

Measurement of variables

In the present study gross value added at constant prices has been taken as the measure of output. In order to express value added at constant prices we need an appropriate deflator. For this the wholesale price index of industries is taken.

In the present study data on the total number of employees is taken as a measure of labour input. Goldar⁴⁸ points out that measuring labour by number of persons is more satisfactory because it gets crudely adjusted for one form of quality change namely, the change in the quality of one hour's work that is due to shortening of hours. Therefore, the measure is partially adjusted for quality changes.

Regarding the payments to labour, we have used wages and salaries that includes money value of benefits and privileges. Following Goldar the wages and salaries are deflated using wholesale price index of output.

Measurement of capital input

The conceptualisation, both definition and measurement of capital, is the most serious controversial among the variables that we have to construct. Here we do not go into the details of

⁴⁸ Goldar, B.N., op. cit., p.156.

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controversies over the conceptualisation and definitions of capital since it is out of scope of the present study. Usually the capital input is conceptualised as a stock of produced tools of production process which renders a flow of services (inputs) to the production process (eg. machine hours).

Considering this, one has to use the flow concept of capital services rather than the stock concept of capital in the measurement of capital input. But quantifying the service of capital used in the production process is quite a difficult task. Hence, most of the empirical studies like studies of Ahluwalia,⁴⁹ Goldar, and Hashim and Dadi⁵⁰ have used the stock concept instead of flow concept by assuming that there is a fixed relationship between the stock of capital and the flow of capital services.

Regarding the problems of capital measurement, it has been argued that net capital stock is preferable theoretically for productivity analysis. To estimate the net capital stock, economic depreciation is required. It is true that capital consumption arises out of the use of capital stock in the production process. Since the available data on depreciation, which is in book value, does not reflect the true value of capital consumption, empirical studies usually favour the use of gross against the use of net measure in the capital measurement.

⁴⁹ see Ahluwalia, I.J., Industrial Growth in India: Stagnation Since the Mid-sixties, Oxford University Press, 1985.

⁵⁰ see Dadi M.M. and Hashim S.R., Capital Output Relations in Indian Manufacturing (1946-64), M.S. University of Baroda, Baroda, 1973.

Moreover, Denison⁵¹ argues that the correct index of capital services would fall somewhere in between gross and net measures of capital stock and thus suggests the use of weighted average of gross and net stock of capital with relatively much weight to the gross capital stock. Like Hashim and Dadi, Banerji⁵² and Goldar, we use the measure of gross capital stock as the measure of capital input.

To estimate the base year gross capital stock Goldar used the gross-net ratio and converted gross capital stock at purchase prices into that at current prices and then that at constant prices using average capital goods price index as a deflator for the period of his study.

In the present study, Gross fixed assets have been taken as a measure of capital input which includes land and building, plant and machinery and other assets.

⁵¹ Denison, E.F., Why Growth Rates Differ: Postwar Experience in Nine Western Countries, The Brookings Institution, Washington D.C., 1967, p.72.

⁵² see Asit Banerji, Capital Intensity and Productivity in Indian Industry, The Macmillan Company of India, Delhi, 1975.

Chapter 4

GROWTH OF PUBLIC SECTOR ENTERPRISES IN INDIA

At the time of independence India was basically an agrarian economy with a weak industrial base, low level of savings and investment and lack of infrastructure. A major percentage of the population was poor; employment opportunities were at a low level and there were serious regional imbalances in the economy.

When the country launched its programme for planned economic development, it was obvious that the private sector, would never be able to muster up the required funds or resources to take risks involved in large investments with long gestation periods.

Accordingly, it was decided that the direct participation of the public sector in the national economy was a must, especially in the capital-intensive areas. It was a pragmatic compulsion to deploy the public sector as an instrument of self reliant economic growth. This was necessary to develop the agricultural and industrial base, to diversify the public economy and to overcome economic and social backwardness.

In fact, it was this necessity that formed the plank of the second five year plan. The idea was to build up a strong base of capital and intermediate goods alongwith the basic infrastructure--physical and financial.

Beginning with the core and strategic industries, it has, over the years, proliferated into various fields including consumer goods. It also embraces a large number of sick industries taken over from the private sector.

The public sector in India has been assuming more and more importance. This is evident from the growth, expansion and diversification of the public sector activities and the increase in the shares of the public sector in the total plan outlays. Table 4.1 indicates the prominent position the public sector has come to occupy in our economy.

Initially, only core and strategic industries were included in the public sector. The objective was to lay down the foundations of sound economic infrastructure leading to further growth. The Industrial Policy Resolution (IPR) of April 1948 classified industries into four categories: The first category included strategic industries like arms and ammunition, atomic energy, river valley projects and railways. These were declared as state monopolies. The second category included coal, iron and steel, aircraft and shipbuilding, communication equipment and mineral oils. The third category included 18 industries such as fertilizers, chemicals, road transport and machine tools. These three categories were the responsibility of the state, the rest of industries were left to the private sector. Beginning with only five enterprises with an investment of Rs. 29 crores in 1951, the number of enterprises had gone upto 21 with an investment of Rs.81 crores when the second five year plan was launched in 1956.

Table 4.1

INVESTMENT IN PUBLIC AND PRIVATE SECTORS DURING FIVE YEAR PLANS

Plan	Public sector	%	Private sector	%	Total
First FYP (1950-51)	1560	46.4	1800	53.6	3360
Second FYP (1956-61)	3731	54.6	3100	45.4	6831
Third FYP (1961-66)	6300	60.6	4100	39.4	10400
Fourth FYP (1969-74)	13555	60.3	8980	39.7	22635
Fifth FYP (1974-79)	36703	57.6	27048	42.4	63751
Sixth FYP (1980-85)	84000	52.9	74710	47.1	158710
Seventh FYP (1985-90)	154218	48.0	168118	52.0	322366
Eighth FYP (1990-95)	335000	54.9	275000	45.1	610000*

Source: Government of India, Ministry of Finance, Indian Economic Statistics, Planning Commission, summary of seven five year plans, December 1984.

* The Hindu, September 20, 1990.

The Industrial Policy Resolution of April 1956 expanded the scope of the public sector. It stated that "adoption of socialistic pattern of society as the national objective, as well as the need for planned and rapid development require that all industries of basic and strategic importance or in the nature of public utility services should be in the public sector"¹. Thus the public sector was viewed as an instrument of implementing the state policy of bringing about a socio-economic revolution in the country. The resolution classified industries into three categories: Schedule 'A' industries were to be the exclusive responsibility of the state; Schedule 'B' were to be progressively state-owned but private entrepreneurs could supplement state initiative; the rest of industries other than the 29 given in Schedules 'A' and 'B' were left to the private sector. In February 1973 government re-emphasised the objectives of the 1956 Industrial Policy Resolution and stated "...in the context of the approach to the fifth five year plan the state will have to take direct responsibility for the future development of industries over a wide field in order to promote the cardinal objective of growth, social justice, self reliance and satisfaction of basic minimum needs...". At the commencement of the fifth plan in April 1974 the number of public sector undertakings had risen to 122 with a total investment of Rs.6237 crores.

¹Industrial Policy Resolution, Government of India, April 30, 1956.

When the parliamentary committee on public undertakings in its 40th report strongly recommended that public sector shall move into the area of consumer articles, the original rationale of the government entering into business was further diluted. That led to the entry in public sector of another generation of enterprises involving bread and beverages, cloth making, trading and marketing, contracts and consultancy, construction and transportation equipment. There was also a spree of taking over sick private industries and restoring them, if possible to health. Such industries included Jessops, Richardson & Cruddas, Balmer Lawrie & Co., and Indian Standard Wagon Co. Ltd. Already, 14 principal banks had been nationalised in 1969; General Insurance in 1971; 214 coking coal mines in 1972 and 465 private coal mines in the following year. When the government burnt its fingers after taking over about 110 sick textiles mills, its fervour to take over sick units dampened.

Over the last four decades, the growth of the public sector enterprises has been phenomenal in terms of investment, production, profitability and range of activities. At the end of 1987-88, the capital employed in the central public sector alone stood at Rs.58125 crores and the total sales turnover was Rs.81367 crores (see table 4.2).

From only five enterprises in April 1951 with a total investment of Rs.29 crores, the number rose to 244 by April 1990 with an investment of Rs.99315 crores (see table 4.3).

Table 4.2

GROWTH OF SALES IN PUBLIC ENTERPRISES IN INDIA

Year	Manufacturing Enterprises			Service Enterprises			Total			
	Sales	Capital employed	Per cent of sales to capital employed	Sales	Capital employed	Per cent of sales to capital employed	Sales	Per cent of growth from previous year	Capital employed	Per cent of sales to capital employed
1978-79	12177	8307	146.59	6884	5662	121.58	19061	5.78	13969	136.45
1979-80	15226	10001	152.24	8064	6181	130.46	23290	22.19	16182	143.93
1980-81	18618	12101	153.85	10017	6106	164.05	28635	22.95	18207	157.27
1981-82	25759	14778	174.31	10723	7157	149.83	36482	27.40	21935	166.32
1982-83	30970	17959	172.45	11109	8567	128.62	41989	15.09	36526	158.29
1983-84	34708	19908	174.34	12564	9943	126.36	47272	12.58	29851	158.36
1984-85	39631	24310	163.02	15153	12072	125.52	54784	15.89	36382	150.58
1985-86	44532	30238	147.21	17828	12727	140.08	62360	13.83	42965	145.14
1986-87	19701	35898	138.45	19387	15937	121.65	69088	10.79	51835	133.28
1987-88	59295	40977	144.70	22072	17144	128.71	81367	17.77	58125	139.99

Source : Quarterly Economic Report of the Indian Institute of Public Opinion, 126, Vol.XXXI, No.4, Jan.- Mar. 1989, p.42.

Table 4.3

INVESTMENT IN CENTRAL GOVERNMENT ENTERPRISES
(under five year plans)

		(Rs. in crores)
	Number of Enterprises	Total Investment
1. At the commencement of the 1st Five Year Plan (1-4-1951)	5	29
2. At the commencement of the 2nd Five Year Plan (1-4-1956)	21	81
3. At the commencement of the 3rd Five Year Plan (1-4-1961)	47	948
4. At the commencement of the 4th Five Year Plan (1-4-1969)	84	3897
5. At the commencement of the 5th Five Year Plan (1-4-1974)	122	6237
6. At the commencement of the 6th Five Year Plan (1-4-1980)	179	18150
7. At the commencement of the 7th Five Year Plan (1-4-1985)	215	42673
8. At the commencement of the 8th Five Year Plan (1-4-1990)	244	99315

Source: A Statistical Review of Central Government Enterprises:
1989-90, CMIE, Bombay, March 1991, p.22.

Note : Investment includes outstanding amounts against paid up
capital and long term loans.

About 55 per cent of the total investment in the central public enterprises is in steel, coal, minerals and metals, power and petroleum group of enterprises. These basic industries provide linkages to a host of other industries. The wide range of products and activities of the central public enterprises include making of steel, mining of coal and minerals, extraction and refining of crude oil, manufacture of heavy machinery, machine tools, instruments, heavy machine building equipment, heavy electrical equipment for thermal and hydel stations, transportation equipment, telecommunication equipment, ships, submarines, fertilizers, drugs and pharmaceuticals, petro-chemicals, cement, textiles, and few consumer items such as bread, newsprint, paper, footwear and contraceptives, operation of air, sea, river and road transport, operation in national and international trade, consultancy, contract and construction services, inland and overseas telecommunication services, hotel and tourist services etc.

The public sector, says the 7th plan document, has initiated and sustained the industrial transformation of India and it shall continue to play this pivotal role in modernising Indian industry and in reducing the concentration of economic power. This with an investment of about Rs.43000 crores envisaged in the 7th plan in these enterprises, public sector would further strengthen its predominance in the industrial and economic scene.

A long and arduous journey has been undertaken by the central public sector enterprises during its lifespan of over

three decades. It has weathered many storms and successfully withstood much ill-informed attacks on it. The overall net profit of the central public enterprises has, during the year 1986-87, not only shown a substantial increase of Rs.596.64 crores or 50.89 per cent over the overall net profit of Rs.1172.44 crores earned during 1985-86, but has touched an all time high figure of Rs.1769.08 crores. In fact the overall profits of the public enterprises has been on a rising scale since 1981-82, barring 1983-84. Although the major contribution in the overall profitability has been from the petroleum group of companies, some of the non-petroleum companies have also been showing substantial profits during the recent years. These favourable trends in profitability have been noticed despite several handicaps with which public sector enterprises suffer, such as the locational disadvantages in some cases, very high initial capital investment in other, having to do with technology which was not necessarily among the best available, cost of learning and development, presence of a large number of sick industries taken over from the private sector to sustain production and protect employment.

The performance of public enterprises highlight a definite and consistent trend of improvement in almost all financial indicators. For example, percentage of gross profit to capital employed has remained steady around 12-13 per cent since 1981-82, despite a very substantial increase in the quantum of capital employed from 1981-82 to 1986-87 viz., 137 per cent. The percentage of gross margin to capital employed had also remained

steady at a respectable level of around 19 per cent. This trend is particularly noteworthy since the concept of gross margin which does not take into account the element of depreciation (usage cost of assets) and interest (financial cost of capital), is generally advocated by economists to measure the return on investment to the economy. Of course, percentage of net profit to capital employed which works out to about 3.4 per cent in 1986-87 would appear to be on the lower side. But one has to appreciate that high interest charges have substantially contributed to this and some of it may be attributable to debt-equity ratio. Also, while assessing financial performance of public enterprises either at micro or macro level, the traditional method of financial appraisal, making use of tools, such as " Return on capital Employed" may not be entirely appropriate. Contributions made by the public sector enterprises in their socio-economic objectives, development of backward regions, provision of public utility services, selling basic inputs or products at administered prices, are some of the important variables in the functioning of public enterprises which cannot be ignored and have to be properly evaluated quantitatively and qualitatively.

The provisional flash results of 191 operating enterprises for the year 1987-88 indicate that these enterprises have earned an overall net profit of Rs. 1748.83 crores during 1987-88 as compared to an overall net profit of Rs.1831.89 earned by the same 191 enterprises during 1986-87. Although there is a marginal decline in profit during 1987-88 viz., by Rs.83.06 crores

or 4.53 per cent, in fact there has been real increase in the profitability since the additional burden of interim relief alone works out to about Rs.750 crores during 1987-88. In addition, there has been payment of DA arrears, rise in input cost of materials, power shortage etc. Major profit making sectors during 1987-88 are petroleum, telecommunication services and power. (see table 4.4).

Major loss-making sectors are coal, textiles, chemicals, fertilizers and pharmaceuticals and consumer goods.

Autonomy and Accountability

The issue of managerial autonomy vis-a-vis their accountability has been the subject-matter of debate and deliberations since the inception of the public sector enterprises in the country.

The public sector enterprises operate with people's money. Therefore, an element of superintendence and control on behalf of the people of the country is essential to ensure that the funds are utilised for the purpose for which these are allocated to the undertakings. These undertakings, however, operating as business houses, have to have a large measure of autonomy to be able to take quick decisions for achieving the commercial and other objectives for which these are established.

Lord Morrison, who was the father of the concept of public enterprises in UK, felt that the public corporation must

Table 4.4

Ten Top Profit Making Enterprises : 1988-89

(Profit before tax)

Sl.No.	Name of enterprises	Pre-tax Profit	Percentage to total pre-tax profit earned by profit making enterprises.
1.	Oil & Natural Gas Commission	2094.58	33.3
2.	Indian Oil Corporation Ltd.	676.41	10.7
3.	Steel Authority of India Ltd.	358.40	5.7
4.	Mahanagar Telephone Nigam	355.56	5.7
5.	National Thermal Power Corporation	330.82	5.3
6.	Hindustan Petroleum Corporation	206.57	3.3
7.	Bharat Heavy Electricals Ltd.	192.56	3.1
8.	Bharat Petroleum Corporation	130.10	2.1
9.	Indian Petrochemical Corporation	116.06	1.8
10.	Videsh Sanchar Nigam	104.86	1.7
Total		4565.92	72.7
Total profit earned by profit making enterprises (118 enterprises)		6282.96	100.00

Source: A Statistical Review of Central Government Enterprises: 1988-89
Bombay, March, 1990.

have autonomy and freedom of business management and that if public enterprise managers become liable to be abused across the floor of the House and subjected to questions attacking them and their commercial ability, we will not get men to serve on these commercial undertakings and shall not get the best out of those who are there.

Pandit Jawaharlal Nehru, the then Prime Minister and the father of the concept of the public sector in India, in one of his speeches on this subject in the Parliament, said that a government rightly has all kinds of checks, as it deals with public money, usually it has time to apply these checks. But when one deals with a plant and an enterprise where quick decisions are necessary, which may make a difference between success and failure, the way a government functions is not sometimes suitable. I have no doubt that normal governmental procedures applied to a public enterprise will lead to the failure of that enterprise. Therefore, we have to evolve a system of working public enterprise, where, on the one hand there are adequate checks and protections, and on the other, enough freedom for the public enterprise to work quickly and without delay. Ultimately it has to be judged by the results, though one cannot judge government by financial results alone. In judging a big enterprise, one has to judge by the final results.

While these observations coming from high authorities in India and the UK emphasise the necessity of adequate autonomy and freedom of functioning to the public enterprises the following

observation made by A.C.Guha, a prominent member of the independent India's Third Lok Sabha, while speaking on the motion for establishing the first Committee on Public Undertakings, emphasised the converse point that autonomy of the public undertakings cannot be limitless. He said "much has been said about autonomous character of the public undertakings. They are very sensitive if a question is asked in the House regarding the working of the public undertakings. We fully share the idea that public undertakings should be autonomous bodies, that is autonomous within certain limitations to be decided by the Parliament. But our experience is that the autonomy of these bodies is more a fiction than a reality. For many small administrative matters of somewhat routine nature they have to wait upon the officers here to get the final approval. For many things they have to keep a liaison office in Delhi to chase their files and to pursue their cases with the respective ministries. So, in the name of autonomy there is a suitable move to curtail the right of scrutiny by this House, we should surely resist that".

The position that emerges from the emphasis laid in the above observations on autonomy and freedom of functioning of the public enterprises on the one hand, and accountability to Parliament on the other, is that sovereignty of the Parliament is undoubtedly supreme and this has to stay as such. Public sector enterprises are set up to fulfil the objective which the sovereign authority has prescribed for them. While, therefore, the

sovereign body, the Parliament, has to take steps to ensure that the public sector enterprises, working with people's money do fulfil the objectives for which they are set up, it is necessary to ensure that those who are charged with the responsibility of fulfilling certain objectives are allowed the freedom to operate and choose the means they consider fit to attain those objectives, provided such means are themselves not contrary to the stated policies and objectives of the state.

Realising the problem, which has been raised lately at several forums in regard to lack of autonomy enjoyed by the public enterprises and excessive accountability which curbs their initiative, recently government has adopted several measures to give greater autonomy to the public enterprises which are briefly mentioned below:²

1. It has been decided to give a five-year term to chief executives and functional directors to ensure stability of senior management.
2. Holding companies have been constituted, wherever needed, to give greater managerial autonomy and flexibility to enterprises functioning in broadly similar areas. Two such companies were set up for engineering enterprises -- one with headquarters at Allahabad and the other at Calcutta.

² Suresh Kumar, "Phenomenal Growth of Public Sector", The Economic Times, January 25, 1989, p.1.

3. A system of memorandum of understanding (MOU)/annual performance plan (APP) has been introduced in the case of some major undertakings in order to focus clearly on the task and responsibilities assigned to the public enterprises on the one hand, and the corresponding obligations of the administrative ministry, on the other. This would ensure greater autonomy to the public sector undertakings and at the same time provide accountability for results. Eleven such MOUs have been signed for the year 1987-88 and more are on the anvil.
4. Based on the recommendations of the Arjun Sengupta Committee it has been decided that investment proposals will go to the public investment board only in cases of excess of Rs.20 crores. The delegation of powers with the enterprises has been revised accordingly. In addition, some more administrative and financial powers have been given to those public enterprises who have signed MOU with the government.
5. It has been decided that the Central Vigilance Commission would be involved with only vigilance cases relating to board level officers, while those relating to lower functionaries would be settled at board level.
6. With the framework of BPE guidelines public enterprises will have freedom of investment on townships and residential accommodation without prior approval of government within the delegated powers subject to the constraints of the approved capital budget.

7. Government nominees on the board of directors should be minimum. Part-time directors of public enterprises should be appointed after consulting the concerned chief executives and non-official directors should have a tenure of three years. Vacancies on the board should not be left unfilled for a long time.
8. Ministries/department of government will not interfere in the areas of decision making which are well within the delegated powers of the enterprises and public enterprises should possess their cases directly through capital goods committee, FIB, RBI, CCIE etc., as in the case of private enterprises.

Industrialisation of Kerala

The golden era of industrialisation in Kerala was the 11 years period from 1936 to 1947, when Sir C.P. Ramaswamy Iyer was the Diwan of Travancore. During this period there was substantial industrial development in the state of Travancore. The industries started at the instance of C.P. were basic industries with great potential for expansion. He invited leading entrepreneurs from outside the state and encouraged to start industrial units in Kerala. Leading among them were Seshasayee Brothers who were instrumental in starting both the Fertilizers and Chemicals Travancore Ltd., and Indian Aluminium Company at Alwaye. Out of the thirteen central public sector units now in Kerala, which account for a capital of Rs.798.40 crores in 1984-85, the three units, FACT Ltd., HIL., and IRE Ltd., account for an investment of Rs.221.86 crores. These units, which employ over 10,000 persons, were seeded in this period, while the other 10 units together

account for an investment of only Rs.568.11 crores giving employment to another 10,000 persons.

At the time of the formation of the state of Kerala, it inherited an industrial base mostly from the princely state of Travancore, which was one among the then states where the role of the state had been commendable in fostering industrialisation. Since then there were several constraints to carry forward the initial momentum in industrialisation. This may be due to the paucity of resources on the one hand and heavy commitment of government expenditure to other social overheads and to the rehabilitation of traditional industries on the other. Since 1960 onwards, Kerala's rate of industrialisation has been lagging behind the national average. During the 1980s Kerala's participation in the industrial upsurge of the country has been very unsatisfactory. The relative backwardness in the field of industry can be shown when per capita value added in factory sector is taken as a criterion. Kerala occupies 8th position in this regard and is well below the national average of Rs. 280. In the case of employment in factory sector, industrial sector of the state is in worse position with 3.1 per cent of total factory employment in the country. Kerala occupies only 11th rank in factory sector employment. Between 1970-71 and 1986-87 the index of industrial production showed an erratic trend in Kerala, while it showed a continuous rise at the national level. The contribution by the secondary sector and in particular by the manufacturing sector to the state domestic product was also lower

in Kerala as compared to the all India position. The relatively lower position in respect of few other indicators like per capita value of output and per capita productive capital also revealed the same trend.

The inter-state disparity in the level of industrialisation is given in table 4.5. Table 4.5. clearly shows that Kerala stands still and no progress has been achieved in comparison with other states. In growth rate, employment and value added, in comparison with all India, the state of Kerala is steadily losing momentum.

A number of explanations can be offered for the industrial backwardness of the state. Important among them are high wage rate, lack of entrepreneurship, wrong policies of the government, inefficient running of existing units, technological backwardness etc. The study by K.K. Subramanian and P. Mohanan Pillai has found that Kerala ranks only 20th among all Indian states in the ratio of emoluments to value added which shows that the argument of higher wages in the Kerala industries is unfounded and is not supported by empirical evidence. Lack of adequate capital formation is another widely talked about factor that is said to hinder the industrial growth in Kerala. This is rather untenable in view of the highest savings rate of Kerala. The proportion of household savings to total SDP and the proportion of

see Subramanian K.K. and Mohanan Pillai, "Kerala's Industrial Backwardness: Explanation of an alternative hypothesis", Economic and Political Weekly, Vol. XXI, No.14, April 15, 1986, p.581.

Table 4.5

Inter-state Disparity in Levels of Industrialisation

State	Share in population in 1981	Share in value added in factory sector 1960-61		1970-71		1980-81	
		%	rank	%	rank	%	rank
Andhra Pradesh	7.8	3.1	8	4.0	8	4.9	8
Assam	2.9	3.0	9	1.4	14	1.1	15
Bihar	10.2	6.5	5	5.5	7	4.2	9
Gujarat	5.0	10.5	3	9.1	3	9.5	4
Haryana	-	-	-	2.2	12	2.9	12
Karnataka	5.4	3.2	7	5.7	6	5.1	6
Kerala	3.7	2.7	11	2.9	10	3.3	10
Madhya Pradesh	7.6	2.4	12	3.6	9	5.0	7
Maharashtra	9.2	26.7	1	26.8	1	25.0	1
Orissa	3.9	0.9	14	1.9	15	1.7	14
Punjab	2.5*	3.0*	10*	2.3	11	3.2	11
Rajasthan	5.0	1.0	13	2.1	13	2.8	13
Tamil Nadu	7.1	7.9	4	9.8	4	10.3	3
Uttar Pradesh	16.2	6.3	6	6.6	5	6.3	5
West Bengal	8.0	20.5	2	13.6	2	11.5	2

Source: Subramanyan K.K and Mohanan Pillai "Kerala's Industrial Backwardness: Explanation of an Alternative Hypothesis, EPW, Vol.XXI, No.14, April 5, 1986, p.581.

Note: *Punjab including Haryana.

financial savings in the total savings are higher in Kerala than for the country as a whole.

Central Public Sector Enterprises in Kerala

There are 13 central public enterprises in Kerala, of which except Cochin Refineries Ltd., Cochin Shipyard Ltd., Fertilisers and Chemicals Travancore Ltd., and Hindustan Latex Ltd., are units of the companies registered outside the state. In addition to the 13 units there are 5 units managed by National Textile corporation. They are Cannanore Spinning & Weaving Mills Cannanore, Vijayamohini Mills, Thirumala, Trivandrum, Kerala Lekshmi Mills, Trichur, Parvathy Mills, Quilon and Alagappa Textiles (Cochin) Mills. Of the central public sector enterprises in Kerala the biggest in terms of capital employed, sales turnover and employment is The Fertilisers And Chemicals Travancore Ltd. The capital investment and employment in these 13 companies are given in the table 4.6. The central sector companies in the state provided employment to more than 24000 persons directly during 1987-88. The FACT Ltd. alone employed 8216 persons during this period.

The central investment in terms of gross block in the public sector industries working in Kerala is showing a declining trend. This declining trend was noticed from 1974-75 onwards. It came down from 3.27 per cent to 1.57 in 1988-89. The data relating to the central investment in Kerala and its percentage

Table 4.6

Central Sector Companies
Capital, Employment and Capital Per Labour Employed

Units	Capital (Rs.crores)	No. of Employees	Capital per Employee (Rs.lakhs)
1.FACT Limited	196.00	7883	2.23
2.Cochin Refineries Ltd.	185.00	828	29.00
3.Hindustan Newsprint Ltd.	160.00	1703	9.00
4.Cochin Shipyard Ltd.	120.00	2550	5.00
5.Hindustan Latex Ltd.	3.60	800	0.45
6.HMT Limited	25.47	3078	0.83
7.ITI Limited	6.00	230	2.60
8.Instrumentation Ltd.	4.40	340	1.27
9.Modern Bakeries (India) Ltd.	0.80	180	0.47
10.IRE Limited	10.39	1532	0.68
11.HIL	15.47	900	1.72
12.Balmer Lawrie & Co.	5.00	250	2.00
13.HOC	78.00	-	-

Source : K.R. Rajan, Industries in Kerala, 1987, p.11.

share in the total investment in the country are shown in table 4.7.

An analysis of the statewise distribution of central investment in the country shows that the states of Maharashtra, Madhya Pradesh, Bihar and Andhra Pradesh have received 47.4 per cent of the total investment of Rs.96581 crores in the year 1989. Moreover these states continued to get the major share of additional investment. About 51 per cent of the additional investment of Rs. 11246 crores during 1986-87 was in these four states.

The state-wise distribution of central sector investment in terms of gross block from 1979 to 1989 is given in tables 4.8 & 4.9. These tables show that Maharashtra occupies the top rank with 16.7 per cent. The compound annual rate of growth (CARG) in 1988-89 over 1971-72 for Kerala is 15.2. This is below the total which comes upto 19.3. The rate for Andhra Pradesh is 29.2, for Karnataka 19.0, for Tamil Nadu 17.0 etc. Hence the need for stepping up central investment in the state to compensate for the gradual reduction in the share of central government in the state and for the shyness of private entrepreneurs in making industrial investment in the state.

A brief account of the selected central public enterprises in Kerala and that of TCC, a state-owned enterprise is given below:

Table 4.7

Investment in Kerala in terms of Gross Block of the Central Sector
Public Enterprises as on 31st March of the year.

Year	Value of Property (Rs. crores)		Percentage to All India
	All India	Kerala	
1970	3885.00	116.00	2.99
1972	4792.00	137.00	2.86
1974	5285.00	173.00	3.27
1975	6242.00	202.00	3.24
1976	9112.00	247.00	2.71
1977	11451.00	274.00	2.39
1978	13705.00	326.00	2.38
1979	15668.00	383.00	2.44
1980	18161.00	423.00	2.33
1981	21192.00	482.00	2.27
1982	25504.00	536.00	2.10
1983	31969.00	618.00	1.93
1984	38848.00	715.00	1.84
1985	47323.00	831.00	1.76
1986	56806.00	923.00	1.62
1987	68052.00	1074.00	1.58
1988	82150.00	1307.00	1.59
1989	96581.00	1520.00	1.57

Source: Economic Review, (various issues), State Planning Board,
Trivandrum.

Table 4.8

Central Investment in Various States (1979 - 1989)

as on 31st March of the year

(Rs. in crores)

Sl.No.	States/UTs	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1.	Andhra Pradesh	513.89	775.12	987.56	1208	2119	3087	4059	5294	6762	8279	9907
2.	Assam	382.68	490.37	666.88	1234	1556	1930	2451	3012	3809	4262	4729
3.	Bihar	2877.02	3151.67	3541.40	4041	4692	5152	5834	6312	6969	7615	8439
4.	Gujarat	762.24	879.80	1068.45	1097	1115	1512	1772	2406	3198	4205	5071
5.	Haryana	213.90	252.97	261.15	289	315	361	412	546	650	763	813
6.	Himachal Pradesh	107.55	127.02	147.80	166	168	175	211	326	527	709	952
7.	Karnataka	529.82	746.45	864.64	967	1065	1199	1328	1547	1722	1931	2181
8.	Kerala	382.74	422.84	481.96	536	618	715	831	923	1074	1307	1520
9.	Madhya Pradesh	1846.13	2230.77	2634.67	3181	3861	4511	5396	6844	8572	10251	11340
10.	Maharashtra	976.56	1313.94	1826.80	2973	3993	5918	7602	9030	10905	13936	16127
11.	Orissa	710.28	928.37	1038.99	1274	1522	2165	2998	4073	4638	5107	5668
12.	Punjab	344.52	362.52	418.64	439	486	537	564	603	641	747	802
13.	Rajasthan	291.97	337.62	361.56	472	543	643	648	717	781	1125	1400
14.	Tamil Nadu	615.78	747.74	922.57	1079	1333	2127	2549	2954	3019	4055	4925
15.	Uttar Pradesh	658.12	802.28	1017.90	1355	2491	2094	2533	3310	3914	6117	8298
16.	West Bengal	1082.88	1540.39	1731.11	1978	2394	2910	3345	4000	4525	5067	5727
17.	Jammu & Kashmir	6.20	7.05	10.03	15	24	28	48	84	118	175	874
18.	Delhi	427.82	501.89	604.16	695	995	1019	1239	1030	1928	2413	2943
19.	Goa	5.35	6.37	6.94	9	12	14	18	28	35	45	52
20.	UTs/other states	130.24	150.24	176.43	219	243	292	317	390	405	546	640
21.	Others	2802.24	2385.72	2422.14	2277	2424	2459	3168	3377	3860	3495	4173
		15667.93	18161.14	21191.78	25504	31969	38848	47323	56806	68052	82150	96581

Source : Government of Kerala, Economic Review, (various issues), State Planning Board, Trivandrum.

Table 4.9

Central Investment in Various States (1979 - 1989)

in percentage as on 31st March of the year

Sl.No.	States/UTs	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1.	Andhra Pradesh	3.28	4.27	4.66	4.74	6.63	7.95	8.58	9.30	9.90	10.10	10.26
2.	Assam	2.44	2.70	3.15	4.84	4.87	4.97	5.18	5.30	5.60	5.20	4.90
3.	Bihar	18.36	17.35	16.73	15.84	14.68	13.26	12.33	11.10	10.20	9.30	8.74
4.	Gujarat	4.86	4.85	5.05	4.30	3.49	3.89	3.74	4.20	4.70	5.10	5.25
5.	Haryana	1.37	1.39	1.23	1.13	0.98	0.93	0.87	1.00	1.00	0.90	0.84
6.	Himachal Pradesh	0.69	0.70	0.70	0.65	0.53	0.45	0.45	0.60	0.80	0.90	0.99
7.	Karnataka	3.38	4.11	3.99	3.79	3.33	3.09	2.81	2.70	2.50	2.30	2.26
8.	Kerala	2.44	2.33	2.27	2.10	1.93	1.84	1.76	1.60	1.60	1.60	1.57
9.	Madhya Pradesh	11.79	12.28	12.44	12.47	12.08	11.61	11.40	12.00	12.60	12.50	11.74
10.	Maharashtra	6.23	7.23	8.63	11.66	12.49	15.23	16.06	15.90	16.00	17.00	16.70
11.	Orissa	4.53	5.11	4.91	5.00	4.76	5.57	6.33	7.20	6.80	6.20	5.87
12.	Punjab	2.20	2.00	1.98	1.72	1.52	1.38	1.19	1.10	0.90	0.90	0.83
13.	Rajasthan	1.86	1.86	1.71	1.85	1.70	1.66	1.37	1.30	1.10	1.40	1.45
14.	Tamil Nadu	3.93	4.12	4.36	4.23	4.17	5.48	5.39	5.20	4.50	4.90	5.10
15.	Uttar Pradesh	4.20	4.42	4.81	5.31	7.79	5.39	5.35	5.90	5.80	7.50	8.59
16.	West Bengal	6.91	8.48	8.18	7.76	7.49	7.49	7.07	7.00	6.60	6.20	5.93
17.	Jammu & Kashmir	0.04	0.04	0.05	0.06	0.07	0.07	0.10	0.10	0.20	0.20	0.90
18.	Delhi	2.73	2.76	2.85	2.72	3.11	2.62	2.62	1.80	2.80	2.90	3.05
19.	Goa	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.10	0.10	0.00	0.05
20.	UTs/other states	0.83	0.83	0.83	0.86	0.76	0.75	0.67	0.70	0.60	0.70	0.66
21.	Others	17.89	13.14	11.44	8.93	7.58	6.33	6.69	6.00	5.70	4.20	4.32
		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source : Economic Review, various issues, State Planning Board, Trivandrum.

A Statistical Review of Central Government Enterprises 1988-89, CMIE, Bombay, March, 1990, p.15.

Cochin Refineries Ltd., Cochin

Cochin Refineries Ltd. was incorporated as a public limited company on the 6th of September 1963, under a tripartite agreement called the 'Formation Agreement' signed by the Government of India, Phillips Petroleum Company, a company incorporated under the laws of the state of Delaware, U.S.A and Messrs. Duncon Brothers Ltd., Calcutta on 27th April, 1963. The refinery was formally inaugurated on 23rd September 1966. The company's registered office and refining unit are located in Ambalamugal, Kerala.

The refinery plant as installed in September 1966 was designed to process 2.5 million tonnes per annum or 50000 barrels per day of light Iranian Aghjari crude. On 20th December 1968, by an agreement between the same participants, it was agreed to modify the 'Formation Agreement' and accordingly an agreement called the 'Modification of Formation Agreement' dated 27th April 1963 was entered on 26th February 1969. By this the refining capacity was expanded to 3.3 million tonnes per annum in September 1973. Facilities for producing and bottling liquefied petroleum gas (LPG) were also added.

The present installed capacity is 4.5 million tonnes of crude run per annum. Liquefied petroleum gas, Naphtha, Motor sprit, Superior Kerosene, Aviation Turbine Fuel, High Speed Diesel, Light Diesel Oil, Furnace oil, Low Sulphur Heavy Stock, Asphalt etc. are important products. The authorised capital of

the company is Rs.75 crores and the issued and subscribed capital is Rs.71.69 and 68.48 crores. The reserves and surplus as on March 31, 1989 stood at Rs.82.15 crores.

The company had 1116 employees as on 31st March 1989.

Hindustan Latex Ltd., Trivandrum

Hindustan Latex limited, was established on 1st March, 1966 under the Ministry of Health & Family Welfare for the manufacture of contraceptive condoms. The first factory for the manufacture of these male condoms was set up at Trivandrum in Kerala with Japanese collaboration. Initially the plant was set up with a production capacity of 144 million pieces of condom per annum and the company doubled its capacity in 1971. Hindustan Latex Limited also established a semi-automatic plant for the manufacture of high altitude meteorological balloons. The company has commissioned two additional new units of 160 million pieces capacity each, one at Trivandrum and the other at Kanagala, Belgaum District, Karnataka State.

The projects were commissioned in technical collaboration with M/s Okamoto Gomu Co. Ltd. and M/s Mitsui & Co.Ltd., Japan with the most modern technology in condom manufacture.

The company is manufacturing contraceptive condoms called 'NIRODH' for the family planning programme of the government of India. The company has successfully launched lubricated condoms in the internal market under the brand name

'MOODS'. The company is planning to start plants to manufacture Disposable Syringe, Copper-T and Examination Gloves.

The authorised capital of the company as on 31st March 1989 stood at Rs.13.50 crores and paid-up capital was Rs.1257.5 lakhs. There were 1615 employees on its rolls as on 31-3-1989.

Fertilisers And Chemicals Travancore Ltd., Alwaye.

The Fertilisers and Chemicals Travancore Ltd., the first large scale fertilizer manufacturing venture in the country went into production in 1947. In 1960 the Government of Kerala took over the management of the company. The Central Government became the majority shareholder in 1962. FACT has two manufacturing divisions - one at Udyogamandal and the other at Cochin. A marketing division was established to market the products manufactured by the producing divisions. A FACT Engineering and Design Organisation (FEDO) was set up in 1965. A fabrication unit by name FACT Engineering Works (FEW) was set up in 1966. FACT has commissioned a new project at Udyogamandal, Ammonium Sulphate-Caprolactum Project, which marks its entry into the fields of petrochemicals.

The authorised capital of the company as on 31-3-1989 was Rs.350 crores and paid up capital Rs. 322.77 crores. As on 31-3-1989, the company has a total strength of 8483 employees.

Ammonium Sulphate, Ammonium Phosphate, Ammonium Chloride, Super Phosphate, Urea, Complex Fertilizers and Caprolactum are important products of FACT.

Cochin Shipyard Ltd., Cochin

Cochin Shipyard Limited is a fully owned Central Government company under the administrative control of the Ministry of Surface Transport with registered office at Cochin. Technical services for the construction of the Shipyard were made available by M/s Mitsubishi Heavy Industries, Japan. Ship building consultancy for the construction of 75000 DWT Bulk Carriers were made available by M/s Scotlithgow Ltd., UK. The total outlay on the project is Rs.132 crores. The project was completed in all respect by 30th June, 1984.

The installed capacity of the Yard is 150000 DWT Panamax Type, construction of crude oil tankers of 86000 DWT, repair of vessels upto 100000 DWT and building of small crafts and undertaking fabrication jobs.

The authorised and paid-up capital as on 31-3-1987 were Rs.80 crores and Rs.71.21 crores respectively. The personnel position as on 31-3-1989 was 2684 comprising 338 officers 144 supervisors and 2202 workmen.

Travancore Cochin Chemicals Ltd.

TCC was established in 1950 through the pioneering efforts of M/s Seshasayee Brothers Travancore Ltd. Even though efforts were made to set up a caustic soda unit as a sister concern of FACT Ltd. also managed by M/s Seshasayee Brothers,

considerable progress could not be made in that direction owing to paucity of funds. The then Travancore Cochin government offered financial assistance for the project and work on the project started in 1949 by a partnership concern named as Travancore and Mettur Chemicals and Industrial Corporation (MCIC), Mettur. Again funds were inadequate for starting commercial production and the state government came to the rescue. A public limited company was registered named as The Travancore Cochin Chemicals Ltd., the major shareholders being the state government, FACT Ltd. and MCIC.

It was also agreed that M/s Seshasayee Brothers would be the managing agents of the company for a period of ten years. Commercial production was started in January, 1954 capacity being 20 MT/day of caustic soda. In August 1960, upon the expiry of the agreement with the managing agents, Kerala government took over the management of the company. In 1960 the company initiated schemes for further expansion. This stage of expansion envisaged the increase in the production capacity of caustic soda unit to 40 MT/day. Commissioning of a sodium sulphite plant in 1960 with a rated capacity of 3 MT/day was the most important of the expansion programme.

In the third stage expansion additional 60 MT/day caustic soda plant, a seven MT/day sodium hydrosulphite plant and 60 MT/day caustic fusion plant were installed. By 1967 the company established facilities to make iron-free sodium sulphite at a rated capacity of six MT/day. Looking back, the company had a substantial growth rates during the first two decades of its

existence. From the original 12 KA cells, the company developed into 25 KA cells, 50 KA cells and with the last expansion of 135 KA cells. The installed capacity with all the cells working in 50 KA cell houses will be 160 tonnes per day of caustic soda.

TCC is the only chloro-alkali unit in Kerala. However, in our country there are approximately 40 chloro-alkali units.

The authorised capital rose from Rs.75 million to Rs.80 million over the years. Today it has a paid-up capital of Rs.634 million and net fixed assets of over Rs.250 million. It had a labour force of 250 to begin with in 1950. There were 1135 employees in TCC as on 31-3-1989.

The chemicals made in TCC are caustic soda, hydrochloric acid and chlorine. Caustic soda had extensive use in the manufacture of rayon fabrics, paper, soap, pulp, aluminium, rare earths chlorides, vanaspathi and so on. Hydrochloric acid is useful to industries such as fertilizers, minerals, plastics, starch industry etc. Chlorine is used in the manufacture of rare earths, plastics, paper and rubber industry, for the purification of water, insecticides etc.

Chapter 5

CAPACITY UTILISATION OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA

In this chapter capacity utilisation of CPSEs is estimated on the basis of installed capacity (ICU), minimum capital output ratio (CUMCOR) and modified minimum capital output ratio (MCU). However the estimate based on minimum capital-output ratio and modified minimum capital-output ratio found to be less realistic compared to that of installed capacity method. Therefore, the estimate based on installed capacity is given emphasis in this study.

Before analysing the capacity utilisation in CPSEs in Kerala it would be helpful to have an overall picture of capacity utilisation of CPSEs in India.

The overall picture of capacity utilisation of productive units of public sector enterprises has been presented in table 5.1. It shows the frequency distribution of enterprises which achieved more than 75 per cent, between 50 and 75 per cent and below 50 per cent capacity utilisation during the period from 1977-78 to 1988-89. It is a hard fact that almost in all the years only about 50 per cent units could utilise more than 75 per cent capacity.

Table 5.1

CAPACITY UTILISATION IN PUBLIC ENTERPRISES IN INDIA

Year	Units under Production (surveyed)	Units reporting capacity util. exceeding 75%	Units reporting capacity util. between 50&75%	Units reporting capacity util. less than 50%
1977-78	129	71 (55.0)	31 (24.0)	27 (21.0)
1978-79	131	62 (47.3)	42 (32.1)	27 (20.6)
1979-80	133	62 (46.6)	43 (32.3)	28 (21.1)
1980-81	150	69 (46.0)	39 (26.0)	42 (28.0)
1981-82	148	80 (54.1)	43 (29.0)	25 (16.9)
1982-83	164	90 (54.9)	43 (26.2)	31 (18.9)
1983-84	172	88 (51.2)	49 (28.5)	35 (20.3)
1984-85	180	87 (48.3)	47 (26.1)	46 (25.6)
1985-86	189	96 (50.8)	45 (23.8)	48 (25.4)
1986-87	175	90 (51.4)	56 (32.0)	29 (16.6)
1987-88	184	101 (54.9)	45 (24.5)	38 (20.6)
1988-89	212	126 (60.0)	43 (20.0)	43 (20.2)

Source: Public Enterprise Survey, various issues, Bureau of Public Enterprises, Ministry of Industry, Government of India,

With the increase in the number of enterprises the estimated loss of production due to underutilisation of capacity is also on the increase. The manufacturing enterprises lost production of nearly Rs.12731 crores during 1989-90 due to underutilisation of their capacities. This is 26 per cent of the present value of production. Table 5.2 shows the extent of loss due to underutilisation of capacity.

Extent of Underutilisation of Capacity in CPSEs in Kerala

Underutilisation of industrial capacity becomes a problem only if it exceeds what may be regarded as inevitable and permissible normal level and if it tends to persist for several years. Again the gravity of the problem also depends upon the number of industries suffering from this malady. A full understanding of the nature and extent of the problem in all its aspects would require a detailed analysis of the industry-wise and unit-wise position in respect of the growth of installed capacity and its utilisation for a period covering many years. The position in respect of capacity utilisation vis-a-vis the growth of installed capacity of the central public sector enterprises in Kerala is studied, the objective being to assess in broad terms the overall intensity of the problem.

Capacity Utilisation in FACT Ltd.

Table 5.3 exhibits the extent of capacity utilisation in FACT for a period of 12 years from 1977-78 to 1988-89 comparing

Table 5.2

ESTIMATED LOSS OF PRODUCTION DUE TO UNDERUTILISATION OF CAPACITY
(for manufacturing enterprises only)

Year	Number of Enterprises	Loss of production (Rs.in crores)	Loss as percentage of value of production
1983-84	214	5468	24
1984-85	221	4549	28
1985-86	225	5479	28
1986-87	226	7016	21
1987-88	225	5022	13
1988-89	232	8900	17
1989-90	244	12731	26

Source: A Statistical Review of Central Government Enterprises:
1989-90, CMIE, Bombay, March 1991.

Table 5.3

CAPACITY UTILISATION IN FERTILIZERS AND CHEMICALS TRAVANCORE LIMITED

Year	Capacity Utilisation (%)			Growth rate of C.U.		
	ICU	MCU	CUMCOR	ICU	MCU	CUMCOR
1977-78	49.98	31.65	32.59	**	**	**
1978-79	53.30	51.50	52.25	6.64	62.72	60.33
1979-80	50.06	57.31	59.87	-6.08	11.28	14.58
1980-81	57.29	59.27	61.53	14.44	3.42	2.77
1981-82	52.89	61.34	62.65	-7.68	3.49	1.82
1982-83	50.64	64.12	65.13	-4.25	4.53	3.96
1983-84	50.58	72.22	72.94	-0.12	12.63	11.99
1984-85	67.60	97.25	97.45	33.65	34.66	33.60
1985-86	62.13	97.79	97.23	-8.09	0.56	-0.23
1986-87	69.75	98.68	97.97	12.26	0.91	0.76
1987-88	74.60	100.00	100.00	6.95	1.34	2.07
1988-89	82.44	96.86	93.63	10.51	-3.14	-6.37
Avg. for 1977-78 to 1982-83	52.36	54.20	55.67	0.51	14.24	13.91
Avg. for 1983-84 to 1988-89	67.85	93.80	93.20	9.19	7.83	6.97
Avg. for 1977-78 to 1988-89	60.11	74.00	74.44	4.85	11.03	10.44

physical production achieved to the installed capacity. Installed capacity is supposed to be a more satisfactory basis to derive the figures relating to the extent of underutilisation. Studies on capacity utilisation in fertilizer group of industries usually classify the products into nitrogenous group and phosphatic group to find separate rates of capacity utilisation. But here, due to factors like multiplicity of products, changes in product-mix, production of chemicals etc., capacity utilisation is calculated for the entire products excluding insignificant items. The calculation is based on weighted average of capacities utilised by different plants.

The calculated values of the capacity utilisation during the period of analysis shows that the capacity utilisation in FACT varied from approximately 50 per cent to 82 per cent and the recent years showed an improvement in capacity utilisation. The average capacity utilisation for the first period was 52.36 per cent. It increased appreciably to 67.85 per cent for the second period. The annual average for the whole period was 60.11 per cent. The annual average rate of growth of capacity utilisation for the period of analysis is 4.85 per cent. Capacity utilisation in FACT had increased remarkably over the period of analysis. Increase in capacity utilisation over the period is more vividly brought out by the compound growth rate. It can be estimated from the following equation.

$$\text{Log } Y = 1.6542 + 0.0182 t$$

$$\text{SE} = 0.0410$$

$$R^2 = 0.74$$

where Y = capacity utilisation

t = time (year)

The compound annual rate of growth (CARG) over the period of analysis is 4.28 per cent. It is gratifying to note that recent years have witnessed substantial improvements in the levels of capacity utilisation in FACT and that more and more of additional capacities are in the process of being created through commissioning of new plants and expansion of existing one.

Causes Responsible for Underutilisation

The causes for underutilisation of capacity in FACT have been the mix of a large variety of factors. The present study has identified the following factors responsible for underutilisation.

1. Power shortage and power interruptions

The study shows that this is by far the major reason which leads to perpetual problem of underutilisation of capacity. FACT has badly suffered on account of power shortage. There were 13 shutdowns during the year 1984-85 out of which six were due either to power failure or voltage drop or frequency variations. FACT lost 1978 mandays during the year 1985-86 due to power-cut and some other reasons; and production loss was Rs. 57.03 lakhs. Due to severe power-cut for about one and half month imposed by

the KSEB the company had to resort to a partial lay off of 1885 workmen in Udyogamandal Unit, Marketing Division and FEW during June-July 1986. During 1987-88 FACT lost 10721 mandays due to power-cut and one day bandh. The production loss due to that came upto Rs. 1254 lakhs. During the year 1989-90 KSEB imposed power-cuts ranging between 20 to 100 per cent upto the end of July 1989. Increased capacity utilisation can be achieved if adequate supply of power is assured. Only a Government policy for developing infrastructure facilities for industrial growth on a priority basis can help to solve this problem.

2. Equipment failures and breakdowns

Another important reason for low capacity utilisation is equipment failures and breakdowns. The Ammonia plant of Cochin Phase I suffered a very major breakdown in that the Process Air Compressor failed on 3rd June, 1985. The spare parts needed to put it back into operation were not available immediately either in India or abroad. Even the original supplier of the equipment in Italy indicated a very long delivery period. The plant also suffered another major breakdown due to fire accident in the same year. The plant was brought back into production after two weeks. The explosion of 2nd stage Oil Gasification Plant in December 1989 and failure of the 3rd stage generator bricks in January 1990 and subsequent maintenance works also contributed to the low capacity utilisation.

3. Shortage of Raw materials

Availability and quality of the raw materials are important factors responsible for better utilisation of capacity. Shortage of raw materials has been responsible for considerable underutilisation of capacity in FACT. For instance, Sulphur is an ingredient of fertilizer production. This is imported from Morocco. Transportation and handling of these inputs have delayed by port labour strikes, a few years back. Again, in Cochin Phase II production had to be curtailed due to limitation in availability of Ammonia consequent to the decommissioning, inspection and recommissioning of the Ammonium storage tanks which took a period of four months. Availability of pure water is another determinant factor in the utilisation of capacity in FACT. During summer season especially between January and May water level in the Periyar river goes down; and the subsequent reverse flow in the river causes an increase in salinity. The saline water is not suitable for the fertilizer production. Salinity of water was a great problem to FACT especially during the drought years. Due to this the company had to resort to water tankers in 1983.

Nonavailability of imported Phosphoric acid and Ammonia during the year 1988-89 was a severe setback in the capacity utilisation of FACT. This was a major constraint which affected production. Production loss due to these factors is estimated at

106,000 tonnes of Urea and 120,000 tonnes of N.P. formulations.

Shortage of Sulphuric acid during July, August and September in the same year was due to unexpected failure of DCDA and Chemiebau Acid Plants in Udyogamandal division.

4. Strained Labour Relations

Strained industrial relations also accounted for loss of production and low capacity utilisation in FACT. Labour unions sometimes make unreasonable demands and use pressure tactics to get them accepted by the management. Other noticeable causes for strained industrial relations are intra-union and inter-union rivalries. It is obvious that under a situation, where conflicts of ideologies and leadership are evident, industrial harmony is hard to be maintained. Because of several trade unions having ideological and personality conflicts, the managements find themselves in a quandary. Thus labour troubles also constituted to the low capacity utilisation.

5. Inadequacy of Demand

The demand for fertilizers fluctuates with the changes in weather condition, area under irrigation, area under high-yielding variety seeds etc. Instability of demand owing to adverse climatic conditions and high quantity of imports and consequent accumulation of stocks affected the utilisation of

capacity in FACT a few years back. In addition, competition from fertilizer companies of neighbouring states such as Madras Fertilizers Ltd., Manali, etc. affected the production and capacity utilisation in FACT indirectly. At present FACT Marketing Division can compete very well with a well-organised distribution network consisting of over 14,000 village level sales outlets distributing over a million tonnes of fertilizers.

6. Managerial Deficiencies

Underutilisation of capacity in FACT is also attributable to managerial shortcomings. It is true that we cannot quantify the extent to which managerial deficiencies impinge on productivity and capacity utilisation. Management is a subject by itself and its tenets do suggest measures to increase production and productivity with better organisation, co-ordination, control mechanism, planning and so on. It is said that overstaffing, political intervention, favouritism in promotion etc., resulted in lack of co-ordination and co-operation among the managerial staff and they affected the production front to some extent.

Capacity Utilisation in Cochin Shipyard Ltd.

Cochin Shipyard Ltd. (CSL) is concerned with both ship building and ship repair. While the ship building capacity is 150,000 Dead Weight Tonnage (DWT), the ship repairing capacity is

one million Gross Registered Tonnage (GRT). After the five Panamax class bulk carriers the shipyard had switched on to building oil tankers. It has built two oil tankers and another one is in the process of building. Even though the work on the first ship of the Panamax series began in 1975, the yard had not been laid fully then. For the period from 1975 to 1980 both ship building and construction of the yard progressed simultaneously. The first ship Rani Padmini of the Panamax series was delivered to the owner on 24th July 1981. The annual reports of the company estimated the actual production and repair from 1982-83 onwards. In that year ship building capacity utilisation was 34.04 per cent, while ship repair capacity utilisation was only 10.32 per cent. The highest utilisation of capacity in ship building was only 39 per cent in 1984-85 and that of ship repair was only 43.05 per cent in 1985-86.

Table 5.4 shows the composite index of capacity utilisation of CSL for the period between 1982-83 and 1988-89. The table shows wide fluctuations in capacity utilisation. The average capacity utilisation for the period under discussion is only 28.74 per cent. Thus there is gross underutilisation of capacity in Cochin Shipyard Ltd. The compound annual rate of growth (CARG) of capacity utilisation for the period was 12.94 per cent. The CARG can be estimated from the following equation.

Table 5.4

CAPACITY UTILISATION IN COCHIN SHIPYARD LIMITED

Year	Capacity Utilisation (%)			Growth rate of C.U.		
	ICU	MCU	CUMCOR	ICU	MCU	CUMCOR
1977-78	--	81.68	68.44	--	--	--
1978-79	--	70.19	71.81	--	-14.07	4.92
1979-80	--	69.79	82.94	--	-0.57	15.50
1980-81	--	100.00	98.37	--	43.29	18.60
1981-82	--	96.66	100.00	--	-3.34	1.66
1982-83	13.41	80.54	86.46	--	-16.68	-13.54
1983-84	22.89	31.34	32.64	70.69	-61.09	-62.25
1984-85	31.02	43.63	45.98	35.52	39.22	40.87
1985-86	41.45	65.79	69.03	33.62	50.79	50.13
1986-87	25.57	75.30	81.57	-38.31	14.46	18.17
1987-88	26.85	71.01	77.32	5.01	-5.70	-5.21
1988-89	40.00	86.43	93.97	48.98	21.72	21.53
Avg. for 1977-78 to 1982-83	13.41	83.14	84.67	**	1.44	4.52
Avg. for 1983-84 to 1988-89	31.30	62.25	66.75	25.92	9.90	10.54
Avg. for 1977-78 to 1988-89	28.74	72.70	75.71	25.92	5.67	7.53

$$\text{Log } Y = 0.9583 + 0.0528 t$$

$$\text{S.E.} = 0.072$$

$$R^2 = 0.67$$

where,

Y = Capacity Utilisation

t = time (year)

Designed to build two ships of upto 85,000 DWT each and to repair ship upto 100,000 DWT a year the yard has remained grossly underutilised. It took 65 months to deliver the first ship, 44 months for the second and 46 months for the third. The fourth ship also took about 46 months to get completed.

Many reasons can be attributed to the gross underutilisation of capacity in the Cochin Shipyard Ltd.

1. Raw material shortage

Ship construction involves bringing together diverse industrial products and erecting the ship within a specified period. Delays creep in the course of acquiring the basic materials. Roughly half the equipment required is imported, which involves an inevitable time lag. A major reason for the delay in construction and delivery of ships is the lack of control of the shipyard over supply of components. While the indigenous suppliers delay the supply, the shipyard is not allowed to import the components and finish the work faster. Another problem

connected with this is that the Cochin Shipyard has no ancillary industries. Foreign shipyards have ancillary industries located right next door. This advantage is not enjoyed by Indian yards. A Japanese shipyard gets its orders for components executed for quicker than its Indian counterpart, which, in any case, is dependent for much of the raw material on imports. The ancillary units did not come up because of the attitude of the management. They were more interested in giving sub-contracts to other people, instead of seeing that ancillary industries are established.

2. Lack of demand

Paucity of orders is another problem for the Cochin Shipyard. It is apparent that the company either displayed no initiative in securing lucrative contracts or simply lost out on orders through sheer ineptitude.

While other shipyards like Mazagon Dock and Hindustan Shipyard were able to bag orders worth several hundred crores from ONGC to build rigs and off-shore platforms, Cochin Shipyard did not bother to secure any such contract from ONGC. When the shipyard on a later occasion entered into a collaboration agreement with a company and gave tenders for ONGC work, Cochin Shipyard's tenders were rejected by ONGC because they were not accompanied by the earnest money deposit.

Again the shipyard moved so tardily on a Shipping Corporation of India (SCI) order for three ships in 1982 that the Government permitted SCI to place its order with a South Korean

company instead. The shipyard lost an order for three self propelled barges from the Calcutta Port Trust under similar circumstances.

Global recession in the shipping industry in the 1980s also contributed its share to this problem. Ships are being sold by foreign shipyards at lower prices. This feature of merchant shipping scenario has an adverse bearing on the Indian shipbuilding industry.

3. Strained labour relations

It is said that trade unions are not playing a constructive role. The proposal of the chairman to link wages with productivity was stoutly opposed by the trade unions. It is said that while trade unions clamour for high wages and other rights of employees, they are totally unconcerned about their duties. When wage negotiations were held, the unions refused to give any commitment to improve productivity. Strikes were regular between 1983 November and January 1984. The loss of production in the ship building yard due to strikes, lay off, power cut etc., in 1983-84 has been estimated at Rs.594 lakhs. During the year 1985-86 CSL lost 3185 mandays due to bandh and certain other problems. Loss of production came upto Rs.18.35 lakhs in that year. The company lost 5599 mandays due to strike during 1987-88 and the loss due to that amounted to Rs. 30.49 lakhs.

4. Lack of planning and co-ordination between the various

departments can be attributed to the delayed production in Cochin Shipyard. The Purchase Department, Inspection Department and Consumer Department — all these three units did not have proper co-ordination. This was admitted by the chairman. In his own words, " we have steel throughput of 2000 tonnes a month. Unfortunately we have been doing only 600 or 700 tonnes. Most of the time it is not because these workers are not doing the job, but because the ancillaries were not arriving on time or the steel had not come or you had a situation where steel would arrive but the pipes would not have arrived."¹

The Report of the Comptroller and Auditor General of India has thrown light on some serious lacunae in the running of the shipyard. The report attributes the ills of the shipyard mainly to lack of proper planning, low capacity utilisation, low productivity of labour, prolonged period of shipbuilding and insufficient control over materials.

5. Pricing policy

Another problem of the company is the uneconomic price fixed for ships built by it. The price fixation of vessels is done on the basis of the prevailing international prices so that the company can take advantage of the competitive market. Since the cost of production will be greater than the prices fixed for it building of each ship incurred losses of more than Rs.10 crores. The chairman says "the day you start a ship construction you have to take it for granted that you will lose. You cannot make profits because you have to import 50 per cent of the

¹ A Special Correspondent, "Cochin Shipyard", Frontline, may 30 - June 12, 1987, p.92.

material and the other 50 per cent which is indigenous is going to be got at the Indian costs".²

Despite a 20 per cent subsidy extended by the government to the Cochin Shipyard for each ship the cost of construction is invariably higher than the price of the ship. Consequently the shipyard has suffered a loss of several crores of rupees on each of the five ships that it has built. Further, cost of production escalates because of low productivity.

6. Structure

The Cochin Shipyard suffers from a fundamental flaw. The yard was laid out by the Japanese while the shipbuilding technology was taken from the British. The company officials say that the blend may not have been a happy one. While the Japanese have a modern heavily planned construction schedule the British have a more traditional approach, drawing upon skills passed on from the generation of English shipwrights to the next. Skills essentially are difficult to transfer as the workforce at Cochin Shipyard has realised to its dismay.

7. Political interference

Political interference in the affairs of the shipyard and the wrong ship pricing policy of the government are some other reasons attributed to the poor performance of the shipyard. Once a chairman had to resign his post due to some conflict with top authorities in shipping ministry.

² Venu Menon, "In Troubled Waters", The Illustrated Weekly of India, August 2, 1987, p.31.

The report of the Public Undertakings Committee tabled in the Lok Sabha on April 24, 1987 had its own scathing comments on the Cochin Shipyard's mode of operation. It was "drifting without any long-term plans or objectives".

No serious attempt was made to venture into diversification as done by other shipyards the world over to make up their loss on the ship building side. It is said that the Indian Navy has already taken a decision to construct aircraft carriers at Cochin Shipyard which with the addition of some facilities would be best suited for the purpose among all shipyards in the country.

Capacity Utilisation in Cochin Refineries Limited

Capacity utilisation in Cochin Refineries Ltd. was commendable during the period of analysis. Excluding the years 1977-78, 1984-85 and 1985-86, all the other years under the period of analysis capacity utilisation was above 80 per cent. During the year 1988-89 it reached upto approximately 106 per cent. The company has changed the period of financial year from September-August to April-March in the year 1977-78. Owing to this shift the capacity utilisation estimate for the year is low. During the period 1979-80 the Crude Distillation Unit was shut down for about 28 days during the year due to plant emergency, nonavailability of crude oil, labour problems, crude mix effects,

product movement problems etc. During the period 1980-81 also the Crude Distillation Unit was closed down for 36 days due to plant emergency, nonavailability of crude oil and labour problems. The year 1981-82 also witnessed certain production hurdles such as plant shut-downs and power failures. During the year 1982-83 there was a shut-down of the plant for turn around from 15th March to 17th April 1982 due to nonavailability of sufficient crude oil, power failures and power dips. The sudden decline of capacity utilisation to 19.27 per cent in the year 1984-85 from 86.51 per cent in the previous year was due to the fire accident on 8th March, 1984. During the financial year 1984-85 the company operated the refinery only for about four months, owing to the forced shut-down for rebuilding its activities necessitated by the explosion and fire as well as for carrying out certain major works connected with the secondary processing and Capacity Expansion Project. The unforeseen developments in the refinery affected the schedule of commissioning of the major projects. Consequently, the expansion project raising its capacity to 4.5 million metric tonnes, was commissioned only in October 1985, the Fluid Catalytic Cracking Plant in June 1985 and the secondary processing plant in March 1985. During the year 1985-86 35141 mandays were lost due to 102 days' strike and lockout for one day.

Table 5.5 shows the capacity utilisation in Cochin Refineries Ltd. On an average for 1977-78 to 1982-83 the capacity utilisation was 84.41 per cent and for the remaining period it

Table 5.5

CAPACITY UTILISATION IN COCHIN REFINERIES LIMITED

Year	Capacity Utilisation (%)			Growth rate of C.U.		
	ICU	MCU	CUMCOR	ICU	MCU	CUMCOR
1977-78	53.45	81.43	81.96	**	**	**
1978-79	86.73	51.39	51.73	62.26	-36.89	-36.88
1979-80	86.88	55.53	55.81	0.17	8.06	7.89
1980-81	88.24	69.84	69.85	1.57	25.77	25.16
1981-82	94.55	100.00	100.00	7.15	43.18	43.16
1982-83	96.58	85.71	87.37	2.15	-14.29	-12.63
1983-84	86.51	80.30	80.91	-10.43	-6.31	-7.39
1984-85	19.27	23.40	26.27	-77.73	-70.86	-67.53
1985-86	61.09	37.24	44.84	217.02	59.15	70.69
1986-87	92.58	55.26	58.45	51.55	48.39	30.35
1987-88	91.36	57.94	57.45	-1.32	4.85	-1.71
1988-89	105.80	78.82	78.00	15.81	36.04	35.77
Avg. for 1977-78 to 1982-83	84.41	73.98	74.45	12.22	4.30	4.45
Avg. for 1983-84 to 1988-89	76.10	55.49	57.65	32.48	11.87	10.03
Avg. for 1977-78 to 1988-89	80.25	64.74	66.05	22.35	8.09	7.24

declined to 76.1 per cent. This decline in the average is due to the sudden dip of capacity utilisation due to the fire accident previously mentioned. The average annual capacity utilisation for the whole period was above 80 per cent. The compound annual growth rate of capacity utilisation was 0.60 per cent for the company during the period of analysis.

Capacity utilisation in Hindustan Latex Ltd.

Table 5.6 shows the capacity utilisation in Hindustan Latex Ltd. On an average for the period 1977-78 to 1982-83 the capacity utilisation was 67.15 per cent and for the remaining period it increased to 83.14 per cent. The average annual capacity utilisation for the whole period was 75.14 per cent. The compound annual growth rate of capacity utilisation was 3.72 per cent for the company during the period of analysis.

Thus capacity utilisation in HLL is commendable. One plant of the company is rather old and this affected the capacity utilisation to some extent. The new plants are utilising almost full capacity.

Capacity Utilisation in Travancore cochin Chemicals Ltd.

Table 5.7 shows the capacity utilisation in Travancore Cochin Chemicals Ltd. Here we have taken only important products such as caustic soda and chlorine. If we take two other less significant products such as hydrosulphite and sodium sulphide there will be slight difference in capacity utilisation (see table

Table 5.6

CAPACITY UTILISATION IN HINDUSTAN LATEX LIMITED

Year	Capacity Utilisation (%)			Growth rate of C.U.		
	ICU	MCU	CUMCOR	ICU	MCU	CUMCOR
1977-78	56.52	32.57	34.23	**	**	**
1978-79	63.38	29.24	30.03	12.14	-10.22	-12.27
1979-80	61.70	26.94	27.83	-2.65	-7.87	-7.33
1980-81	36.54	14.07	14.54	-40.78	-47.77	-47.75
1981-82	92.26	57.85	59.44	152.49	311.16	308.80
1982-83	92.50	74.35	76.28	0.26	28.52	28.33
1983-84	93.09	70.82	74.29	0.64	-4.75	-2.61
1984-85	89.83	80.08	84.18	-3.50	13.08	13.31
1985-86	97.90	100.00	100.00	8.98	24.88	18.79
1986-87	57.00	18.53	21.23	-41.78	-81.47	-78.77
1987-88	72.00	30.70	37.67	26.32	65.68	77.44
1988-89	89.00	34.14	41.33	23.61	11.21	9.72
Avg. for 1977-78 to 1982-83	67.15	39.17	40.39	20.24	45.64	44.96
Avg. for 1983-84 to 1988-89	83.14	55.71	59.78	2.38	4.77	6.31
Avg. for 1977-78 to 1988-89	75.14	47.44	50.09	11.31	25.20	25.64

Table 5.7

CAPACITY UTILISATION IN TRAVANCORE COCHIN CHEMICALS LIMITED

Year	Capacity Utilisation (%)			Growth rate of C.U.		
	ICU	MCU	CUMCOR	ICU	MCU	CUMCOR
1977-78	46.20	27.55	23.28	**	**	**
1978-79	45.26	32.86	32.69	-2.03	19.27	40.42
1979-80	52.19	46.63	43.40	15.31	41.91	32.76
1980-81	56.75	61.69	53.99	8.74	32.30	24.40
1981-82	60.27	77.61	70.71	6.20	25.81	30.97
1982-83	48.15	68.37	64.97	-20.11	-11.91	-8.12
1983-84	40.42	65.73	66.75	-16.05	-3.86	2.74
1984-85	59.23	80.55	82.27	46.54	22.55	23.25
1985-86	65.75	100.00	99.83	11.01	24.15	21.34
1986-87	52.00	79.04	81.72	-20.91	-20.96	-18.14
1987-88	56.85	88.67	89.90	9.33	12.18	10.01
1988-89	64.12	98.89	100.00	12.79	11.53	11.23
Avg. for 1977-78 to 1982-83	51.47	52.45	48.17	1.35	17.90	20.07
Avg. for 1983-84 to 1988-89	56.40	85.48	86.75	7.12	7.60	8.41
Avg. for 1977-78 to 1988-89	53.93	68.97	67.46	4.23	12.75	14.24

5.8). It is clear that capacity utilisation in TCC is comparatively low. Only during the years 1981-82, 1985-86 and 1988-89 could the company achieve more than 60 per cent capacity utilisation during the period of analysis. On an average for the first half of the period the capacity utilisation was 51.47 per cent and for the second half it increased to only 56.4 per cent. It shows that significant increase in capacity utilisation achieved over the years. Considerable amount of idle capacity is there in the company. Annual average growth rate of capacity utilisation during the period of analysis was 4.23 per cent.

Frequent power cuts ranging from 30 per cent to 100 per cent by the Kerala State Electricity Board adversely affected the capacity utilisation in TCC. TCC is a highly power consuming company. So power-cut affected production adversely.

Another important reason was that demand for caustic soda had gone down. This was mainly due to imports and to the spiralling prices of input like raw materials, fuel, industrial salt etc. Moreover the installed capacity of caustic soda in the country is much higher than the demand for the product. It is reported that the international market for caustic soda is showing signs of recovery and if proper incentives are revived by the central government the industry may be able to enter the export market in a moderate way, thus enabling better overall capacity utilisation in the country. Under the import policy 1988-91, caustic soda has been shifted from the list of canalised items to

Table 5.8

Installed Capacity and Production in TCC from 1977-78 to 1988-89

Products (in MT)	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
1. Caustic Soda												
Installed capacity	59400	59400	59400	59400	59400	59400	59400	59400	59400	59400	52800	52800
Production	27440	26883	31002	33711	35803	28602	24010	35180	39057	27449	30019	33869
2. Hydrosulphite of Soda												
Installed capacity	2100	2100	2100	2100	2100	2100	2100	2100	2100	--	--	--
Production	242	352	110	10	--	--	--	--	--	--	--	--
3. Sodium Sulphide (62%)												
Installed capacity	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	--	--
Production	573	456	344	659	971	739	390	525	646	227	--	--
4. Chlorine												
Installed capacity	52272	52272	52272	52272	52272	52272	52272	52272	52272	52272	46464	46464
Production	24147	23657	27282	29666	31507	25170	21129	30958	34370	24155	26417	29805
Total Installed Capacity per annum												
	115872	115872	115872	115872	115872	115872	115872	115872	115872	113772	99264	99264
Total Production per annum												
	52402 (45%)	51348 (44%)	58738 (51%)	64046 (55%)	68281 (59%)	54511 (47%)	45529 (39%)	66663 (58%)	74073 (64%)	51831 (45%)	56436 (49%)	63674 (64%)

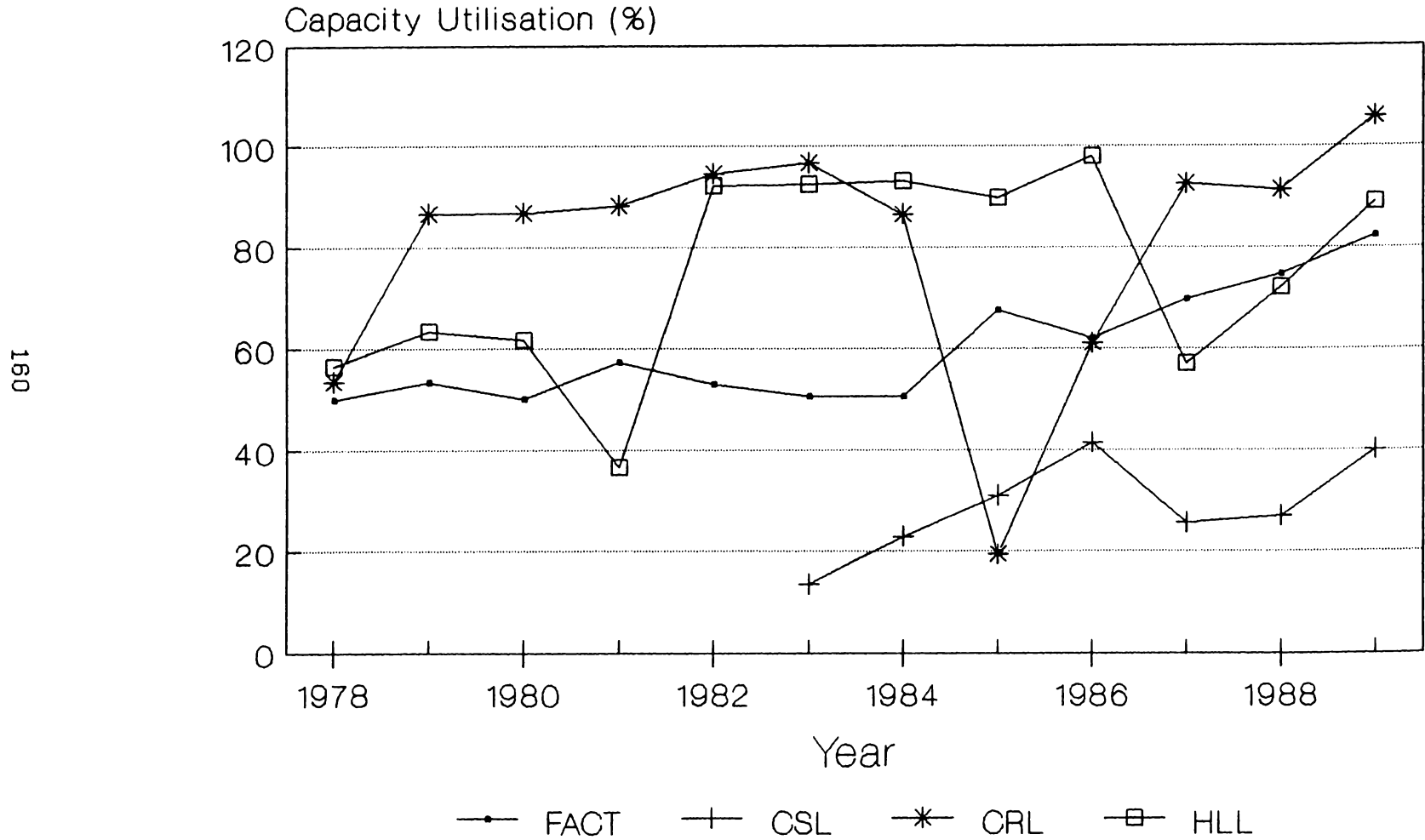
Source : Annual Reports, TCC, from 1977-78 to 1988-89

the list of restricted items in 'Appendix 2 - Part B'. This is an encouraging change and it will prevent indiscriminate imports of the material. Recent trend in capacity utilisation shows an increasing tendency (see figure 5.1).

Capacity utilisation and employment generation

Capacity utilisation has important implications also for employment generation. When a manufacturing unit moves from single shift to multiple shift operation, its requirement of direct workers tends to increase almost proportionately. Requirements of indirect workers and supervisory personnel will also rise, much less than in proportion to the increase in the number of shifts. This generalisation would not, of course, apply to all industries across the board. Thus impact on employment through multiple shifts may have little relevance in the case of continuous process industries such as chemicals and petroleum industries. Batch process industries such as engineering industries of various kinds, on the other hand, may offer considerable scope for increasing employment through fuller utilisation of capacity. The elasticity of employment with respect to utilisation may, therefore, vary from one industry to the other. The range of the coefficient will tend to lie between zero and unity. The larger the value of the elasticity coefficient, the greater the chances of bringing down the capital-labour ratio through fuller utilisation.

**Figure 5.1 Capacity Utilisation in CPSEs
in Kerala (1978-1989)**



The studies on capital utilisation in developing countries carried out in the last few years under the sponsorship of International Labour Office (ILO) have focussed on the employment augmenting effect of increased capacity utilisation.

Therefore an attempt is made to analyse the employment generation in the selected CPSEs in Kerala and how far the employment generation is related to capacity utilisation in these enterprises.

Employment generation in CPSEs in India

As per the objectives central public sector enterprises are under the obligation to create employment opportunities. But the data show that public enterprises failed to generate enough employment opportunities. Efficient utilisation of manpower is one of the indicators of efficiency. In India the central government non-departmental industrial and commercial enterprises employed a little more than 22 lakh persons in 1988-89. It was only around 8 per cent of the total employment in the entire organised sector and less than one per cent of the total workforce in the country. In 1977-78 these enterprises employed 16.38 lakhs persons and it has risen to 22.09 lakhs persons in 1988-89 i.e. an increase of 5.31 lakhs persons over 12 years.

Table 5.9 shows a fairly satisfactory rate of growth in employment from 1977-78 to 1982-83. There was a slowing down from 1982-83 onwards. During the year 1988-89 there was a negative

Table 5.9

EMPLOYMENT GENERATION IN PUBLIC ENTERPRISES IN INDIA

Year	Employment generation (lakh number of persons)	Growth of employment generation (%)
1977-78	16.38	4.00
1978-79	17.03	3.97
1979-80	17.75	4.23
1980-81	18.39	3.61
1981-82	19.39	5.44
1982-83	20.24	4.38
1983-84	20.72	2.37
1984-85	21.07	1.69
1985-86	21.54	2.23
1986-87	22.11	2.65
1987-88	22.14	0.14
1988-89	22.09	-0.23
Average	19.90	2.87

Source: A Statistical Review of Central Government Enterprises:
1988-89, CMIE, Bombay, March 1990.

growth in the generation of employment to the tune of 0.23 per cent. That is, it declined from 22.14 lakhs persons in 1987-88 to 22.09 lakhs in 1988-89 by 0.05 lakhs persons. The rate of employment generation varied between 5.44 per cent and 0.14 per cent over the period. The average annual growth rate of employment generation was 2.89 per cent between 1977-78 and 1988-89.

There is a remarkable increase in average per capita emoluments in the public sector enterprises in 1988-89 compared to 1977-78. It increased from Rs.10048 in the year 1977-78 to Rs.39513 in 1988-89 i.e. an increase by approximately four times. In real terms or at constant prices (1970 = 100) it increased from Rs.5808.09 per annum to Rs.9146.53 respectively i.e. an increase by 58 per cent over the period (see table 5.10). The rate of growth of total emoluments was 15.08 per cent per annum and that of per capita emoluments at current prices was 12.41 per cent per annum. The annual growth rate of per capita emoluments at constant prices (1970 = 100) was 3.91 per cent during the period of analysis. The employees satisfaction ratio (ratio of per capita emoluments at current prices to per capita emoluments at constant prices) increased from 1.48 in 1973-74 to 4.32 in 1988-89.

Table 5.11 shows the state-wise distribution of employment of central public sector enterprises in India. On an average, 31 thousand persons were employed by these enterprises in Kerala. Approximately it is 1.43 per cent of the total number of

T: 5.10

Growth of Employment, Emoluments and Employees Satisfaction Ratio
(1977-78 to 1988-89)

Year	Employment in lakhs numbers	Total emoluments (Rs in crores)	Per capita emoluments at current prices (Rs)	Per capita emoluments at constant prices (Rs)	Employment satisfaction ratio
1977-78	16.38	1646	10048	5808.09	1.73
1978-79	17.03	1908	11210	6297.75	1.78
1979-80	17.75	2214	11468	5705.47	2.01
1980-81	18.39	2619	14239	6300.44	2.26
1981-82	19.39	3133	16158	6568.29	2.46
1982-83	20.24	3649	18029	6677.41	2.70
1983-84	20.72	4465	21549	7183.00	3.00
1984-85	21.07	5126	24328	7723.17	3.15
1985-86	21.54	5576	25887	7547.23	3.43
1986-87	22.11	6371	28820	7961.33	3.62
1987-88	22.14	7193	32537	8216.41	3.96
1988-89	22.09	8709	39513	9146.53	4.32
Growth rate	2.89	15.08	12.41	3.91	--

Note : At constant prices 1970 = 100.

Table 5.11

State-wise Distribution of Employment of Central Public Sector Undertakings in India

Sl.No.	States/UTs	No. of employees including casual employees (No. in lakhs)								
		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
1.	Andhra Pradesh	0.74	0.75	0.87	0.89	0.92	0.92	0.93	0.96	0.99
2.	Assam	0.33	0.45	0.48	0.50	0.54	0.56	0.57	0.57	0.56
3.	Bihar	4.34	4.44	4.49	4.50	4.55	4.53	4.53	4.50	4.40
4.	Gujarat	0.46	0.46	0.47	0.49	0.51	0.51	0.49	0.51	0.51
5.	Haryana	0.12	0.12	0.13	0.14	0.15	0.16	0.17	0.17	0.18
6.	Himachal Pradesh	0.10	0.10	0.04	0.04	0.04	0.05	0.05	0.07	0.05
7.	Jammu & Kashmir	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.09
8.	Karnataka	1.71	1.17	1.16	1.17	1.19	1.18	1.19	1.18	1.17
9.	Kerala	0.28	0.28	0.30	0.30	0.31	0.33	0.33	0.32	0.33
10.	Madhya Pradesh	2.50	2.58	2.65	2.75	2.85	2.83	2.82	2.83	2.84
11.	Maharashtra	1.55	1.64	1.76	1.77	1.72	1.88	2.24	2.25	2.26
12.	Manipur	NA	NA	NA	NA	0.03	0.01	0.02	NA	NA
13.	Meghalaya	NA	NA	NA	NA	0.01	0.01	0.01	NA	NA
14.	Nagaland	NA	NA	NA	NA	0.01	0.02	0.02	NA	NA
15.	Orissa	0.63	0.65	0.64	0.69	0.70	0.72	0.75	0.75	0.76
16.	Punjab	0.17	0.21	0.23	0.25	0.24	0.24	0.24	0.23	0.23
17.	Rajasthan	0.33	0.33	0.32	0.33	0.35	0.36	0.36	0.37	0.39
18.	Sikkim	NA	NA	NA	NA	NA	NA	NA	NA	NA
19.	Tamil Nadu	0.71	0.73	0.77	0.80	0.82	0.86	0.86	0.88	0.88
20.	Tripura	NA	NA	NA	NA	0.01	0.02	0.02	NA	NA
21.	Uttar Pradesh	0.81	0.97	1.01	1.06	1.13	1.21	1.29	1.30	1.32
22.	West Bengal	3.80	3.81	4.18	4.16	4.20	4.29	4.22	4.17	4.13
23.	Andaman & Nicobar	NA	NA	NA	NA	0.02	0.03	0.02	NA	NA
24.	Chandigarh	NA	NA	NA	NA	0.01	0.04	0.01	NA	NA
25.	Delhi	0.71	0.76	0.92	0.93	1.01	1.01	1.33	1.26	1.34
26.	Goa	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
27.	Pondicherry	NA	NA	NA	NA	0.03	0.01	0.05	NA	NA
28.	Others/Unallocated	0.50	0.69	0.45	0.64	0.09	0.28	0.34	0.53	0.47
Total		19.29	20.18	20.93	21.47	21.51	22.14	22.94	22.94	22.93

Source : Public Enterprises Survey 1980-81 to 1986-87, Ministry of Industry, Government of India.

A Statistical Review of Central Government Enterprises 1988-89, CMIE, Bombay, March, 1990, p.15.

Includes other states/union territories

employees including casual employees in central public sector enterprises in Kerala. This percentage share is stagnant over the years for 1980-81 through 1988-89. If we compare the semi-averages of the number of employees in the CPSEs in Kerala only a nominal increase is seen. The increase is from 1.42 per cent to 1.44 per cent of the total number of employees indicating an average of 1.4 per cent increase. In absolute numbers the total number of employees including casual employees increased from 19.29 lakhs in 1980-81 to 22.93 lakhs in 1988-89. This shows an increase of 19 per cent over the years. If we compare the semi-averages the increase is slightly reduced to 11.1 per cent i.e. from 20.47 lakhs to 22.74 lakhs persons.

Employment generation in selected enterprises in Kerala

Chronic unemployment of a large portion of the active labour force has been the most serious socio-economic problem of Kerala during the last three decades. Due to the enormous increase in unemployment and its alarming nature, the unemployment issue has emerged as the foremost political issue of Kerala today. The Department of Economics and Statistics survey of 1987 estimates the open unemployed as 27.81 lakhs accounting for 25.8 per cent of the labour force. Open unemployed is defined as those who had not worked a single day during the reference year and are available and seeking employment. The survey estimates that 15.28 lakh persons are underemployed constituting 14 per cent of the labour force. The unemployed is defined as those who worked for

at least one day during the year, but had not worked for the major part of the year (less than 183 days) and are available and seeking for more days of work. This includes persons belonging to all age groups of the population.

In CRL 447 persons were employed in 1977-78. It increased to 1116 in 1988-89, showing an increase by 669 persons i.e. 150 per cent increase over the period. If we compare the semi-averages, the average for the first half of the period, i.e. average for 1977-78 to 1982-83, was 446 persons and for the second half of the period i.e. average for 1983-84 to 1988-89, was 903 persons, making the average of 685 persons for the whole period. The rate of growth of employment varied from -6.68 to 29.38 per cent over the period of analysis. The exponential rate of growth was 9.64 per cent.

Total emoluments at constant prices increased from Rs.38.03 lakhs in 1977-78 to Rs.142.68 lakhs in 1988-89. Per capita emoluments at constant prices increased from Rs.8510 to Rs.12780 in CRL. The rate of growth of per capita emoluments at constant prices varied from -21.66 to 49.94 per cent (vide table 5.12).

CSL employed 2107 persons in the year 1977-78. It increased to 2684 persons in 1988-89, exhibiting an increase of 577 persons, i.e. an increase of 27.4 per cent over the period. The annual rate of growth of employment varied from -.28 to 6.72 per cent over the period under review. The average for the first half of the period was 2250 and for the second half of the period

Table 5.12

Employment and Emoluments in CRL

Year	Employment in Nos.	Rate of growth	Total emolu. in lakhs Rs.	Per capita emol. (Rs. '000).	Rate of growth
1977-78	447	--	38.03	8.51	--
1978-79	468	4.70	59.70	12.76	49.94
1979-80	464	-0.85	58.06	12.51	-1.91
1980-81	433	-6.68	55.09	12.72	1.68
1981-82	471	8.78	50.47	10.72	-15.78
1982-83	511	8.49	61.73	12.08	12.74
1983-84	640	25.24	60.57	9.46	-21.66
1984-85	828	29.38	71.35	8.62	-8.95
1985-86	812	-1.93	77.92	9.60	11.36
1986-87	980	20.69	99.85	10.19	6.18
1987-88	1043	6.43	114.08	10.94	7.35
1988-89	1116	7.00	142.68	12.78	16.89

Source: Compiled and computed from the annual reports of the company.

it increased to 2586 persons. The annual average rate of growth over the period was 2.32 per cent.

Total emoluments in CSL at constant prices more than doubled from Rs.120.02 lakhs in 1977-78 to Rs.274.75 lakhs in 1988-89 showing an increase of Rs.154.73 lakhs. Per capita emoluments in real terms increased from Rs.5700 to 10240 persons. The rate of growth of per capita emoluments varied from -22.26 to 27.16 per cent (vide table 5.13).

FACT is the biggest employer among the CPSEs in Kerala. In FACT 7028 persons were employed in 1977-78 and it increased to 8483 persons in 1988-89 showing an increase of 1455 persons or an increase of 20.7 per cent over the period under consideration. On an average during the first half of the period 7372 persons were employed and it increased to 8023 during the second half of the period. The annual employment average for the whole period was 7698 persons. The rate of growth of employment varied from -1.26 per cent to 4.25 per cent. The exponential rate of growth over the period was 1.49 per cent.

Total emoluments at constant prices increased from Rs.463.54 lakhs in 1977-78 to Rs.747.88 lakhs in 1988-89. This shows an increase of Rs.284.34 lakhs or 61.3 per cent increase over the period. Per capita emoluments in real terms increased from Rs. 6600 in 1977-78 to Rs.8820 in 1988-89 exhibiting an increase of 33.64 per cent over the period of analysis. The rate of growth of per capita emoluments varied from -6.82 to 14.94 per cent per annum (vide table 5.14).

Table 5.13

Employment and Emoluments in CSL

Year	Employment in Nos.	Rate of growth	Total emolu. in lakhs Rs.	Per capita emol. (Rs. '000).	Rate of growth
1977-78	2107	--	120.02	5.70	--
1978-79	2139	1.52	137.96	6.45	13.23
1979-80	2142	0.14	150.46	7.02	8.91
1980-81	2286	6.72	187.69	8.21	16.89
1981-82	2393	4.68	196.92	8.23	0.23
1982-83	2430	1.55	220.71	9.08	10.37
1983-84	2537	4.40	179.13	7.06	-22.26
1984-85	2530	-0.28	227.15	8.98	27.16
1985-86	2540	0.40	232.91	9.17	2.13
1986-87	2533	-0.28	216.18	8.53	-6.93
1987-88	2689	6.16	245.89	9.14	7.14
1988-89	2684	-0.19	274.75	10.24	11.95

Source: Compiled and computed from the annual reports of the company.

Table 5.14

Employment and Emoluments in FACT

Year	Employment in Nos.	Rate of growth	Total emolu. in lakhs Rs.	Per capita emol. (Rs. '000).	Rate of growth
1977-78	7028	--	463.54	6.60	--
1978-79	7160	1.88	499.15	6.97	5.70
1979-80	7363	2.84	548.46	7.45	6.85
1980-81	7384	0.29	568.53	7.70	3.36
1981-82	7698	4.25	568.89	7.39	-4.02
1982-83	7601	-1.26	569.68	7.49	1.42
1983-84	7747	1.92	541.03	6.98	-6.82
1984-85	7877	1.68	632.29	8.03	14.94
1985-86	7813	-0.81	660.28	8.45	5.28
1986-87	8003	2.43	695.23	8.69	2.79
1987-88	8216	2.66	730.43	8.89	2.34
1988-89	8483	3.25	747.88	8.82	-0.83

Source: Compiled and computed from the annual reports of the company.

Total number of persons employed in HLL was 748 in 1977-78. It more than doubled to 1615 persons in 1988-89 showing an increase of 867 persons or 116 per cent increase over the period. If we compare the semi-averages, there were 740 persons on an average for the first half of the period. The annual average for the whole period was 893 persons. The exponential rate of growth was 5.77 per cent during the period of analysis.

Total emoluments at constant prices increased from Rs.38.96 lakhs in 1977-78 to Rs.113.9 lakhs in 1988-89 i.e. there was an increase of Rs.74.94 lakhs or 192.4 per cent increase over the period. Per capita emoluments in real terms increased from Rs.5210 in 1977-78 to Rs. 7050 in 1988-89, showing an increase of 35.32 per cent over the period under consideration. The rate of growth of per capita emoluments at constant prices varied from -14.57 to 38.41 per cent during the period of analysis (vide table 5.15).

TCC employed 1084 persons in 1977-78. Number of persons employed increased to 1111 persons in 1988-89 showing a slight increase of 27 persons or 2.49 per cent increase over the period. The average number of persons employed in the company for the first half of the period was 1070 and it increased to 1108 for the second half of the period. The annual average number of persons employed for the whole period was 1089. The rate of growth of employment varied from -3.36 to 5.19 per cent during the period. The exponential rate of growth was only 0.41 per cent during the period of analysis.

Table 5.15

Employment and Emoluments in HLL

Year	Employment in Nos.	Rate of growth	Total emolu. in lakhs Rs.	Per capita emol. (Rs. '000).	Rate of growth
1977-78	748	--	38.96	5.21	--
1978-79	728	-2.67	41.69	5.73	9.95
1979-80	708	-2.75	38.92	5.50	-4.01
1980-81	708	0.00	33.25	4.70	-14.57
1981-82	750	5.93	48.75	6.50	38.41
1982-83	797	6.27	55.49	6.96	7.11
1983-84	799	0.25	56.61	7.09	1.76
1984-85	828	3.63	60.00	7.25	2.28
1985-86	818	-1.21	69.56	8.50	17.35
1986-87	913	11.61	76.98	8.43	-0.85
1987-88	1304	42.83	97.81	7.50	-11.04
1988-89	1615	23.85	113.90	7.05	-5.97

Source: Compiled and computed from the annual reports of the company.

In TCC total emoluments at constant prices increased from Rs.94.02 lakhs in 1977-78 to Rs. 110.93 lakhs in 1988-89 showing an increase of Rs.16.91 lakhs or 17.99 per cent increase over the period. Per capita emoluments in real terms increased from Rs.8670 in 1977-78 to Rs.9980 in 1988-89, showing an increase of 15.11 per cent over the period under consideration. The rate of growth of per capita emoluments at constant prices varied from -15.04 to 19.52 per cent (vide table 5.16).

Thus in general FACT generated the highest level of employment among CPSEs in Kerala (see figure 5.2). It ranks first in creating additional employment during the period of analysis i.e. it created 1455 additional employment. But when we consider the relative growth position CRL comes first with 150 per cent increase in number of employment and FACT comes last with only 20 per cent increase. If we compare FACT with TCC, the position of TCC in the generation of employment is far below. The increase in the generation of employment in TCC over twelve years period is only 2.49 per cent. If we take all the public sector enterprises taken for analysis, TCC shows poor performance in the generation of employment (vide table 5.17).

However generation of employment cannot be a good measure of efficiency. Since public sector enterprises are generally criticised as already having excess staff.

The higher rates of growth of employment generation in CRL and HLL are mainly due to the expansion and diversification of

Table 5.16

Employment and Emoluments in TCC

Year	Employment in Nos.	Rate of growth	Total emolu. in lakhs Rs.	Per capita emol. (Rs. '000).	Rate of growth
1977-78	1084	--	94.02	8.67	--
1978-79	1079	-0.46	90.12	8.35	-3.69
1979-80	1072	-0.65	87.81	8.19	-1.92
1980-81	1036	-3.36	101.34	9.78	19.41
1981-82	1077	3.96	101.33	9.41	-3.78
1982-83	1071	-0.56	89.79	8.38	-10.95
1983-84	1113	3.92	82.39	7.40	-11.69
1984-85	1118	0.45	96.05	8.59	16.08
1985-86	1090	-2.50	102.87	9.44	9.56
1986-87	1079	-1.01	86.56	8.02	-15.04
1987-88	1135	5.19	94.82	8.35	4.11
1988-89	1111	-2.11	110.93	9.98	19.52

Source: Compiled and computed from the annual reports of the company.

Figure 5.2 Employment Generation in CPSEs in Kerala (1978-1989)

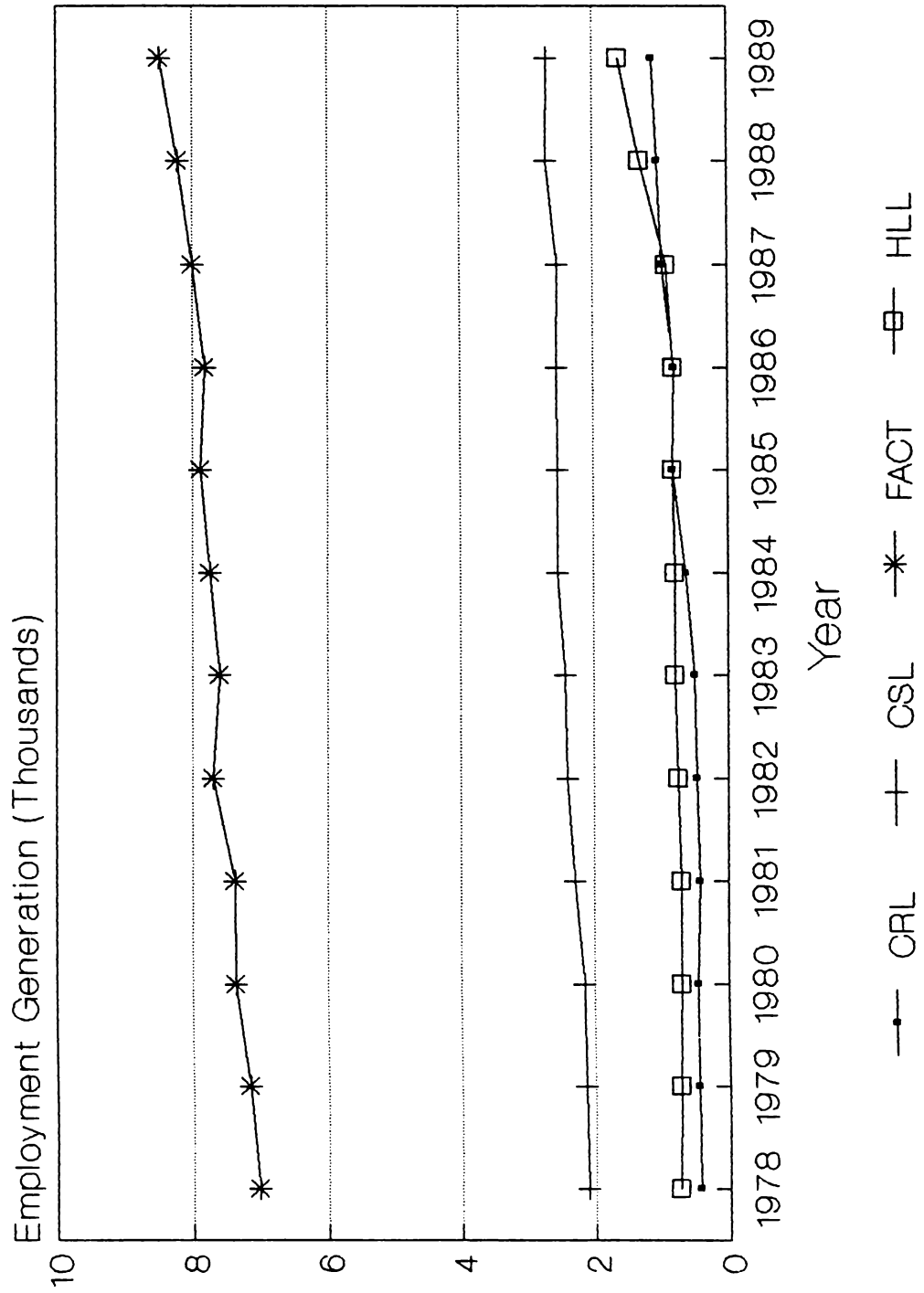


Table 5.17

Employment and Per capita Emoluments - A comparison

Coy.	No. of employees		Increase over 12 year period in percentage	Per capita emoluments at constant prices(Rs)		Increase over 12year period in percentage
	1977-78	1988-89		1977-78	1988-89	
CRL	447	1116	150 (9.64)	8510	12780	50.18
CSL	2107	2684	24.7(2.32)	5700	10240	79.65
FACT	7028	8483	20.7(1.49)	6600	8820	33.64
HLL	748	1615	116 (5.77)	5210	7050	35.32
TCC	1084	1111	2.49(0.41)	8670	9980	15.11

Source: Compiled and computed from the annual reports of the company.

Note : Figures in brackets are exponential growth rates per annum in percentage.

these companies. In that sense we can say that these companies fared well.

When we compare the annual per capita emoluments CRL stands first with Rs.12780 and the lowest is HLL with only Rs.7050. If we take the growth rate of per capita emoluments over the twelve years period CSL showed the highest rate and TCC showed the lowest rate.

Regression equations are fitted for capacity utilisation analysis of the public enterprises under study. Here we assume that capacity utilisation is functionally related to employment of these enterprises. The functional relation is made in the following equation:

$$E = f(CU)$$

where E is employment generation

CU is capacity utilisation rates.

Based on this functional relation the following econometric model is fitted

$$E = \alpha + \beta CU + \mu$$

where α is constant

β is coefficient

μ is the error term

The estimated values of the model for FACT, TCC, HLL, CRL and CSL are given below:

$$1. \text{ FACT } \quad E = 5710.833 + 33.05742 CU \quad R^2 = 0.745$$

$$t = 0.14695$$

2. TCC	E	=	1068.894	+	0.36845 CU	$R^2 = .011905$
					t = .01325	
3. HLL	E	=	647.7125	+	3.26426 CU	$R^2 = .054$
					t = .01147	
4. CRL	E	=	649.47	+	0.43545 CU	$R^2 = .001656$
					t = .001611	
5. CSL	E	=	2411.554	+	5.2792 CU	$R^2 = .312527$
					t = .062798	

From the estimated values it is clear that there is no significant relationship between employment generation and capacity utilisation in these enterprises.

In sum, the capacity utilisation of central public sector enterprises in India is very low. About 50 per cent of the central public sector enterprises in India are utilising less than 75 per cent of the capacity. Due to this underutilisation of capacity a heavy loss of production is incurred every year. In 1989-90 the loss of production comes upto Rs. 12731 crores.

Among the selected enterprises in Kerala FACT showed an average rate of utilisation of 60.11 per cent. In CSL there is a gross underutilisation of capacity. During the period of analysis the average capacity utilisation in CSL was only 28.74 per cent. On the contrary capacity utilisation in CRL is commendable. On an average it is more than 80 per cent. HLL also showed a higher capacity utilisation. The average capacity utilisation for the period of analysis was above 75 per cent. Capacity utilisation was comparatively low in TCC, the state enterprise in Kerala. On

an average it could achieve only about 54 per cent capacity utilisation. Many reasons can be given for underutilisation of capacity in these enterprises. They are power shortage, raw material shortage, labour, financial and demand problem, equipment failure etc. But power shortage is the first and foremost factor that stood in the way of higher utilisation of capacity in these enterprises especially after the 1980s. However there is an increasing trend in the utilisation of capacity in these enterprises.

Capacity utilisation has important implication for employment generation. Therefore analysis of employment generation is also made in these enterprises. Though there is remarkable increase in average per capita emoluments in the central public sector enterprises in India the rate of employment generation was very low during the period of analysis. The annual growth rate was only 2.89 per cent. A little more than 22 lakh persons were employed in these enterprises in 1988-89. This constitutes only around eight per cent of the total employment in the organised sector and less than one per cent of the total work force in the country.

On an average 31 thousand persons were employed by the central public enterprises in Kerala. Approximately it is only 1.43 per cent of the total number of employees. This share is stagnant during the period of analysis. Among the selected enterprises in Kerala FACT generated the highest level of employment generation. The annual growth rates of employment

generation of CRL, CSL, FACT, HLL and TCC are 6.64, 2.32, 1.49, 5.77 and 0.41 respectively. However there is great disparity in per capita emoluments in these enterprises. The correlation between emoluments per employee and value added per employee in FACT, TCC and HLL is highly significant. This shows that the wages of the workers have kept in proportion with the increase in productivity of these enterprises. But such a significant relation is not found in CSL and CRL.

An enquiry is also made whether employment generation in the selected enterprises is related to capacity utilisation by regression analysis. But the estimates do not show any significant relationship between these variables.

Chapter 6

PROFITABILITY OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA

In this chapter profitability of CPSEs in Kerala is analysed by means of some of the important financial ratios. Before we analyse these financial ratios it is relevant to know the position of CPSEs in the national level.

The position of CPSEs in the national level has not been satisfactory on the profitability front. A few units have been suffering huge losses causing an undue pressure on the economy. The losses of some units are on the increase. Table 6.1 exhibits that on the whole the public sector enterprises have suffered losses during 1977-78 through 1981-82. But, on the contrary, these enterprises have made profits during all the remaining years under review. The profitability (as percentage of post-tax profit to capital employed) of these enterprises ranged between 0.8 per cent and 4.48 per cent during these years.

During the year 1989-90 public enterprises have showed substantial improvement. The overall net profits of these enterprises touched an all time high figures of Rs.3782 crores showing an increase of Rs.801 crores or 26.87 per cent over the overall net profits of Rs.2981 crores earned during 1988-89. The overall profits of the public enterprises have been showing consistent trend of improvement in the recent years. Pre-tax

Table 6.1
PROFITABILITY PROFILE OF PUBLIC ENTERPRISES

(Rs. in crores)

Year 1	Number of Enterprises 2	Capital employed 3	Gross margin 4	Depreciation DRE & Amort. 5	Gross profit 6	Interest 7	Pretax profit 8
1977-78	155	12065	1489.16	574.49	914.67	755.13	159.54
1978-79	159	13969	1765.82	694.59	1071.23	886.18	185.05
1979-80	169	16182	2054.66	825.50	1229.16	1004.03	225.13
1980-81	168	18207	2400.89	983.06	1417.83	1399.15	18.68
1981-82	188	21935	4012.16	1357.79	2654.37	1629.71	1024.66
1982-83	193	26526	5184.49	1719.75	3464.74	1922.74	1542.00
1983-84	201	29851	5770.54	2205.14	3565.40	2085.81	1479.59
1984-85	207	36382	7386.21	2758.40	4627.81	2529.20	2098.61
1985-86	211	42965	8270.27	2982.99	5287.28	3114.62	2172.66
1986-87	214	51835	9896.76	3375.63	6521.13	3420.46	3100.67
1987-88	221	58125	11245.54	4133.04	7112.50	3591.36	3521.14
1988-89	222	67535	13424.84	4879.49	8545.35	4168.90	4376.45
1989-90	233	84437	16410.00	5787.00	10623.00	5341.00	5282.00

Tax 9	Post tax profit/ losses 10	Dividend 11	% of gross margin to to ca.emp. 12	% of gross profit to cap. emp. 13	% of post- tax profit to cap.emp 14	% of div. to cap. employed. 15
250.61	-91.07	58	12.34	7.58	-0.75	0.48
225.14	-40.09	72	12.64	7.69	-0.29	0.52
299.42	-74.09	76	12.70	7.60	-0.46	0.47
221.65	-202.97	83	13.19	7.79	-1.11	0.46
578.74	445.92	109	18.29	12.10	2.03	0.50
928.49	313.51	15	19.54	13.06	2.31	0.43
1239.45	240.14	133	19.33	11.94	0.80	0.45
1189.71	908.90	176	20.30	12.72	2.50	0.48
1000.22	1172.44	191	19.25	12.31	2.73	0.44
1329.28	1771.39	297	19.09	12.58	3.41	0.57
1337.79	2183.35	314	19.35	12.24	3.76	0.54
1395.45	2981.00	353	19.90	12.65	4.41	0.52
1500.00	3782.00	311	19.40	12.60	4.48	0.37

Source: Public Enterprise Survey, various issues, Bureau of Public Enterprises, Ministry of Industry, Government of India,

profits earned by the profit-making enterprise had shown marked improvement from Rs.5098 crores in 1987-88 to Rs.6283 crores in 1988-89 i.e. an increase of Rs.1185 crores. Along with an improvement in overall net profits of Centre's public sector enterprises in 1988-89, there was an increase of 19.4 per cent in gross margin (i.e. profit before depreciation, interest and tax). In absolute terms gross margin increased from Rs.11245.54 crores in 1987-88 to Rs.13424.84 crores in 1988-89. The percentage of gross margin to capital employed had also increased from 19.4 per cent in 1987-88 to 19.9 per cent in 1988-89 despite an increase of Rs.9410 crores in the quantum of capital employed during 1988-89. The ratios of gross profit to capital employed had also increased marginally from 12.24 per cent in 1987-88 to 12.65 per cent in 1988-89.

However the loss-making units had increased from Rs.1745 crores in 1987-88 to Rs.1907 crores in 1988-89 (an increase of Rs.162 crores). It is evident from the table 6.2 that nearly half of the central public sector enterprises in India are continuously incurring losses. Thus the problem of poor profitability and still the more serious problem of increasing losses of loss-making units has been earning a serious concern.

Group-wise net profits/losses of public enterprises for 1979-80, 1986-87 through 1989-90 are given in table 6.3. Public enterprises are grouped into manufacturing enterprises and non-manufacturing enterprises.

Table 6.2

Profit / Loss Making Central Public Enterprises in India

Year	No of operating enterprises	No of profit making enterprises	No of loss making enterprises	No of enterprises making neither profit nor loss
1979-80	169	101 (59.76)	68 (40.24)	--
1980-81	168	94 (55.95)	74 (44.05)	--
1981-82	188	104 (55.32)	83 (44.15)	1 (0.53)
1982-83	193	109 (56.48)	82 (42.49)	2 (1.03)
1983-84	201	108 (53.73)	92 (45.77)	1 (0.50)
1984-85	207	113 (54.59)	92 (44.44)	2 (0.97)
1985-86	211	119 (56.40)	90 (42.65)	2 (0.95)
1986-87	214	108 (50.47)	100 (46.73)	6 (2.80)
1987-88	220	114 (51.82)	103 (46.82)	3 (1.36)
1988-89	222	118 (53.15)	101 (45.50)	3 (1.35)
1989-90	233	131 (56.22)	98 (42.06)	4 (1.72)

Source: Public Enterprises Survey, 1988-89, Bureau of Public Enterprises; A Statistical Review of Central Government Enterprises 1989-90, CMIE, Bombay March 1991, p.2.

Note : Figures in brackets are percentages to the total.

Table 6.3

GROUPWISE NET PROFITS/LOSSES OF PUBLIC ENTERPRISES

(Rs.in crores)

Enterprises	1979-80	1986-87	1987-88	1988-89	1989-90
A.Manufacturing Enterprises					
1.Steel	-4.36	-26.38	-50.91	186.01	51.29
2.Minerals & Metals	-6.04	-55.74	-96.49	40.71	310.61
3.Coal & Lignite	-109.24	-265.15	-151.94	51.64	166.86
4.Power	--	233.78	338.81	474.07	638.83
5.Petroleum	158.17	2142.05	2171.54	2563.66	2899.53
6.Fertilizers	-86.48	-112.31	-83.62	-241.57	-288.38
7.Chemicals & Pharma.	-3.66	-34.30	-27.87	-15.18	37.67
8.Heavy engineering	-34.70	8.09	26.10	76.69	48.90
9.Medium & Light eng.	27.08	54.76	47.56	36.68	59.33
10.Transportation equip.	-7.90	-52.51	-68.34	-64.21	-88.78
11.Consumer goods	-8.12	-141.12	-123.01	-211.87	-232.26
12.Agro-based industries	1.02	-3.72	-3.31	-2.72	-3.74
13.Textiles	-11.60	-189.55	-228.24	-304.99	-208.06
B.Non-manufacturing Enterprises					
14.Trading & Marketing	18.35	40.08	78.02	89.48	131.89
15.Transportation services	-32.59	-55.55	-44.09	73.75	77.73
16.Contract & Construction	-5.17	-27.51	-27.79	-107.51	-114.45
17.Ind.dev.& Tech.consult.	0.51	3.05	-5.91	-20.13	-103.09
18.Tourist services	2.98	-0.79	1.05	-0.31	0.16
19.Financial services	12.85	38.29	46.39	65.98	128.15
20.Telecom.services	--	198.95	220.19	290.82	264.30
21.Section 25 companies	6.80	17.22	12.27	-0.04	5.25
Total	-74.78	1771.64	2030.46	2980.96	3781.73

Source: A Statistical Review of Central Government Enterprises:
1989-90, CMIE, Bombay, March 1991.

When we study table 6.3 and analyse it group-wise we see that the units engaged in power sector, petroleum sector, medium and light engineering sector, trading and marketing units and telecommunication services units have made profit continuously during all the years under review. Still there are a number of units suffering losses on a regular basis are in the fertilizer sector, transportation sector, consumer goods sector, textiles sector and contract and construction. The remaining units in public sector have witnessed a mixed trend relating to their profit and loss position. Of these, steel sector, minerals and metals sector, coal and lignite sector and transportation services sector are making profits from 1988-89 onwards. Units established under section 25 of the companies, such as Artificial Limb Manufacturing, National Research Development Corporation etc., have made losses only in the year 1988-89 during the years under review. What more concerning is that the petroleum sector units and power sector units have made continuous profits and because of huge profits of these units the overall position of the public sector show positive results although a number of units have suffered losses. We should evaluate public sector units taking in view the performance of individual units and not the performance of the public sector on the whole. Public sector, on the whole, showing profit results have also been a victim of criticism because of the losses suffered by individual units. It is interesting to note here that if we separate the profits by petroleum sector and power sector from the profits of entire

public sector units would be in the negative or in the losses. It should be remembered that the profits of petroleum enterprises which may be termed as 'petro-profits' are attributable more to the government's overall energy pricing policy than to their efficiency. This is the most burning problem of the sector and for their economic viability the profitability position of individual units has to be improved effectively, else the public sector would continue remaining nobody's sector.

Profitability of CPSEs in Kerala

Among the enterprises under study CRL alone have been continuously making profits during the period of analysis. But there are violent fluctuations in the profits made by CRL. In 1977-78 the company made profit to the tune of Rs.244 lakhs. The profit nosedived to Rs.25 lakhs in 1985-86. In 1988-89 it has got Rs.4156 lakhs as profit. At current prices it comes upto Rs.1004 lakhs only. The annual growth rate of profit of CRL at current prices estimated by the exponential trend method was 16.16 per cent and at constant prices it was 8.53 per cent during the period of analysis.

On the other hand, CSL could achieve profit only during 1980-81 and 1981-82 to the tune of Rs.288 lakhs and Rs.2 lakhs respectively. It is evident from table 6.4 that the company's loss is getting inflated towards the end of the period under consideration. The annual growth rate of profit of CSL at current

Table 6.4

Profits of Public Sector Enterprises in Kerala
(as on March 31 of the year)

(Rs. in lakhs)

Year	CRL		CSL		FACT		HLL		TCC	
	A	B	A	B	A	B	A	B	A	B
1978	244	136	-515	-288	-886	-495	14	8	-258	-144
1979	184	103	-275	-154	-554	-310	-12	-7	-134	-75
1980	182	84	-789	-365	65	30	-3	-1	5	2
1981	203	79	288	112	160	62	-45	-18	130	51
1982	620	229	2	1	-1099	-406	55	20	271	100
1983	701	258	-968	-356	-712	-262	78	29	226	83
1984	947	320	-1031	-348	11	4	83	28	199	67
1985	258	81	-1325	-415	1928	604	4	1	102	32
1986	25	7	-864	-252	1123	327	94	27	226	66
1987	465	130	-1021	-284	3645	1015	53	15	-122	-34
1988	1954	509	-2586	-673	190	49	194	50	182	47
1989	4156	1004	-2638	-637	597	144	272	66	256	62
Growth rates										
	16.16	8.53	-10.63	-8.25	63.13	50.09	42.92	29.66	33.66	25.5

Source: Compiled and computed from the annual reports of the companies.

'A' refers to profit at current prices.

'B' refers to profit at constant prices (1970 = 100)

prices estimated by the exponential trend method was negative i.e. -10.63 per cent and at constant prices it was -8.25 per cent during the period of analysis.

FACT has different story to tell. During the first half of the period of analysis the company was making losses except during 1979-80 and 1980-81 when it could make marginal profits of Rs.65 lakhs and Rs.160 lakhs respectively. But during the second half of the period the company has been making profits continuously, though towards the end of the period, the size of profit has got some diminution. The company's annual growth rate of profit at current prices was 63.13 per cent and at constant prices it was 50.09 per cent during the period of analysis.

Though small in size compared to the other enterprises under consideration, HLL has got stability in making profits from 1981-82 onwards. But the company was running at a loss for three years consecutively before 1981-82. The annual growth rate of profit of HLL at current prices estimated by the exponential trend method was 42.92 per cent and at constant prices it was 29.66 per cent during the period of analysis.

One of the oldest companies in the state sector, TCC was making loss in the beginning of the period under consideration. The company got out of this situation and from 1979-80 onwards it has been making profits except during the year 1986-87. The annual growth rate of profit of TCC at current prices estimated by the exponential trend method was 33.66 per cent and at constant prices it was 25.47 per cent during the period of analysis.

Giving importance to the different yardsticks in vogue, the operating efficiency of the enterprises in the present study is analysed with the help of the following widely used ratios:

- a) Gross margin as percentage to capital employed (GNC).
- b) Gross profit as percentage to capital employed (GPC).
- c) Net profit as percentage to capital employed (NPC).
- d) Gross margin as percentage to net worth (GMN).
- e) Gross profit as percentage to net worth (GPN).
- f) Net profit as percentage to net worth (NPN).
- g) Gross margin as percentage of sales (GMS) and
- h) Gross profit as a percentage of sales (GPS).

While the ratios involving sales would directly provide us with end profitability on turnover made by the public sector enterprises, the gross margin and/or gross profit to total capital employed would indicate the efficiency of activities of these enterprises in generating the surpluses over the capital invested. Further, the size of gross margin would indicate contributions made by the industrial enterprises towards meeting the requirements of financial costs and depreciation. The larger the gross margin the larger will be the certainty of the present level of operations to result in the future sufficient surpluses for the enterprises.

Among the ratios mentioned above, the ratio of gross margin to capital employed seems the key financial ratio for a

public enterprise for the following set of reasons:

In the case of public enterprises practically there is only one share holder - the government. This being so since the taxes also go to the government, and where the banking system is nationalised, interest earnings, taxes and interest payments become a little artificial.

The case for not providing for depreciation is that it has no real correspondence with the actual rate of physical deterioration, in the absence of data on the age-structure of capital assets and the rate of discarding.

The significance of using capital employed in the denominator emanates from the pattern in which capital is mobilised in the public enterprise. The financing pattern of public enterprises are not the same as the private enterprises pattern where the sources of capital are different and where consequently the gains go to different capital contributors. Since almost the entire capital comes in the shape of loans from the government and the nationalised banking system, the distinction sought to be made between debt and equity is artificial or even arbitrary. With the entire capital coming from one source, treating part of capital as entitled to dividends and part entitled to interest seems unnecessary. Effectually, therefore, the key indicator would not be net profits post-tax to net worth, but gross margin pre-tax, pre-depreciation to total capital employed. This ratio would more efficiently capture the productivity of the total capital.

However, there are certain limitations to financial profitability as a criterion of performance.

The traditional belief about the nexus between financial profitability and efficiency is based on a textbook view of competitive markets. The sources of demand and supply are freely at play in the market place where competitive forces involve a survival of the fittest and the elimination of the unfit. In these conditions of 'perfect' markets, prices reveal the scarcity value of various goods. Hence it is concluded that if an enterprise can remain profitable in such a competitive market economy, it can do so only if it is efficient in the case of minimising unit cost.

The manipulative possibilities of the commercial accounting systems is such that the profit situation can be engineered by playing around with the formulae.

The examination of profitability can be a very delusive operation if viewed only for a limited period of time. The dynamics of profitability ought to be understood on an inter-temporal basis.

There are certain artificially contrived imperfections in the system which arise out of state policy. A government may require an enterprise, for reasons of social considerations or may be of political expediency, deliberately to underprice its products and services. There could also be situations where governments treat certain public enterprises essentially as revenue earners and stipulate high profit margins. In either

case, the profits or losses of the enterprises are not the result of management capability but of conscious state intervention. Evidently in such situations, the use of profitability as an index of efficiency is very questionable.

Net profit as percentage of net worth in CRL is on an average 23.43. If we compare the semi-averages there is a decline in net profit as percentage of net worth from 25.47 to 21.39. The ratio came down to 9.68 in 1984-85 and to the bottom of 0.93 in 1985-86. The same trend is seen in the case of gross profit as percentage of capital employed. On an average it was 18.85. The first half of the period showed an average of 21.64 and it declined to 16.06 for the second period. Similar to that of net profit to net worth, the gross profit to capital employed was very low during 1984-85 and 1985-86 and it was 8.60 and 9.29 respectively. Gross margin as percentage of capital employed showed a corresponding decline from 29.37 to 23.44 and, on an average, it was 26.41 during the period of analysis. But gross margin as percentage of net worth showed an increase from 82.51 for the first half of the period to 92.84 for the second half of the period, making 87.68 as average for the whole period. But gross profit as percentage to net worth showed a reverse trend, showing a decline from 66.83 to 59.55. The average of the semi-averages was 63.19. There is an increasing trend in the case of gross profit as percentage of sales, and gross margin as percentage of sales. These ratios more than doubled in the second half of the period of analysis and their values were 2.82 and 4.09

respectively. Net profit as percentage of capital employed showed a declining trend from 9.78 to 8.57 and the average of the semi-averages was 9.18. In general the profitability position of Cochin Refineries Ltd. is far ahead, even though there is a declining trend in some of the ratios (vide table 6.5).

The profitability position of Cochin Shipyard Ltd. is in a distressing situation. Excluding gross margin as percentage of sales, all other ratios were in the negative. It showed negative net worth for 1986-87 through 1988-89. If we take gross profit, except for 1978-79, 1980-81 and 1981-82, all other years under study showed negative values. The company could achieve net profit only during 1980-81 and 1981-82. Another important factor is that first half of the period showed positive average values except for net profit as percentage of net worth and net profit as percentage of capital employed, while for the second half of the period all the ratios were negative showing a declining trend in all the financial ratios. The net result was that in the case of gross margin as percentage of sales alone there is positive value for the 12 year average (see table 6.6). Thus in general the profitability position of Cochin Shipyard Ltd. is in an agonizing situation.

Fertilisers and Chemicals Travancore Ltd. showed, on an average, negative value only for net profit as percentage of net worth and that is below unity. If we compare the semi-averages remarkable increase is seen in almost all the ratios. The ratios such as net profit as percentage of net worth and capital employed

Table 6.5

Profitability Profile of Cochin Refineries Ltd.

Year	GPS	GPC	NPN	GNC	GMS	GMN	GPN	NPC
1977-78	1.78	16.11	8.17	33.86	3.75	42.44	20.20	6.52
1978-79	1.85	17.46	14.53	23.56	2.64	53.08	37.28	6.45
1979-80	1.91	24.89	15.05	33.20	2.43	77.50	60.79	6.45
1980-81	1.50	12.12	19.71	15.51	1.86	101.26	81.46	3.02
1981-82	2.32	36.59	54.24	40.50	2.51	168.33	156.17	13.05
1982-83	1.09	22.64	41.14	29.60	1.27	52.46	45.07	23.21
1983-84	2.13	19.72	37.71	23.28	2.34	54.20	49.14	16.20
1984-85	5.39	8.60	9.68	12.82	7.64	45.61	32.17	2.72
1985-86	3.92	9.29	0.93	14.56	6.01	122.65	79.88	0.11
1986-87	3.46	12.30	15.15	26.07	6.90	180.36	90.46	2.19
1987-88	3.32	16.47	37.29	27.25	5.33	105.06	65.34	9.67
1988-89	5.21	30.01	27.59	36.65	6.37	49.19	40.28	20.55
First	1.74	21.64	25.47	29.37	2.41	82.51	66.83	9.78
Second	3.90	16.06	21.39	23.44	5.77	92.84	59.55	8.57
Average	2.82	18.85	23.43	26.41	4.09	87.68	63.19	9.18

Table 6.6

Profitability Profile of Cochin Shipyard Ltd.

Year	GPS	GPC	NPN	GNC	GMS	GMN	GPN	NPC
1977-78	-77.83	-3.61	-11.33	0.65	13.91	0.70	-3.94	-10.40
1978-79	68.24	2.62	-6.36	6.69	174.25	9.38	3.67	-4.53
1979-80	-98.29	-4.16	-21.04	0.09	2.05	0.16	-7.65	-11.44
1980-81	162.59	8.55	7.04	12.00	228.10	30.50	21.74	2.77
1981-82	23.99	6.94	0.04	9.76	33.74	22.58	16.06	0.02
1982-83	-7.55	-0.65	-25.57	3.01	34.72	8.13	-1.77	-9.45
1983-84	-17.47	-4.16	-37.59	-0.20	-0.85	-0.73	-14.95	-10.45
1984-85	-121.88	-6.21	-85.87	-2.03	-39.79	-12.38	-37.91	-14.07
1985-86	-0.26	-0.09	-115.39	4.34	12.83	51.82	-1.07	-9.66
1986-87	-18.32	-2.19	(-716.52)	3.10	25.92	-162.81	(-115.09)	-13.65
1987-88	-37.04	-27.95	(-113.66)	-19.85	-26.30	(-51.47)	(-72.48)	-43.84
1988-89	-24.98	-30.87	(-57.06)	-20.97	-16.97	(-20.25)	(-29.82)	-59.09
First	11.86	1.61	-9.54	5.36	81.13	11.91	4.69	-5.51
Second	-36.66	-11.91	-187.68	-5.93	-7.53	-32.64	-45.22	-25.13
Average	-12.40	-5.15	-98.61	-0.29	36.80	-10.36	-20.27	-15.32

show negative values for the first half of the period and positive values for the second half of the period. In the case of net profit as percentage of net worth, negative value of the first half of the period is greater than the positive value of the second half of the period such that the 12 year average was made negative i.e. -0.57. On the other hand, in the case of net profit as percentage of capital employed the positive value of the first semi-average is greater than the negative value of the second semi-average and the 12 year average is a positive value, i.e., 1.26 (see table 6.7). Thus, in general, the profitability position of FACT is satisfactory.

Hindustan Latex Ltd. has excellent performance in the profitability position. The average of gross margin as percentage of capital employed was 50.12 for the whole period. If we compare the semi-averages there is a conspicuous declining trend in the case of gross margin as percentage of capital employed, gross margin as percentage of sales and gross margin as percentage of net worth (see table 6.8). The gross margin as percentage of capital employed declined from 66.54 to 33.70, gross margin as percentage of sales from 59.32 to 22.22 and gross margin as percentage of net worth from 114.98 to 40.98 respectively from the first half of the period to the second half. Still the different financial ratios are at a higher level and that is why it could maintain a higher level of profitability among the enterprises under study.

Table 6.7

Profitability Profile of FACT Ltd.

Year	GPS	GPC	NPN	GNC	GMS	GMN	GPN	NPC
1977-78	-3.42	-3.18	-13.19	4.51	4.85	6.01	-4.24	-9.88
1978-79	0.90	0.81	-8.39	8.11	9.02	11.94	1.20	-5.70
1979-80	9.94	7.02	1.02	14.84	21.01	31.99	15.14	0.47
1980-81	8.84	6.98	2.33	14.31	18.10	32.37	15.80	1.03
1981-82	-0.33	-0.30	-18.74	7.88	8.70	19.50	-0.73	-7.58
1982-83	3.02	2.80	-12.92	10.92	11.79	28.89	7.40	-4.88
1983-84	6.08	7.01	0.16	15.46	13.40	31.77	14.41	0.08
1984-85	12.78	16.03	18.76	22.31	17.79	35.33	25.39	11.84
1985-86	8.05	10.24	7.66	16.67	13.11	17.79	10.93	7.18
1986-87	14.08	22.84	14.17	28.02	17.27	22.30	18.18	17.81
1987-88	5.07	10.74	0.61	19.74	9.32	11.09	6.03	1.09
1988-89	2.42	6.34	1.73	11.56	4.41	5.47	3.00	3.66
First	3.16	2.36	-8.32	10.09	12.25	21.78	5.76	-4.42
Second	8.08	12.20	7.18	18.96	12.55	20.62	12.99	6.94
Average	5.62	7.28	-0.57	14.53	12.40	21.20	9.38	1.26

Table 6.8

Profitability Profile of Hindustan Latex Ltd.

Year	GPS	GPC	NPN	GNC	GMS	GMN	GPN	NPC
1977-78	9.64	8.36	8.51	50.87	58.63	77.66	12.77	5.57
1978-79	-1.55	-1.50	-6.78	53.56	55.43	80.79	-2.26	-4.49
1979-80	2.59	1.63	-2.29	55.70	88.60	97.71	2.86	-1.30
1980-81	-12.61	-10.79	-34.81	55.04	64.29	113.33	-22.22	-16.91
1981-82	11.77	23.58	27.98	87.42	43.64	165.48	44.64	14.78
1982-83	13.49	28.75	24.51	96.64	45.34	154.90	46.08	15.29
1983-84	16.38	37.83	21.81	125.00	54.13	156.38	47.33	17.43
1984-85	3.85	6.58	0.19	33.67	19.70	25.58	5.00	0.25
1985-86	11.96	14.35	4.43	6.66	5.55	4.75	10.23	6.21
1986-87	8.19	3.40	3.21	4.53	10.92	8.64	6.48	1.68
1987-88	19.75	13.04	10.75	8.52	12.90	14.89	22.81	6.15
1988-89	12.71	10.06	12.56	23.82	30.09	35.62	15.04	8.39
First	3.89	8.34	2.85	66.54	59.32	114.98	13.64	2.16
Second	12.14	14.21	8.82	33.70	22.22	40.98	17.81	6.69
Average	8.01	11.27	5.84	50.12	40.77	77.98	15.73	4.42

The comparative profitability (see table 6.9) of the four central public sector enterprises mentioned above shows that HLL stands first, CRL second, FACT third and CSL fourth in descending order, when we rank them on the basis of gross margin as percentage of capital employed (see figure 6.1). It could be remembered that the administered pricing policy of the government regarding oil prices in the case of Cochin Refineries Ltd. point to the fact that the higher profitability of CRL may not be attributed fully to the efficiency of the company.

A comparison of profitability is also made between FACT which is a central public sector enterprise with TCC which is a state sector enterprise. In all the financial ratios, except net profit as percentage of net worth, both the enterprises show positive values, but TCC shows better profitability. On an average net profit as percentage of net worth of FACT showed negative value of 0.57 and that of TCC showed a positive value of 13.87 (see tables 6.7 & 6.10).

In general the profitability position in TCC is better than that in FACT. On an average, the gross margin as percentage to capital employed in FACT stood at 14.53 and in TCC it was 23.18. The corresponding value for the central public sector enterprises in general was 17.20.

The regression equations are fitted for profitability analysis of the public enterprises under study. Here we assume that profitability is functionally related to capital output ratio, capital labour ratio and capacity utilisation. The

Table 6.9

Comparative Profitability
(1977-78 to 1988-89)

Average	CRL	CSL	FACT	HLL	ALL INDIA
GNC	26.41	(0.29)	14.53	50.12	17.20
GPC	18.85	(5.15)	7.28	11.27	10.88
NPC	9.18	(15.32)	1.26	4.42	1.61
GMN	87.68	(10.36)	21.20	77.98	N.A
GPN	63.19	(20.27)	9.38	15.73	N.A
NPN	23.43	(98.61)	(0.57)	5.84	N.A
GMS	4.09	36.80	12.40	40.77	11.62
GPS	2.82	(12.40)	5.62	8.01	7.34

Note: Figures in brackets are negative values.

**Figure 6.1 Profits of CPSEs in Kerala
(1977-78 to 1988-89)**

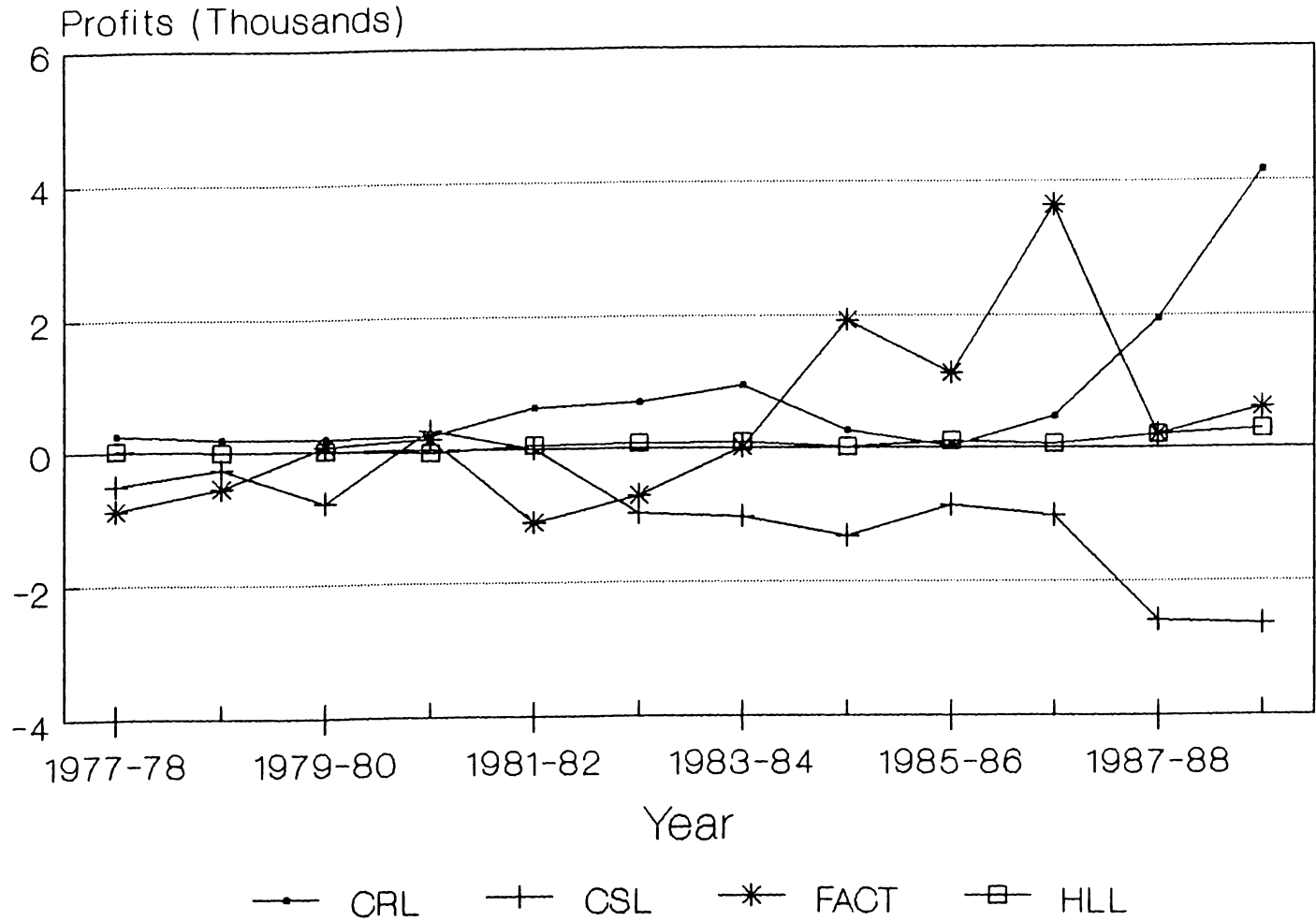


Table 6.10

Profitability of Travancore Cochin Chemicals Ltd.

Year	GPS	GPC	NPN	GNC	GMS	GMN	GPN	NPC
1977-78	-16.28	-9.52	-1531.16	4.55	7.78	-304.09	-636.74	-22.89
1978-79	1.73	1.25	-88.68	17.11	23.75	-120.56	-8.79	-12.58
1979-80	13.89	11.07	-3.42	24.05	30.18	-217.71	-100.20	0.38
1980-81	20.62	20.60	1555.02	28.95	28.98	4585.53	3262.68	9.82
1981-82	26.56	28.64	97.16	35.37	32.80	188.16	152.36	18.27
1982-83	25.23	26.59	44.73	30.68	29.11	87.63	75.93	15.66
1983-84	26.80	24.42	28.23	28.36	31.12	61.45	52.91	13.03
1984-85	13.10	16.56	12.98	23.86	18.88	46.93	32.57	6.60
1985-86	14.51	20.72	25.45	26.86	18.81	49.92	38.51	13.69
1986-87	-1.07	-1.25	-14.77	4.78	4.10	8.84	-2.30	-7.99
1987-88	11.19	17.42	18.42	23.61	15.16	34.56	25.51	12.58
1988-89	13.43	25.76	22.50	29.99	15.63	37.24	31.99	18.11
First	11.96	13.10	12.28	23.45	25.43	703.16	457.54	1.44
Second	12.99	17.27	15.47	22.91	17.28	39.82	29.86	9.34
Average	12.48	15.19	13.87	23.18	21.36	371.49	243.70	5.39

functional relation is made in the following equation:

$$P = f(K/O, K/L, CU)$$

where K/O is capital output ratio.

K/L is capital labour ratio.

CU is capacity utilisation rates

P is profitability.

Based on the functional relation the following econometric model is fitted.

$$P = \alpha + \beta_1 K/O + \beta_2 K/L + \beta_3 CU + \mu.$$

where α is constant.

β is coefficient

μ is the error term.

The estimated values of the model for FACT, TCC, HLL and CRL are given below. Since the capacity utilisation data based on installed capacity method for CSL is available only for 7 years, that company is excluded from regression analysis, because fitting of a meaningful regression equation requires time series data for at least 10 years.

1. FACT	$P = 18.52 - 5.43 K/O + 5.34 K/L + .07 CU$	$R^2 = .54$
2. TCC	$P = 8.64 - 12.71 K/O + 50.43 K/L + .02 CU$	$R^2 = .64$
3. HLL	$P = 17.8 + 8.4 K/O + 115.1 K/L + .6 CU$	$R^2 = .67$
4. CRL	$P = 37 + 3.5 K/O + .26 K/L + .03 CU$	$R^2 = .65$

From the estimated values it is clear that there is significant relationship among profitability and the variables capital-output ratio, capital-labour ratio and capacity utilisation. Except in the case of TCC, profitability and capacity utilisation are positively related. This means that there is scope for improving the profitability of public enterprises by increasing capacity utilisation.

In sum the central public sector enterprises in India show a low profile on the profitability front. During the period of analysis these enterprises made net profits only from 1981-82 onwards. During the period in which these enterprises have earned profits, profitability as percentage of gross margin to capital employed ranged between 12.34 per cent and 20.3 per cent. On an average it was 17.2 per cent. But profitability as percentage of net profit to capital employed was very low. On an average it was only 1.61 per cent.

Among the selected enterprises in Kerala CRL alone have been continuously making profits during the period of analysis. The annual average growth rate of profit of CRL was 16.16 per cent at current prices and 8.53 per cent at constant prices. CSL could achieve profit only during 1980-81 and 1981-82. The annual average growth rate of profit of CSL is negative during the period of analysis. FACT incurred loss during four years of the first half of the period of analysis and during the second half of the period it has been continuously making profits. On an average, profit increased at the rate of more than 50 per cent per annum.

HLL was running at a loss for three years consecutively before 1981-82 and its profit-making was stable for the remaining period. At constant prices its profit increased at the rate of approximately 30 per cent per annum. TCC had been steady in making profit from 1979-80 onwards except during the year 1986-87. At constant prices the annual growth rate of profit of TCC was 25.47 per cent.

Among the various financial ratios estimated, the ratio of gross margin to capital employed is taken as the key financial ratio for profitability analysis. CRL shows higher profitability than the central public sector enterprises in India as a whole. But CSL showed negative profitability during the period of analysis. While FACT showed profitability which is less than the national average, HLL's profitability is higher than the national average. TCC also showed higher profitability than that of the national average. Thus a comparison of profitability of the four central public sector enterprises in Kerala shows that HLL stands first, CRL second, FACT third and CSL fourth in the descending order. The comparison of profitability between FACT and TCC shows that the profitability position of TCC is better than that of FACT.

From the regression analysis it is clear that there is significant relationship between profitability and capacity utilisation except in the case of TCC. This implies that there is scope for improving the profitability of the enterprises by increasing the capacity utilisation.

Chapter 7

PRODUCTIVITY OF CENTRAL PUBLIC SECTOR ENTERPRISES IN KERALA

In this chapter productivity is analysed by partial and total factor productivity indices. Partial productivity indices include labour productivity and capital productivity indices. Total factor productivity indices include Kendrick, Solow and Translog indices.

In the beginning productivity of the central public sector enterprises in India is analysed to get an idea of the level of productivity of public enterprises in the national level and then productivity of selected CPSEs in Kerala is analysed to know whether the central public sector enterprises in Kerala are performing differently. An attempt is also made to compare the central public sector enterprises in Kerala with the TCC, a state level public sector enterprise.

At the end of this chapter Cobb-Douglas production function is fitted to estimate the coefficients of inputs, their marginal productivities and share in total output and degree of returns to scale.

Table 7.1 gives the productivity indices of central public sector enterprises for the period between 1977-78 and 1988-89. The partial productivity indices, i.e. labour productivity and capital productivity indices show that while the

Table 7.1
Productivity Indices of CPSEs in India
(from 1977-78 to 1988-89)

Year	Partial Productivity		Total Factor Productivity		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100.00	100.00	100	100	100
1978-79	112.72	102.50	109	109	109
1979-80	102.35	98.08	101	101	101
1980-81	98.37	98.65	98	98	98
1981-82	125.58	120.64	123	124	124
1982-83	146.68	120.70	133	138	135
1983-84	152.34	115.50	133	139	135
1984-85	162.16	109.78	135	143	136
1985-86	165.36	100.99	131	141	133
1986-87	182.19	100.36	137	150	139
1987-88	184.31	90.48	131	146	133
1988-89	209.46	93.71	142	161	144
Average 1977-78 to 1982-83	114.28	106.76	111	112	111
Average 1983-84 to 1988-89	175.97	101.80	135	146	137
Average 1977-78 to 1988-89	145.13	104.28	123	129	124

Source: Computed from Public Enterprises Survey (various issues)
BPE, Government of India, New Delhi.

former increased significantly during the period under consideration, the latter showed a slight decline. The average of the indices of labour productivity for the first half of the period (from 1977-78 to 1982-83) was 114.28 and for the second half of the period (from 1983-84 to 1988-89) it increased to 175.97 making the average 145.13 for both the periods.

The average of the indices of capital productivity was 106.76 for the first half of the period and it showed a slight decline to 101.80 for the second half of the period. The average for both the periods came to 104.28. The compound annual rate of growth (CARG) of labour productivity was 6.99 per cent and that of capital productivity was only -.66 per cent. Because of the increase in capital intensity over time for almost all the industries labour in most of the industries had more and better machines to work with. So there is a significant positive trend of growth in labour productivity in most of the industries, while the trend in capital productivity was dominantly downward. However, as mentioned earlier, partial productivity has the limitations that it does not measure the overall productive efficiency due to the influence of substitution effect.

In order to measure the overall productive efficiency, total factor productivity measures such as Kendrick measure, Solow measure and Translog measure are given in table 7.2. The estimate of total factor productivity growth is derived by finding out the difference between the growth of value added and the weighted sum of the growth of labour and capital, the weights being the

Table 7.2

Total Factor Productivity of CPSEs in India
(from 1977-78 to 1988-89)

Year	No of Enterprises	Total Factor Productivity Growth		
		Solow	Kendrick	Translog
1977-78	155	-0.0444	-0.0950	-0.0456
1978-79	159	0.0861	0.0357	0.0887
1979-80	169	-0.0808	-0.0500	-0.0819
1980-81	168	-0.0279	0.0007	-0.0248
1981-82	188	0.2272	0.2061	0.2255
1982-83	193	0.0819	0.0181	0.0834
1983-84	201	0.0005	-0.0348	0.0008
1984-85	207	0.0116	-0.0378	0.0103
1985-86	211	-0.0291	-0.0717	-0.0303
1986-87	214	0.0461	0.0059	0.0465
1987-88	221	-0.0444	-0.0905	-0.0450
1988-89	222	0.0819	0.0459	0.1038

Average 1977-78				
to 1982-83		0.0404	0.0194	0.0409
Average 1983-84				
to 1988-89		0.0111	-0.0305	0.0143
Average 1977-78				
to 1988-89		0.0257	-0.0056	0.0276

respective factor shares. TFPG is designed as the difference between the rates of growth of output and the rates of growth in inputs.

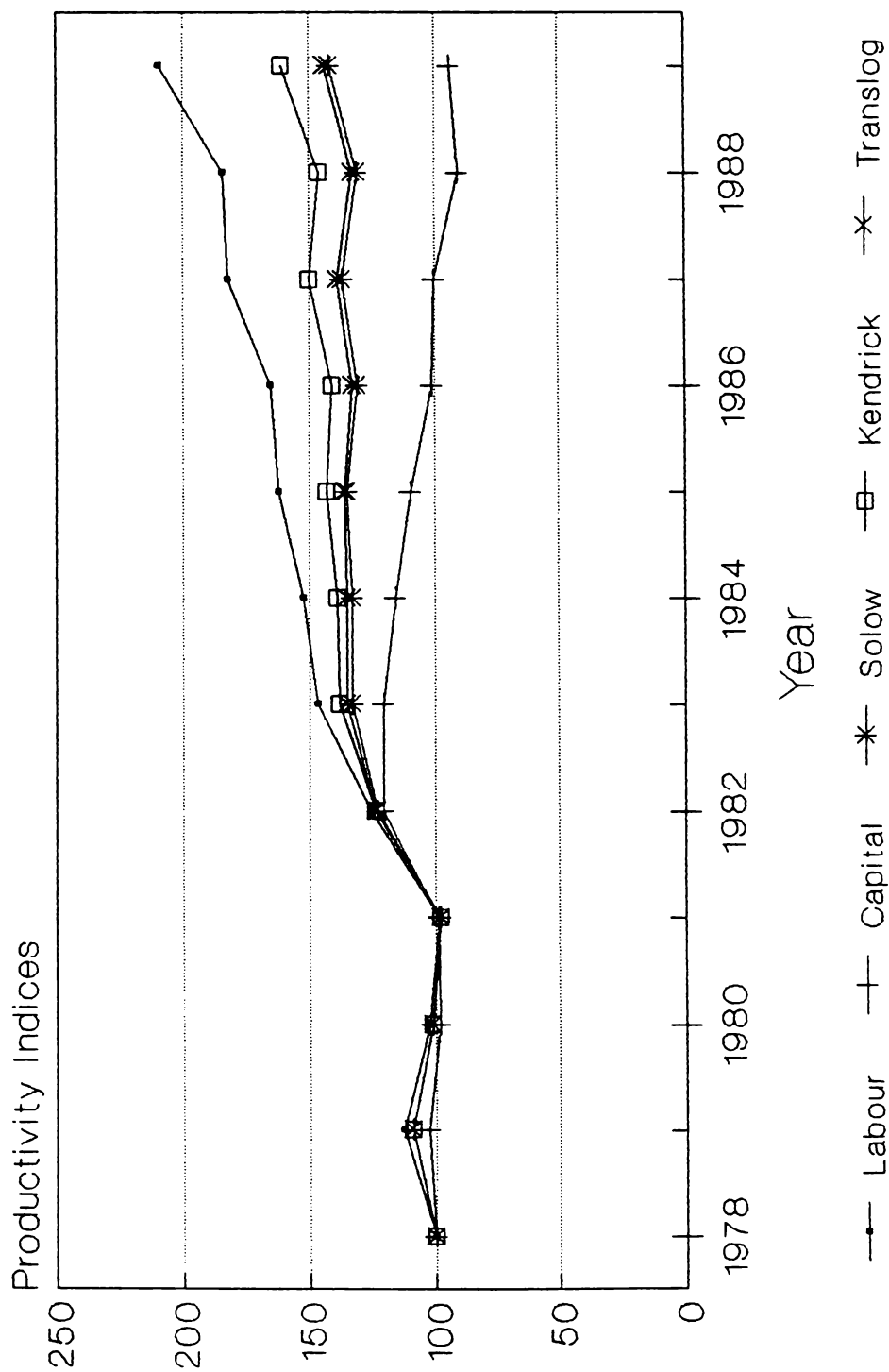
From table 7.2 it is clear that TFPG measures like Solow, Kendrick and Translog showed fluctuations in the total factor productivity. The average of both Solow measure and Translog measure for the period of analysis was approximately 0.03, while the average for Kendrick measure was negative and near to zero. Thus, on the whole, while labour productivity showed a clear increasing trend, capital productivity showed a declining trend and total factor productivity growth showed a stagnating tendency (see figure 7.1)

But the total factor productivity indices are on the increase. The Kendrick, Solow and Translog indices increased to 161, 142 and 144 respectively in the year 1988-89. Thus, even though the total factor productivity growth showed a stagnating tendency the total factor productivity indices were increasing in the case of central public sector enterprises in India. The growth rates of productivity estimated by fitting an exponential trend for Kendrick, Solow and Translog indices are 4.14, 3.28 and 3.44 per cent respectively during the period of analysis.

Productivity of selected CPSES in Kerala

Productivity indices of the selected central public sector enterprises in Kerala are analysed in the following.

**Figure 7.1 Productivity of CPSEs
in India (from 1978 to 1989)**



Cochin Refineries Ltd.

In CRL value added at constant prices increased from Rs.815 lakhs in 1977-78 to Rs. 2297 lakhs in 1988-89 showing an increase of Rs.1483 lakhs over the 12 year period. The exponential trend rate of growth was 11.76 per cent per annum. At current prices it increased from Rs.1458 lakhs in 1977-78 to Rs.9511 lakhs in 1988-89 showing an increase of Rs. 8053 lakhs over the period mentioned above. Exponential trend rate of growth was 19.33 per cent per annum which is much higher than that at the constant prices. Similarly fixed cost at constant prices increased from Rs.1809 lakhs in 1977-78 to Rs. 5361 lakhs in 1988-89 showing an increase of Rs.3552 lakhs over the period of analysis. Exponential trend rate of growth was 13.71 per cent per annum. At current prices the increase was from Rs.3364 lakhs to Rs.23319 lakhs respectively showing an increase of Rs. 19955 lakhs over the period. The exponential trend rate of growth was 21.57 per cent per annum (see table 7.3). The company showed a lower growth rate of value added than that of fixed cost both at the constant and at the current prices.

The productivity indices of Cochin Refineries Ltd. for the period between 1977-78 and 1988-89 is given in table 7.4. The partial productivity indices such as labour and capital productivity indices show that while the former increased significantly, the latter showed a marginal decline. However, during the first half of the time period labour productivity indices showed a declining trend and it plummeted to 19.23 in the

Table 7.3

Value Added and Gross Fixed Assets of Cochin Refineries Ltd.

(Rs.in lakhs)

Year	Value Added		Gross Fixed Assets	
	A	B	A	B
1977-78	814.53	1458	1808.73	3364.24
1978-79	521.23	933	1833.67	3410.62
1979-80	481.94	1041	1571.60	3426.09
1980-81	516.73	1328	1346.32	3460.04
1981-82	681.55	1847	1242.24	3490.70
1982-83	644.49	1753	1342.52	3879.89
1983-84	552.36	1635	1242.48	3926.25
1984-85	285.89	912	1980.87	6695.34
1985-86	1281.63	4396	5201.60	18621.74
1986-87	1847.63	6633	5752.78	21687.98
1987-88	1775.00	6816	5623.23	22774.08
1988-89	2297.34	9511	5360.71	23319.10
Growth rates	11.76	19.33	13.71	21.57

Source: Compiled and computed from the annual reports of the company

Note : 'A' refers to the value at constant prices

'B' refers to the value at current prices

Table 7.4

Productivity Indices of Cochin Refineries Ltd.

(from 1977-78 to 1988-89)

Year	Partial Productivity		Total Factor Productivity		
	-----		-----		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100.00	100.00	100	100	100
1978-79	60.99	63.14	63	63	63
1979-80	57.14	68.11	67	68	67
1980-81	65.38	85.23	83	84	83
1981-82	79.67	121.83	117	119	117
1982-83	69.23	106.62	102	104	102
1983-84	47.25	98.73	91	95	92
1984-85	19.23	32.05	31	31	31
1985-86	86.81	54.72	57	56	61
1986-87	103.85	71.33	74	73	80
1987-88	93.41	70.11	72	71	78
1988-89	113.19	95.18	97	96	105

Average 1977-78					
to 1982-83	72.07	90.82	89	90	88
Average 1983-84					
to 1988-89	77.29	70.35	70	70	74
Average 1977-78					
to 1988-89	74.68	80.59	79	80	81

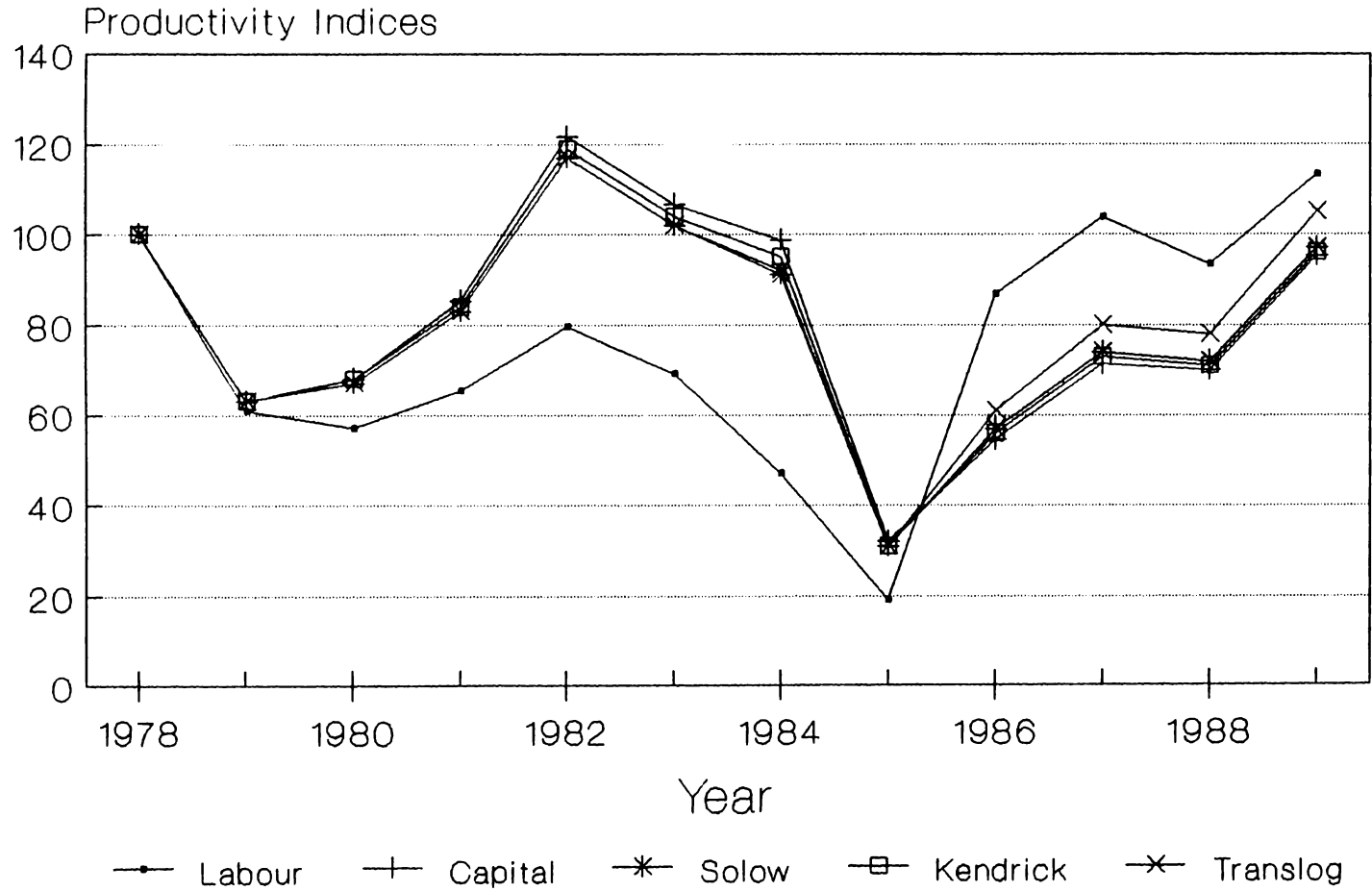
Source: Computed from the annual reports of the company.

year 1984-85. The average of the indices of labour productivity for the first half of the time period was 72.07. It increased to 77.29 for the second half of the time period. The average for the whole time period was 74.68.

Capital productivity indices took a serpentine course during the period under review. The average of the indices of capital productivity was 90.82 for the first half of the time period and it showed a decline to 70.35 for the second half of the time period. The average for both the periods came to 80.59. The labour productivity increased at the rate of 2.15 per cent per annum and capital productivity showed a negative growth of -1.95 per cent per annum.

The total factor productivity growth showed a diminishing trend during the period of analysis. The average of the indices of Kendrick measure for the first half of the period was 90 and it declined to 70. Similarly the Solow and Translog indices for the same period declined from 89 and 88 to 70 and 74 respectively. Thus, on the whole, we find a declining total factor productivity in the case of Cochin Refineries Ltd. It should be noted that in the year 1981-82 there was a sudden jump in the total factor productivity from 83-84 to 117-119. Then it plummeted to 31 in 1984-85. An encouraging change is that there is a recouping in the total factor productivity towards the reference year of the study (see figure 7.2). The exponential trend rate of growth of

Figure 7.2 Productivity of CRL
(from 1978 to 1989)



Kendrick, Solow and Translog indices are negative and they are -1.75, -1.54 and -0.67 respectively.

Cochin Shipyard Ltd.

In CSL value added at constant prices increased from approximately Rs.420 lakhs in 1977-78 to Rs.613 lakhs in 1988-89 showing an increase of Rs. 193 lakhs over the 12 year period. But during this period the exponential trend rate of growth was -0.61 per cent per annum. At current prices value added increased from Rs.751 lakhs in 1977-78 to Rs.2498 lakhs in 1988-89 showing an increase of Rs.1747 lakhs over the 12 year period. The exponential trend rate of growth of value added at current prices was 6.91 per cent per annum. Similarly fixed cost at constant prices increased from approximately Rs.2458 lakhs in 1977-78 to approximately Rs.2573 lakhs in 1988-89 showing an increase of only Rs.115 lakhs over the period. At current prices, however, the figures are approximately Rs.4572 lakhs, Rs.11193 lakhs and Rs.6621 lakhs respectively. The exponential trend growth rate was 7.55 per cent per annum (see table 7.5). It is to be noted that the growth rate of value added is lower than the growth rate of fixed cost in the enterprise.

Cochin Shipyard Ltd. showed a falling trend in both labour and capital productivity. The semi-average of labour productivity for the first period was 148.33 and it declined to 92.5 in the second half. The annual average for the whole period

Table 7.5

Value Added and Gross Fixed Assets of Cochin Shipyard Ltd.

(Rs.in lakhs)

Year	Value Added		Gross Fixed Assets	
	A	B	A	B
1977-78	419.55	751	2458.27	4572.38
1978-79	500.56	896	2795.10	5198.88
1979-80	599.54	1295	2898.66	6319.07
1980-81	889.88	2287	3627.55	9322.80
1981-82	869.37	2356	3488.99	9804.07
1982-83	768.75	2091	3565.49	10304.26
1983-84	281.76	834	3461.88	10939.55
1984-85	374.92	1196	3269.54	11051.06
1985-86	535.28	1836	3109.37	11131.54
1986-87	585.24	2101	2876.88	10845.83
1987-88	519.01	1993	2691.72	10901.46
1988-89	613.00	2498	2573.20	11193.41
Growth rates	-0.61	6.9	-0.31 (NS)	7.55

Source: Compiled and computed from the annual reports of the company

Note: (NS) means that the growth rate is not significant at 5 per cent level.

'A' refers to the value at constant prices

'B' refers to the value at current prices

was 120.42. The growth rate of labour productivity index was negative and it showed a conspicuous decline to the tune of -3.09 per cent per annum.

In the case of capital productivity a similar decline is seen from 123.68 to 97.52 and the annual average for the whole period was 110.60. The growth rate of capital productivity indices was negative to the tune of -.36 per cent per annum (see table 7.6).

However the total factor productivity indices show ups and downs during the period of analysis. The first peak is seen during the period 1980-81, when it increased to 155-157 range. Then it gradually declined leading to a steep fall in the year 1983-84. It came down to 48-50 range. Next peak is seen in the end year of the study. If we take the semi-averages of the indices for comparison there is a declining trend in total factor productivity. This is because the first peak was higher than the second peak in total factor productivity indices. All the indices showed a negative growth (see figure 7.3 also). The growth rates of total factor productivity indices of Kendrick, Solow and Translog were -1.11, -2.03 and -1.88 respectively.

Fertilisers and Chemicals Travancore Ltd.

In FACT value added at constant prices increased from approximately Rs.1167 lakhs in 1977-78 to approximately Rs.3418

Table 7.6

Productivity Indices of Cochin Shipyard Ltd.

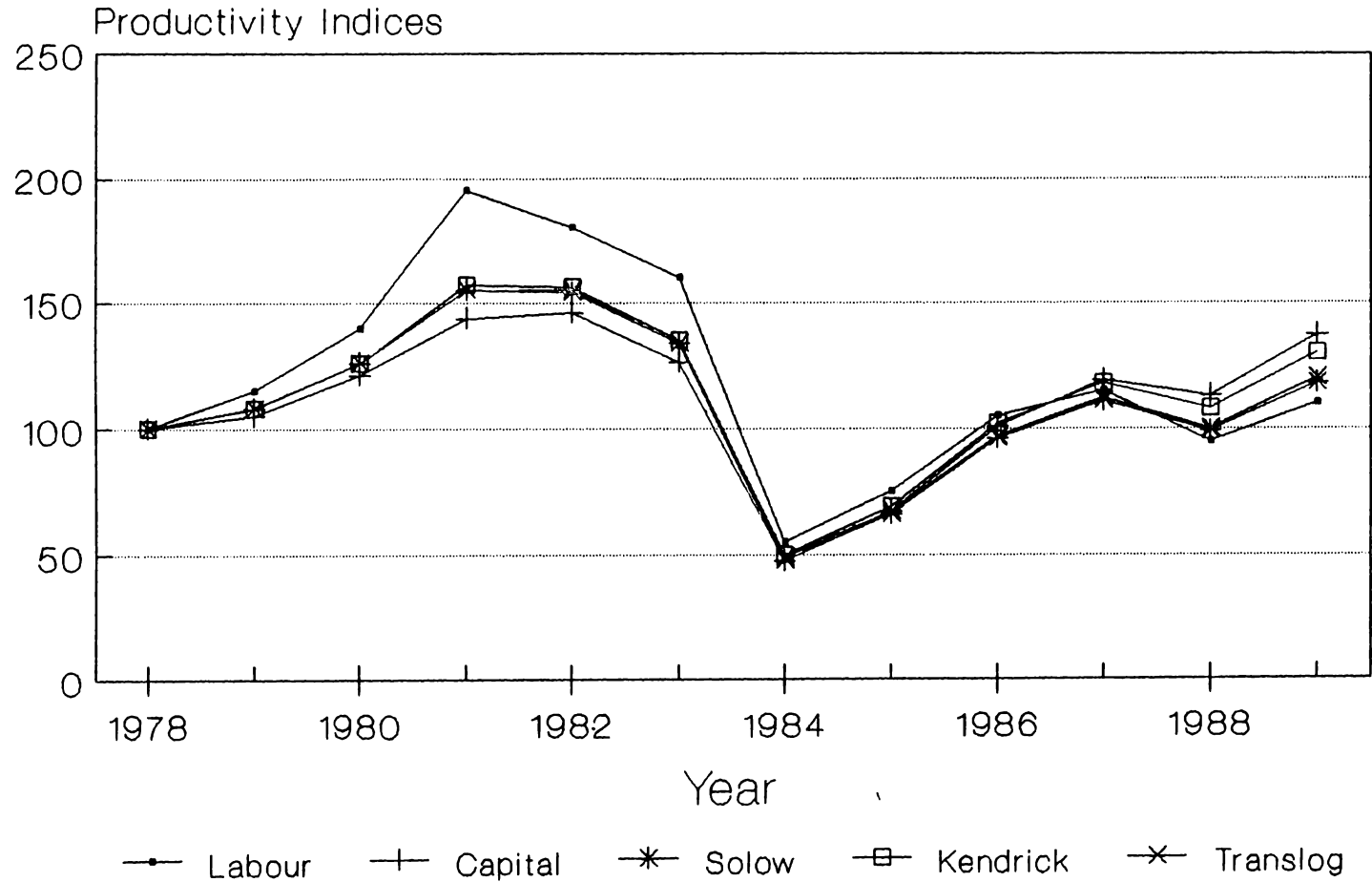
(from 1977-78 to 1988-89)

Year	Partial Productivity		Total Factor Productivity		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100	100.00	100	100	100
1978-79	115	104.92	108	108	108
1979-80	140	121.15	126	126	126
1980-81	195	143.70	155	157	155
1981-82	180	145.99	154	156	155
1982-83	160	126.30	134	135	134
1983-84	55	47.69	48	50	49
1984-85	75	67.19	66	69	67
1985-86	105	100.88	96	102	97
1986-87	115	119.16	111	118	112
1987-88	95	112.95	99	108	100
1988-89	110	137.26	118	130	120
Average 1977-78 to 1982-83	148.33	123.68	129	130	130
Average 1983-84 to 1988-89	92.50	97.52	90	96	91
Average 1977-78 to 1988-89	120.42	110.60	110	113	110

Source: Computed from the annual reports of the company.

Figure 7.3 Productivity of CSL
(from 1978 to 1989)

223



lakhs in 1988-89 showing an increase of Rs.2251 lakhs over the period. During this period the growth rate was 7.67 per cent per annum. At current prices it increased from Rs.2089 lakhs in 1977-78 to Rs.14151 lakhs in 1988-89 showing an increase of Rs.12062 lakhs over the period. At current prices the growth rate was 15.25 per cent per annum. Fixed cost at constant prices increased from approximately Rs.5193 lakhs in 1977-78 to approximately Rs. 5293 lakhs in 1988-89 showing a marginal increase of Rs.100 lakhs over the period. At current prices it increased from approximately Rs.9659 lakhs in 1977-78 to approximately Rs.23026 lakhs in 1988-89 showing an increase of Rs.13367 lakhs over the period. The exponential trend rate of growth was 6.93 per cent per annum. This company also showed a higher rate of growth of value added than that of fixed cost (see table 7.7).

In FACT both the labour and the capital productivity showed an increasing trend. If we compare the semi-averages for labour and capital productivity the increase was more prominent in labour productivity than in capital productivity. The semi-averages increased from 175.49 to 247.06 in the case of former and from 170.86 to 285.97 in the case of latter. The growth rate of capital productivity was 8.61 per cent and that of labour was 6.11 per cent per annum (see table 7.8)

But the total factor productivity growth showed uniformly a declining trend during the period. They declined from 0.14 to 0.06 from the first period to the second period and the

Table 7.7

Value Added and Gross Fixed Assets of FACT Ltd.

(Rs. in lakhs)

Year	Value Added		Gross Fixed Assets	
	A	B	A	B
1977-78	1167.04	2089	5193.07	9659.11
1978-79	1948.04	3487	5405.63	10054.47
1979-80	2718.52	5872	6584.06	14353.26
1980-81	2476.26	6364	5835.87	14998.19
1981-82	2422.14	6564	5606.31	15753.72
1982-83	2507.35	6820	5581.75	16131.26
1983-84	2718.58	8047	5404.46	17078.09
1984-85	3508.46	11192	5220.26	17644.48
1985-86	3448.98	11830	5143.59	18414.05
1986-87	3515.32	12620	5202.89	19614.90
1987-88	3577.08	13736	5195.63	21042.32
1988-89	3418.12	14151	5293.26	23025.69
Growth rates	7.67	15.25	-0.93 (NS)	6.9

Source: Compiled and computed from the annual reports of the company

Note: (NS) means that the growth rate is not significant at 5 per cent level.

'A' refers to the value at constant prices

'B' refers to the value at current prices

Table 7.8

Productivity Indices of Fertilisers and Chemicals Travancore Ltd.
(from 1977-78 to 1988-89)

Year	Partial Productivity		Total Factor Productivity		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100.00	100.00	100	100	100
1978-79	158.82	160.39	161	162	161
1979-80	217.65	183.76	191	198	192
1980-81	200.00	188.83	191	194	192
1981-82	182.35	192.26	191	191	192
1982-83	194.12	199.91	199	199	200
1983-84	205.88	223.85	220	219	222
1984-85	264.71	299.11	292	286	294
1985-86	258.82	298.40	291	285	293
1986-87	258.82	300.67	292	286	294
1987-88	258.82	306.41	296	288	298
1988-89	235.29	287.36	277	269	279
Average 1977-78 to 1982-83	175.49	170.86	129	174	173
Average 1983-84 to 1988-89	247.06	285.97	278	272	280
Average 1977-78 to 1988-89	211.27	228.41	225	223	226

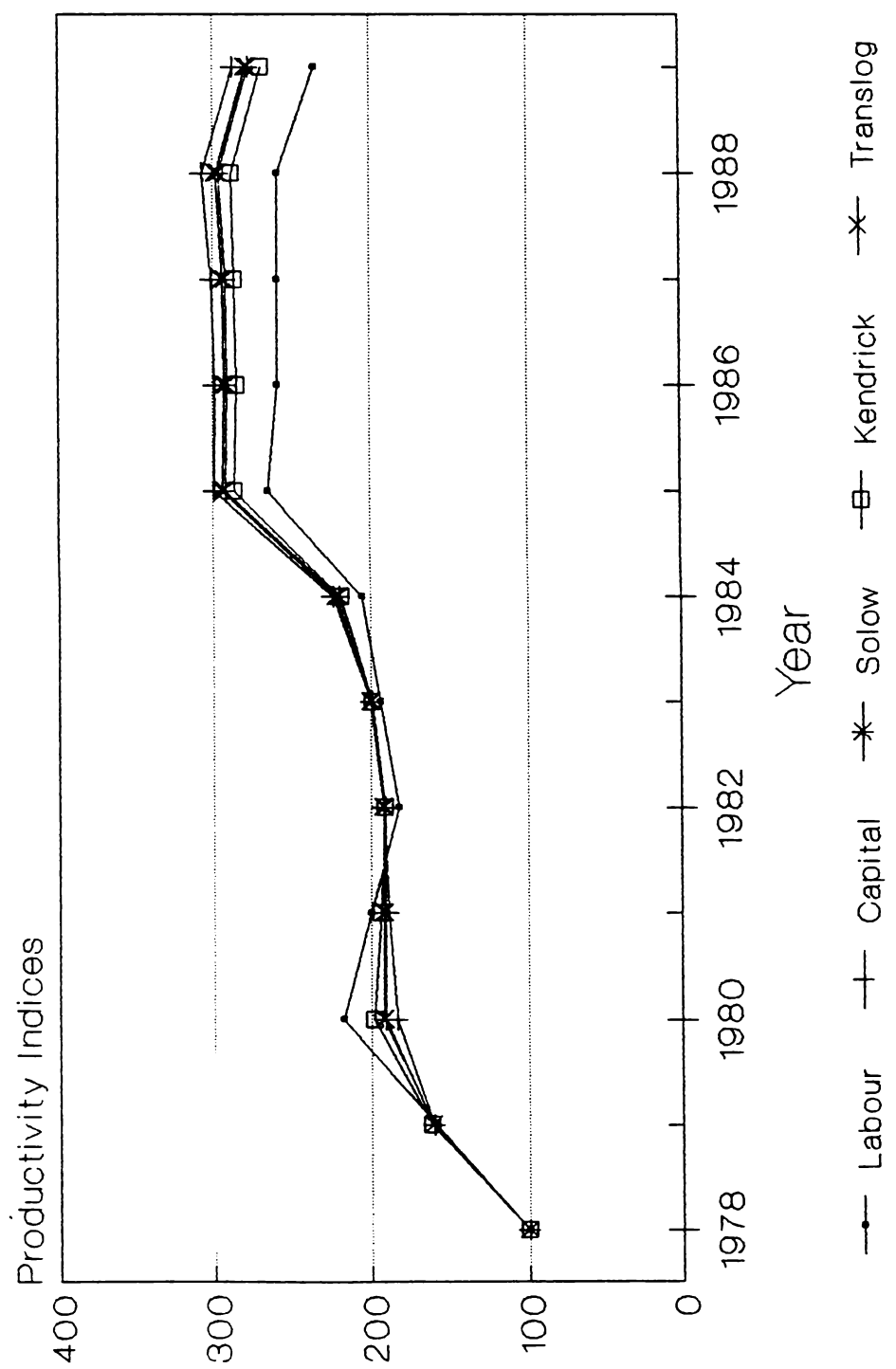
Source: Computed from the annual reports of the company.

annual average for the whole period was 0.09. However the total factor productivity indices showed a marked increase (see figure 7.4). In all the cases these indices were more than doubled. The semi-averages increased from 174 to 272, from 172 to 278 and from 173 to 280 respectively in the case of Kendrick, Solow and Translog measures. The growth rates of Kendrick, Solow and Translog indices were 7.65, 8.09 and 8.15 respectively.

Hindustan Latex Ltd.

In HLL value added at constant prices increased from approximately Rs.67 lakhs in 1977-78 to approximately Rs.367 lakhs in 1988-89 showing an increase of Rs.300 lakhs over the period of analysis. The exponential trend rate of growth was 19.13 per cent per annum. At current prices it increased from Rs. 120 lakhs in 1977-78 to approximately Rs.1520 lakhs in 1988-89 showing an increase of Rs.1400 lakhs over the 12 year period and the growth rate was 26.7 per cent per annum. Fixed cost at constant prices increased from approximately 145 lakhs in 1977-78 to approximately Rs.512 lakhs over the period. The growth rate of fixed cost was 14.6 per cent per annum. At current prices it increased from approximately Rs.270 lakhs to approximately Rs.2859 lakhs showing an increase of Rs. 2589 lakhs over the period. At current prices the growth rate of fixed cost was 22.47 per cent per annum. The company showed a higher rate of growth of value added than that of the fixed cost both at the current prices and at the constant

**Figure 7.4 Productivity of FACT Ltd.
(from 1978 to 1989)**



prices (see table 7.9).

HLL also showed a similar trend in the case of labour and capital productivity. The respective semi-averages increased from 98.15 to 220.37 in the case of labour productivity and from 118.02 to 175.00 in the case of capital productivity. Thus labour productivity has more than doubled and capital productivity showed approximately 50 per cent growth when we take the semi-averages. The growth rates of labour and capital productivity are 13.61 and 4.52 per cent respectively.

However the total factor productivity growth showed a declining trend during the period of analysis (see figure 7.5). The semi-averages showed significant variations and the annual average for the whole period is approximately 0.03. Now let us examine the case of total factor productivity indices. The corresponding total factor productivity indices show an increasing trend (see table 7.10). The semi-averages of Kendrick, Solow and Translog indices show an increase from 106, 97.8 and 98 to 190, 148.5 and 152 respectively and the averages of the semi-averages are 148, 123.2 and 125 respectively. The growth rates of total factor productivity indices estimated by exponential trend method are 6.08, 9.69 and 6.52 respectively.

Travancore Cochin Chemicals Ltd.

In TCC value added at constant prices increased from approximately Rs.251 lakhs in 1977-78 to approximately Rs.591

Table 7.9

Value Added and Gross Fixed Assets of Hindustan Latex Ltd.

(Rs. in lakhs)

Year	Value Added		Gross Fixed Assets	
	A	B	A	B
1977-78	67.04	120.00	144.95	269.61
1978-79	61.45	110.00	151.41	281.62
1979-80	50.46	109.00	134.18	292.51
1980-81	22.57	58.00	114.90	295.30
1981-82	86.35	234.00	107.50	302.07
1982-83	111.40	303.00	108.07	312.31
1983-84	114.19	338.00	113.75	359.46
1984-85	125.20	399.39	110.06	372.01
1985-86	150.83	517.33	110.89	396.99
1986-87	203.58	730.85	709.61	2675.23
1987-88	347.48	1334.31	682.54	2764.29
1988-89	367.07	1519.68	657.22	2858.91
Growth rates	19.13	26.70	14.60	22.47

Source: Compiled and computed from the annual reports of the company

Note : 'A' refers to the value at constant prices

'B' refers to the value at current prices

**Figure 7.5 Productivity of HLL
(from 1978 to 1989)**

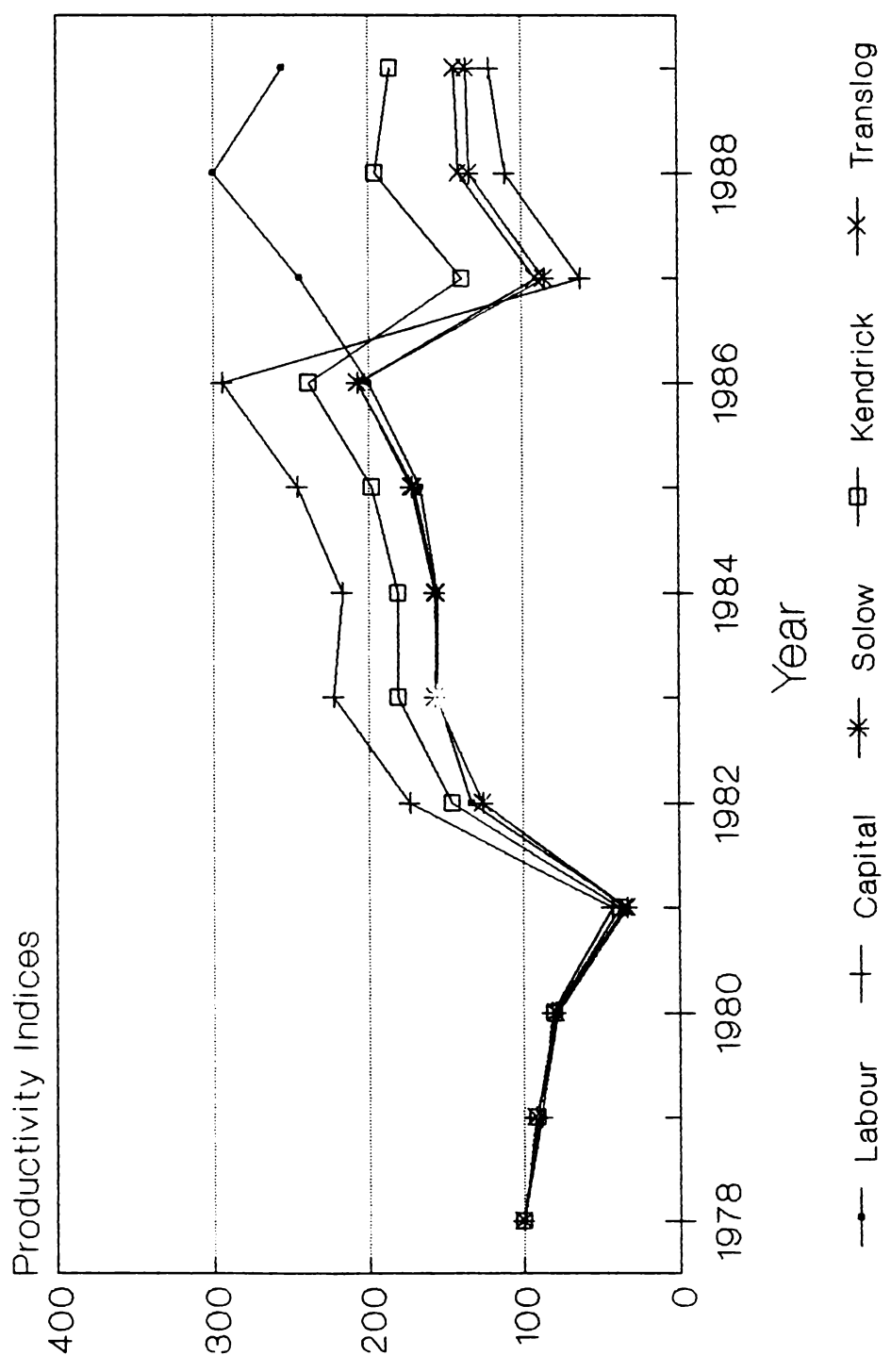


Table 7.10

Productivity Indices of Hindustan Latex Ltd.

(from 1977-78 to 1988-89)

Year	Partial Productivity		Total Factor Productivity		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100.00	100.00	100	100	100
1978-79	88.89	87.76	92	91	92
1979-80	77.78	81.32	79	80	79
1980-81	33.33	42.46	33	38	35
1981-82	133.33	173.69	126	146	126
1982-83	155.56	222.88	157	181	157
1983-84	155.56	217.06	157	181	156
1984-85	166.67	245.97	172	198	171
1985-86	200.00	294.10	207	239	207
1986-87	244.44	62.03	85	139	91
1987-88	300.00	110.08	134	196	141
1988-89	255.56	120.76	136	186	144
Average 1977-78 to 1982-83	98.15	118.02	97.8	106	98
Average 1983-84 to 1988-89	220.37	175.00	148.5	190	152
Average 1977-78 to 1988-89	159.26	146.51	123.2	148	125

Source: Computed from the annual reports of the company.

lakhs in 1988-89 showing an increase of Rs.340 lakhs over the period. The growth rate of value added was 4.97 per cent per annum. At current prices it increased from Rs.450 lakhs in 1977-78 to Rs.2448 lakhs in 1988-89 showing an increase of 1998 lakhs over the period. At current prices growth rate was 12.54 per cent per annum. Fixed cost at constant prices decreased from approximately Rs.1349 lakhs in 1977-78 to approximately Rs.738 lakhs in 1988-89 showing a reduction to the tune of Rs.611 lakhs over the period. However, at current prices it increased from Rs.2171 lakhs in 1977-78 to approximately Rs.2998 lakhs in 1988-89 showing an increase of Rs.827 lakhs over the period. The growth rate was 2.48 per cent per annum. TCC also showed a higher rate of growth of value added than that of fixed cost both at the current as well as at the constant prices (see table 7.11).

In TCC labour productivity has doubled and capital productivity has more than trebled. The semi-average of labour productivity indices has increased to 200.97 from 170.01. The semi-average of capital productivity has increased to 372.64 from 206.94. The growth rates of labour and capital productivity are 4.56 per cent and 11.58 per cent respectively (see figure 7.6)

Total factor productivity is highest in TCC among the enterprises under study. The total factor productivity indices showed a remarkably increasing trend (see table 7.12). The semi-averages of Solow, Kendrick and Translog indices increased from 198, 192 and 197 to 330, 296 and 328 respectively and the

Table 7.11

Value Added and Gross Fixed Assets of TCC Ltd.

(Rs.in lakhs)

Year	Value Added		Gross Fixed Assets	
	A	B	A	B
1977-78	251.40	450	1348.73	2171.45
1978-79	336.31	602	1284.70	2171.14
1979-80	415.28	897	1195.01	2210.76
1980-81	467.32	1201	1080.98	2226.81
1981-82	564.95	1531	997.85	2324.99
1982-83	491.54	1337	944.93	2371.77
1983-84	438.51	1298	820.48	2436.81
1984-85	516.30	1647	783.73	2507.93
1985-86	619.24	2124	774.65	2595.08
1986-87	449.03	1612	686.17	2531.98
1987-88	481.25	1848	668.55	2587.29
1988-89	591.30	2448	738.46	2998.16
Growth rates	4.97	12.54	-6.6	2.48

Source: Compiled and computed from the annual reports of the company

Note : 'A' refers to the value at constant prices

'B' refers to the value at current prices

Figure 7.6 Productivity of TCC Ltd.
(from 1978 to 1989)

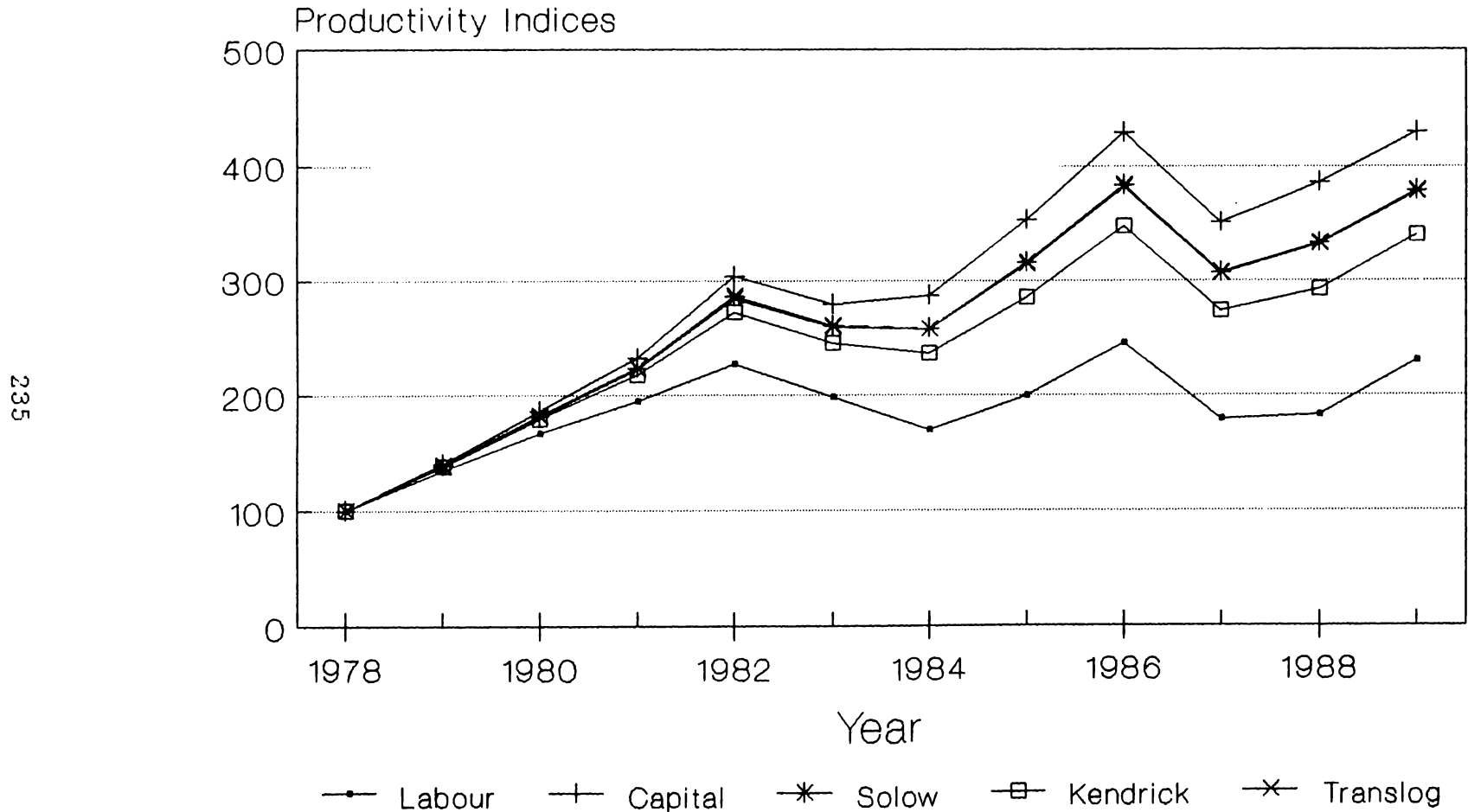


Table 7.12

Productivity Indices of Travancore Cochin Chemicals Ltd.

Year	Partial Productivity		Total Factor Productivity		
	Labour	Capital	Solow	Kendrick	Translog
1977-78	100.00	100.00	100	100	100
1978-79	134.41	140.45	139	138	138
1979-80	167.05	186.43	182	179	181
1980-81	194.51	231.93	223	217	222
1981-82	226.20	303.73	286	272	284
1982-83	197.91	279.07	260	245	259
1983-84	169.90	286.73	258	236	257
1984-85	199.14	353.42	316	285	314
1985-86	244.98	428.85	384	348	382
1986-87	179.45	351.07	307	273	306
1987-88	182.84	386.18	333	292	332
1988-89	229.51	429.57	379	340	378
Average 1977-78 to 1982-83	170.01	206.94	198	192	197
Average 1983-84 to 1988-89	200.97	372.64	330	296	328
Average 1977-78 to 1988-89	185.49	289.79	264	244	263

Source: Computed from the annual reports of the company.

averages of the semi-averages are 264, 244 and 263 respectively. The growth rates of total factor productivity indices estimated by exponential trend method are 10.21, 8.96 and 10.21 per cent for Solow, Kendrick and Translog respectively.

Thus among the central public sector enterprises under study, all the enterprises, except CSL, show an increasing labour productivity. The highest rate of growth of labour productivity is accorded to HLL. This growth rate is almost the double of the growth rate of labour productivity of central public sector enterprises in the national level. FACT also kept almost the same pace of growth as in the national level. Labour productivity of CSL showed a negative growth rate. But the growth rate of labour productivity of TCC is less than that of HLL and the central public sector enterprises in general.

But capital productivity depicts a different picture. Here TCC shows the highest rate of growth and among the central public sector enterprises under study FACT and HLL alone are showing positive growth rates. Among them FACT show the highest rate of growth. CRL and CSL are showing negative growth rates.

Total factor productivity is highest in TCC among the enterprises under study. Among the central public sector enterprises under study only FACT and HLL show positive growth rates and they are more or less on the same footing, if we compare

the growth rates of total factor productivity. The remaining two show negative growth rates.

Capital intensity of the enterprises is declining except in the case of CRL and CSL (vide table 7.13). The increasing capital intensity in CRL and CSL may be one of the reasons for declining capital productivity as is evident if we compare the semi-averages of the capital productivity indices. While in FACT, HLL and TCC we see a declining trend in the capital productivity, the growth rates of capital output ratios are 2.51, 0.31, -8.6, -4.49 and -11.57 for CRL, CSL, FACT, HLL and TCC respectively during the period of analysis. On an average the capital output ratio of CRL, CSL, FACT, HLL and TCC are 3.39, 5.84, 2.17, 2.04 and 2.24 respectively. Thus it is clear that CSL is the most capital-intensive enterprise and HLL is the least capital-intensive enterprise among the enterprises under study.

The capital labour ratio is the highest in CRL and the lowest in HLL. Except in the case of CRL and HLL, in all other cases capital labour ratio is declining. It shows that more and more capital is required to employ an additional labour in CRL and HLL. The increasing labour productivity of these enterprises may be due to the increasing capital labour ratio. On the other hand there is a declining trend in labour productivity in CSL which may be due to the declining capital labour ratio. The growth rates of capital labour ratios estimated by exponential trend method are

Table 7.13

Capital Intensity of CPSEs in Kerala

Year	CRL	CSL	FACT	HLL	TCC
1977-78	2.40	5.86	4.45	2.16	5.36
1978-79	3.80	5.58	2.77	2.46	3.82
1979-80	3.32	4.83	2.42	2.66	2.88
1980-81	2.61	4.08	2.36	5.09	2.31
1981-82	1.96	4.01	2.31	1.24	1.77
1982-83	2.35	4.64	2.23	0.97	1.92
1983-84	2.56	12.29	1.99	1.00	1.87
1984-85	7.78	8.72	1.49	0.88	1.52
1985-86	4.42	5.81	1.49	0.74	1.25
1986-87	3.43	4.92	1.48	3.49	1.53
1987-88	3.52	5.19	1.45	1.96	1.39
1988-89	2.58	4.20	1.55	1.79	1.25
Avg. 77-78 to 82-83	2.74	4.83	2.76	2.43	3.01
Avg. 83-84 to 88-89	4.05	6.85	1.58	1.64	1.47
Avg. 77-78 to 88-89	3.39	5.84	2.17	2.04	2.24

4.35, -2.64, -2.43, 8.71 and -7.01 respectively during the period of analysis. Except in the case of CSL, in all other enterprises labour productivity is increasing. This is a clear indication of inefficiency in CSL. On an average, capital labour ratios of CRL, CSL, FACT, HLL and TCC are 4.05, 1.28, 0.71, 0.26 and 0.87 respectively (vide table 7.14).

Cobb-Douglas Production Function

The objective of applying Cobb-Douglas production function is to estimate the co-efficients of inputs, their marginal productivities and shares in total output and degree of returns to scale. It is based on unitary elasticity of substitution of inputs incorporated in the equation of the production function. This production function has been widely applied in studies on industries to estimate technological relationship between output and its inputs because of relative ease in its computation and interpretation. Here the production function is fitted to five companies under study.

Initially the following equation is applied to monetary data on output and inputs for estimating the Cobb-Douglas Production function.

$$Y = \eta K^{\alpha} . L^{\beta}$$

where Y = value added, K = fixed capital, L = wages, η =

Table 7.14

Capital-Labour Ratios of CPSEs in Kerala

Year	CRL	CSL	FACT	HLL	TCC
1977-78	4.21	1.17	0.74	0.19	1.24
1978-79	4.07	1.31	0.75	0.21	1.19
1979-80	3.42	1.35	0.89	0.19	1.11
1980-81	3.11	1.59	0.79	0.16	1.04
1981-82	2.74	1.46	0.73	0.14	0.93
1982-83	2.79	1.47	0.73	0.14	0.88
1983-84	2.07	1.36	0.70	0.14	0.74
1984-85	2.54	1.29	0.66	0.13	0.70
1985-86	6.69	1.22	0.66	0.14	0.71
1986-87	6.17	1.14	0.65	0.78	0.64
1987-88	5.69	1.00	0.63	0.48	0.59
1988-89	5.05	0.96	0.62	0.41	0.66
Avg. 77-78 to 82-83	3.39	1.39	0.77	0.17	1.07
Avg. 83-84 to 88-89	4.70	1.16	0.65	0.35	0.67
Avg. 77-78 to 88-89	4.05	1.28	0.71	0.26	0.87

efficiency parameter, α = coefficient of capital and β = coefficient of labour. The logarithm of both the sides of the above equation was taken to convert the equation in linear form. Its log transformation is specified as:

$$\log Y = \log \eta + \alpha \log K + \beta \log L$$

The efficiency parameter η and the co-efficients of the inputs were estimated by Ordinary Least Square method.

The estimated co-efficients of capital and labour, the sum of these coefficients indicating the degrees of returns to scale and shares of the above two factors in the output of the industries for the period 1977-78 to 1988-89 are given in table 7.15.

It is observed that the estimated coefficients are negative in two cases. The negative coefficients imply inverse relationship between input and output, that is, increase in the use of an input results in the decrease of output. It amounts to diminishing returns to increasing use of the input. Such a result is found in HLL and TCC in which the value of the coefficient of capital, that is α , comes out to be negative. The effect of the negative value of this coefficient is also observed in its share in output. It turns out to be negative which implies that the share of capital declines as its quantity increases. This appears logical as the above enterprises in which the value of the

Table 7.15

Estimates of Cobb-Douglas Production Function

Company	Estimated Coefficients			Sum of Coefficients	R ²	Factor Shares	
	α	β	η	Returns to scale parameters $S = \alpha + \beta$		α/S	β/S
CRL	0.810940	0.053805	0.170300	0.864746	0.71	0.937779	0.062221
CSL	0.589947	0.220420	0.419626	0.810367	0.96	0.728000	0.272000
FACT	1.026508	2.064375	-14.134830	3.090883	0.81	0.332108	0.667892
HLL	-0.031823	2.082806	-3.568535	2.050983	0.95	-0.015516	1.015516
TCC	-0.647111	1.154239	5.287288	0.507128	0.63	-1.276030	2.276030

coefficient of capital is negative are having diminishing marginal productivity of capital.

As regards estimated coefficient of labour, that is, β , its value comes out to be positive in all the enterprises under study. It implies that increase of labour input causes an increase in output. Share of labour (β/s) in total output is positive in all the enterprises.

The sum of coefficients indicates the degree of returns to scale. It is observed that except in FACT and HLL the sums of coefficients are less than unity. This shows that FACT and HLL are showing increasing returns to scale and CRL and CSL and TCC are showing diminishing returns to scale.

Marginal productivities of capital and labour have also been computed for each enterprise (see figures 7.7 and 7.8). Besides marginal productivities, output-capital and output-labour ratios have been calculated. The marginal productivities and the ratios of the enterprises under study are presented in tables 7.16 and 7.17.

It is clear that average output labour ratio is lowest in HLL and highest in CRL with 0.144 and 1.359 respectively. If we take the case of marginal productivity of labour there is an increasing trend in FACT, HLL and TCC. But there is a stagnating tendency in the case of CRL and CSL.

Figure 7.7 Marginal Productivity of Labour in Selected Enterprises

245

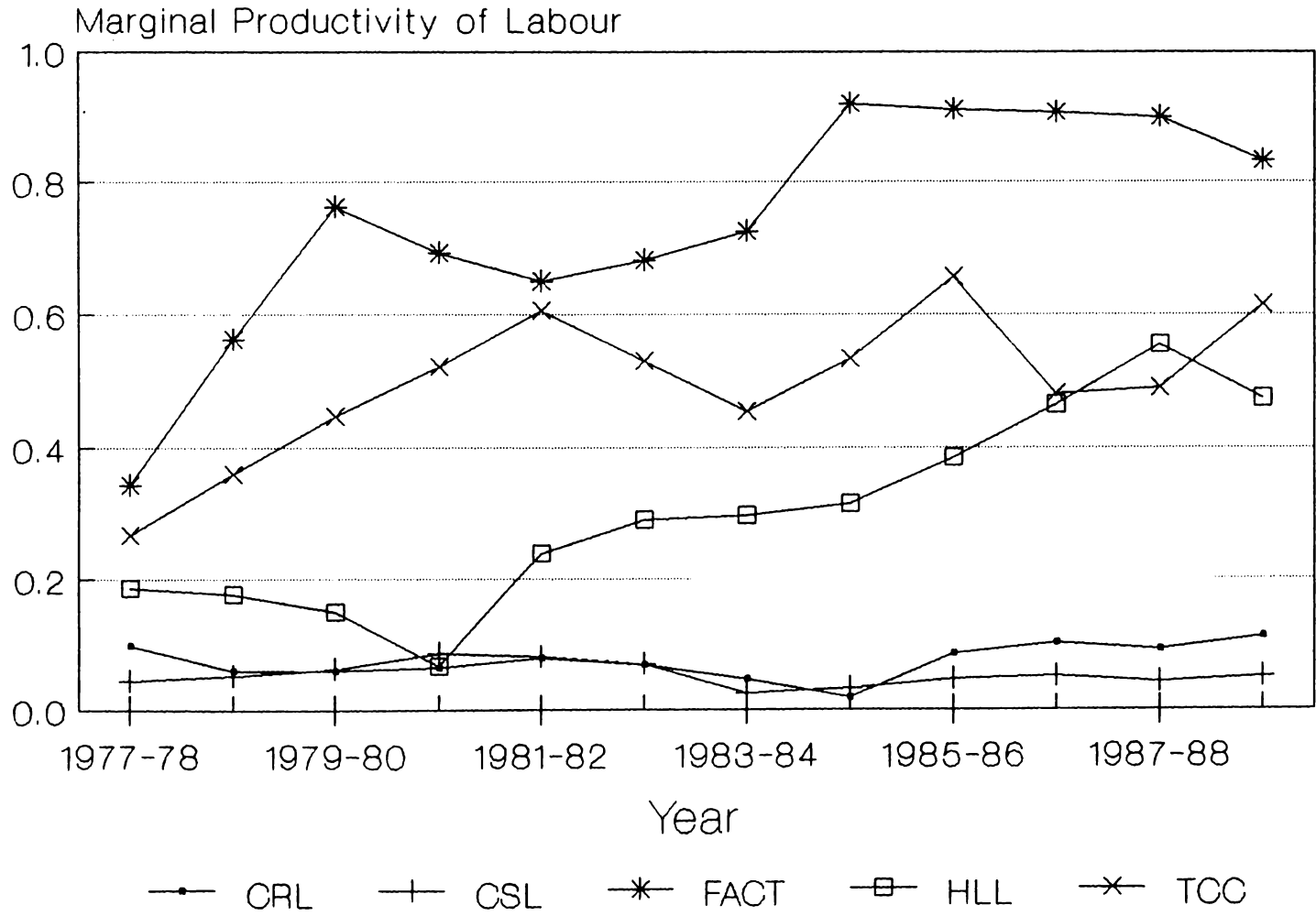


Figure 7.8 Marginal Productivity of Capital in Selected Enterprises

246

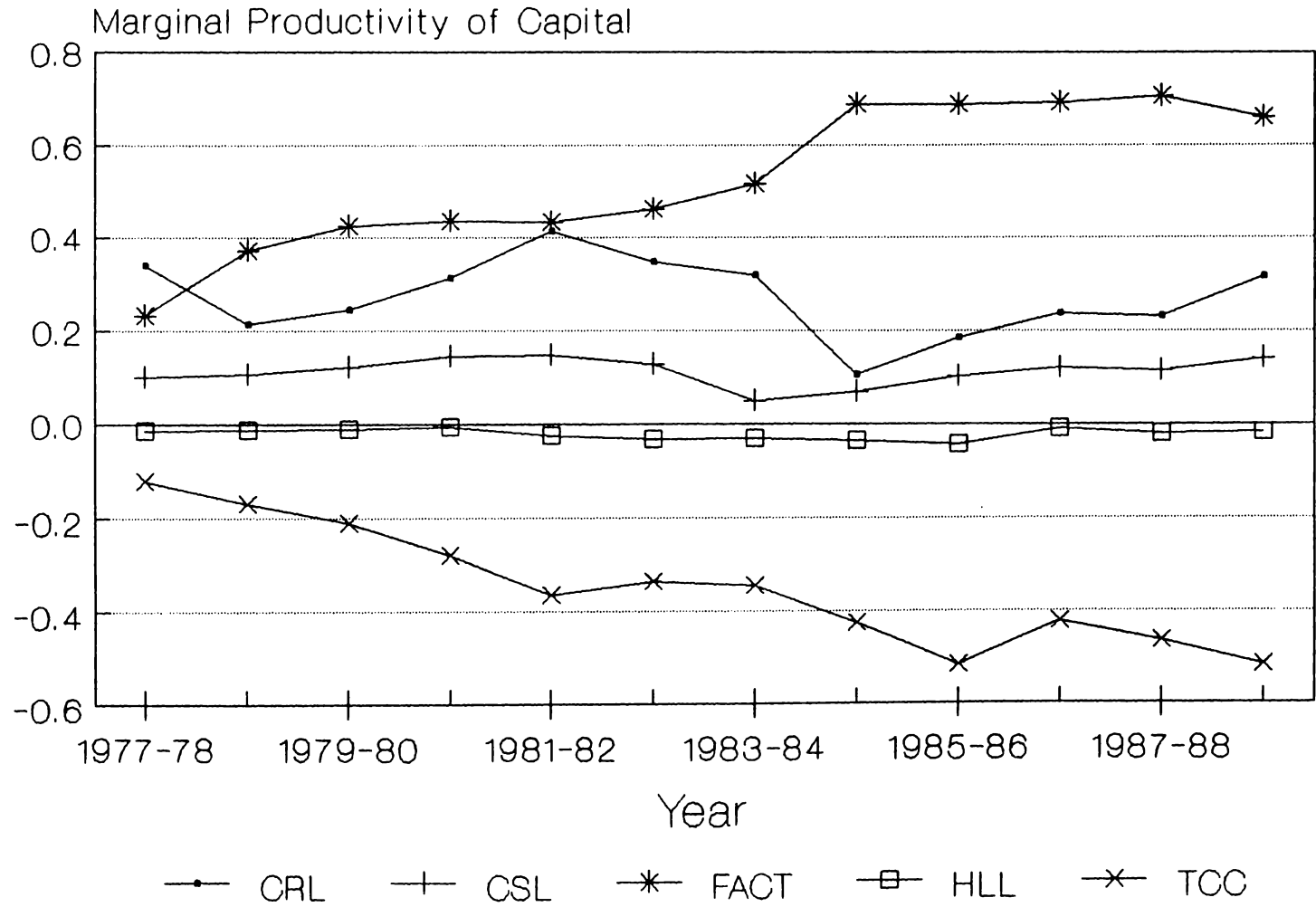


Table 7.16

Output-Labour Ratio and Marginal Productivity of Labour in CPSEs in Kerala

Year	CRL		CSL		FACT		HLL		TCC	
	O/L	MPL	O/L	MPL	O/L	MPL	O/L	MPL	O/L	MPL
1977-78	1.8222	0.0980	0.2319	0.0439	0.1661	0.3429	0.0896	0.1866	0.1991	0.2677
1978-79	1.1137	0.0599	0.3117	0.0516	0.2721	0.5617	0.0844	0.1758	0.2340	0.3598
1979-80	1.0387	0.0599	0.3874	0.0617	0.3692	0.7622	0.0713	0.1485	0.2799	0.4472
1980-81	1.1934	0.0642	0.4511	0.0858	0.3354	0.6924	0.0319	0.0664	0.3893	0.5207
1981-82	1.4470	0.0779	0.5245	0.0801	0.3146	0.6495	0.1151	0.2397	0.3633	0.6054
1982-83	1.2612	0.0679	0.4590	0.0697	0.3299	0.6810	0.1398	0.2912	0.3164	0.5298
1983-84	0.8631	0.0464	0.3940	0.0245	0.3509	0.7244	0.1429	0.2976	0.1111	0.4548
1984-85	0.3453	0.0186	0.4618	0.0327	0.4454	0.9195	0.1512	0.3149	0.1482	0.5330
1985-86	1.5784	0.0849	0.5681	0.0464	0.4414	0.9112	0.1844	0.3841	0.2107	0.6557
1986-87	1.8853	0.1014	0.4162	0.0509	0.4393	0.9069	0.2230	0.4645	0.2310	0.4804
1987-88	1.7018	0.0916	0.4240	0.0425	0.4354	0.8988	0.2665	0.5551	0.1930	0.4894
1988-89	2.0585	0.1108	0.5322	0.0503	0.4029	0.8317	0.2273	0.4734	0.2284	0.6143
Average	1.3591		0.4302		0.3586		0.1440		0.2420	

Table 7.17

Output-Capital Ratio and Marginal Productivity of Capital in CPSEs in Kerala

Year	CRL		CSL		FACT		HLL		TCC	
	O/K	MPK	O/L	MPK	O/K	MPK	O/K	MPK	O/K	MPK
1977-78	0.4167	0.3379	0.1706	0.1006	0.2247	0.2307	0.4630	-0.0147	0.1866	-0.1208
1978-79	0.2632	0.2134	0.1792	0.1057	0.3610	0.3706	0.4065	-0.0129	0.2618	-0.1694
1979-80	0.3012	0.2443	0.2070	0.1221	0.4132	0.4242	0.3759	-0.0120	0.3472	-0.2117
1980-81	0.3831	0.3107	0.2451	0.1446	0.4237	0.4349	0.1965	-0.0063	0.4329	-0.2801
1981-82	0.5102	0.4137	0.2494	0.1471	0.4219	0.4331	0.8065	-0.0257	0.5650	-0.3656
1982-83	0.4255	0.3451	0.2155	0.1271	0.4484	0.4603	1.0309	-0.0328	0.5808	-0.3370
1983-84	0.3906	0.3168	0.0814	0.0480	0.5025	0.5158	1.0000	-0.0318	0.5348	-0.3461
1984-85	0.1285	0.1042	0.1147	0.0677	0.6711	0.6889	1.1364	-0.0362	0.6579	-0.4257
1985-86	0.2262	0.1834	0.1721	0.1015	0.6711	0.6889	1.3514	-0.0430	0.8000	-0.5177
1986-87	0.2915	0.2364	0.2033	0.1199	0.6757	0.6936	0.2865	-0.0091	0.6536	-0.4230
1987-88	0.2841	0.2304	0.1927	0.1137	0.6897	0.7080	0.6250	-0.0199	0.7194	-0.4655
1988-89	0.3876	0.3143	0.2381	0.1405	0.6452	0.6623	0.5587	-0.0178	0.8000	-0.5177
Average	0.3340		0.1891		0.5124		0.6864		0.5450	

Output-capital ratio is highest in HLL and lowest in CSL with 0.68644 and 0.1891 respectively. The Marginal Productivity of capital is showing an increasing trend in FACT and declining trend in TCC. But in the case of CRL, and HLL the marginal productivity of capital is showing a stagnating tendency.

Let us summarise: In the central public sector enterprises in India while the labour productivity increased significantly, capital productivity showed a slight decline. This can be explained by the increase in capital intensity over time for almost all the industries. But total factor productivity showed an increase. The average growth rate of total factor productivity indices was 3.62 per cent per annum.

Among the selected enterprises in Kerala CRL showed a lower growth rate of value added than fixed cost both at the current and at the constant prices. CRL showed an increase in labour productivity and a marginal decline in capital productivity. But total factor productivity showed a decline. In CSL also the growth rate of value added is lower than the growth rate of fixed cost. The company showed a falling trend in labour, capital and total factor productivity. On the contrary, FACT showed a higher growth rate of value added than that of fixed cost. The company showed a higher rate of growth of value added than that of fixed cost. There is significant increase in labour, capital and total factor productivity. TCC also showed a higher

rate of growth of value added than that of fixed cost. There is significant increase in labour, capital and total factor productivity.

Thus among the selected central public sector enterprises, all except CSL, showed an increasing labour productivity. The highest rate of growth is accorded to HLL. This growth rate is almost double of the growth rate of labour productivity of central public sector enterprises on the whole. FACT also kept almost the same pace of growth as in the national level. Labour productivity of CSL showed a negative growth rate. But the growth rate of labour productivity of TCC is less than that of HLL and that of central public sector enterprises in general.

But capital productivity depicts a different picture. Here TCC shows the highest rate of growth. Among the central public sector enterprises under study FACT and HLL alone show positive growth rates with regard to capital productivity.

Total factor productivity is highest in TCC among the enterprises under study. Among the selected central public sector enterprises with regard to TFP, FACT and HLL alone show positive growth rates and they are more or less on the same footing if we compare the growth rates of total factor productivity. The remaining two show negative growth rates.

Except in the case of CRL and CSL capital intensity of these enterprises is declining. The increasing capital intensity in CRL and CSL may be one of the reasons for the declining capital

productivity. Except in the case of CRL and HLL in all other cases capital labour ratio is declining. The increasing labour productivity of these enterprises may be due to the increasing capital labour ratio. On the other hand, there is a declining trend in labour productivity in CSL which may be due to the declining capital labour ratio.

The estimation of production function shows that FACT and HLL are having increasing returns to scale and CRL, CSL and TCC are having diminishing returns to scale. Marginal productivity of labour shows an increasing trend in FACT, HLL and TCC. But there is a stagnating tendency in the case of CRL and CSL. Marginal productivity of capital shows an increasing trend in FACT and declining trend in TCC. But in the case of CRL, CSL and HLL the marginal productivity of capital is showing a stagnating tendency.

Chapter 8

CONCLUSIONS AND RECOMMENDATIONS

Public enterprises in India occupy a predominant position in the country's economy. They have helped the process of industrialisation, generation of employment and dispersal of industries in different parts of the country. But the performance of these enterprises has been the subject-matter of considerable discussion and criticism of experts and the public at large. The present study made an attempt to evaluate the efficiency of central public sector enterprises in Kerala. In order to study the efficiency of central public sector enterprises in Kerala all the four enterprises that have been registered in Kerala are identified. They are Fertilisers and Chemicals Travancore Ltd. (FACT), Cochin Refineries Ltd.(CRL), Cochin Shipyard Ltd. (CSL) and Hindustan latex Ltd. (HLL). The evaluation of these enterprises have been dealt with by examining the physical and financial parameters such as capacity utilisation, profitability and productivity. An attempt is also made to compare the efficiency of the central public sector enterprises in Kerala to that of its counterpart in the state sector. For this purpose Travancore Cochin Chemicals Ltd. (TCC) is identified as the only comparable representative state enterprise.

8.1 Conclusions

The conclusions of the study can be summarised as follows: There is a declining trend in the investment in central public sector enterprises in Kerala. While the investment in central public sector enterprises in India increased at a compound annual growth rate of 19.3 per cent, the investment in Kerala increased at the rate of 15.2 per cent only. In terms of percentage to all India, the central investment in Kerala is showing a declining trend. This trend can be noticed from 1974-75 onwards. It declined from 3.24 per cent in 1974-75 to 1.57 per cent in 1988-89. Hence the need for stepping up central investment in the state to compensate for the gradual reduction in the share of central investment in the state.

8.1.1 Conclusions regarding capacity utilisation

The capacity utilisation of central public sector enterprises in India is very low. About 50 per cent of the central public sector enterprises in India are utilising less than 75 per cent of the capacity. Due to this underutilisation of capacity a heavy loss of production is incurred every year. In 1989-90 the loss of production came upto Rs. 12731 crores.

Among the selected enterprises in Kerala FACT showed an average rate of utilisation of 60.11 per cent. In CSL there is a gross underutilisation of capacity. During the period of analysis the average capacity utilisation in CSL was only 28.74 per cent.

On the contrary capacity utilisation in CRL is commendable. On an average it is more than 80 per cent. HLL also showed a higher capacity utilisation. The average capacity utilisation for the period of analysis was above 75 per cent. Capacity utilisation was comparatively low in TCC, the state enterprise in Kerala. On an average, it could achieve only about 54 per cent capacity utilisation. Thus our hypothesis that capacity utilisation of the central public sector enterprises in Kerala is very low is not fully correct with respect to the actual utilisation. Cochin Shipyard Ltd. alone is an exception to this reality.

There are many reasons for the underutilisation of capacity in these enterprises. They are power shortage, raw material shortage, labour, financial and demand problem, equipment failure etc. But power shortage is the first and foremost factor that stood in the way of higher utilisation of capacity in these enterprises especially after the 1980s. However there is an increasing trend in the utilisation of capacity in these enterprises.

Capacity utilisation has important implication for employment generation. Therefore analysis of employment generation is also made in these enterprises. Though there is remarkable increase in average per capita emoluments in the central public sector enterprises in India the rate of employment generation was very low during the period of analysis. The annual growth rate was only 2.89 per cent. A little more than 22 lakh persons were employed in these enterprises in 1988-89. This

constitutes only around eight per cent of the total employment in the organised sector and less than one per cent of the total work force in the country.

On an average 31 thousand persons were employed by the central public enterprises in Kerala. Approximately it is only 1.43 per cent of the total number of employees. This share is stagnant during the period of analysis. Among the selected enterprises in Kerala FACT generated the highest level of employment generation. The annual growth rates of employment generation of CRL, CSL, FACT, HLL and TCC are 6.64, 2.32, 1.49, 5.77 and 0.41 respectively. However there is great disparity in the per capita emoluments of these enterprises. The correlation between emoluments per employee and value added per employee in FACT, TCC and HLL is highly significant. This shows that the wages of the workers have kept in proportion with the increase in productivity of these enterprises. But such a significant relation is not found in CSL and CRL.

An enquiry was also made whether employment generation in the selected enterprises is related to capacity utilisation by regression analysis. But the estimates do not show any significant relationship between these variables. Thus our hypothesis that higher rates of utilisation of capacity leads to greater employment opportunities is not in conformity with the reality.

8.1.2 Conclusions regarding profitability

The central public sector enterprises in India show a

low profile on the profitability front. During the period of analysis these enterprises made net profits only from 1981-82 onwards. During the period in which these enterprises have earned profits, profitability as percentage of gross margin to capital employed ranged between 12.34 per cent and 20.3 per cent. On an average it was 17.2 per cent. But profitability as percentage of net profit to capital employed was very low. On an average it was only 1.61 per cent.

Among the selected enterprises in Kerala CRL alone have been continuously making profits during the period of analysis. The annual average growth rate of profit of CRL was 16.16 per cent at current prices and 8.53 per cent at constant prices. CSL could achieve profit only during 1980-81 and 1981-82. The annual average growth rate of profit of CSL is negative during the period of analysis. FACT incurred loss during four years of the first half of the period of analysis and during the remaining period it has been making profits continuously. On an average profit increased at the rate of more than 50 per cent per annum. HLL was running at a loss for three years consecutively before 1981-82 and its profit-making was stable for the remaining period. At constant prices its profit increased at the rate of approximately 30 per cent per annum. TCC has been steady in making profit from 1979-80 onwards except during the year 1986-87. At constant prices the annual growth rate of profit of TCC was 25.47 per cent.

Among the various financial ratios estimated, the ratio of gross margin to capital employed is taken as the key financial

ratio for profitability analysis. CRL shows higher profitability than the central public sector enterprises in India as a whole. But CSL showed negative profitability during the period of analysis. While FACT showed profitability which is less than the national average, HLL's profitability is higher than the national average. TCC also showed higher profitability than that of the national average. Thus a comparison of profitability of the four central public sector enterprises in Kerala shows that HLL stands first, CRL second, FACT third and CSL fourth in the descending order. The comparison of profitability between FACT and TCC shows that the profitability position of TCC is better than that of FACT.

From the regression analysis it is clear that there is significant relationship between profitability and capacity utilisation except in the case of TCC. Thus, as hypothesised, the profitability of the enterprises depends to a considerable extent on the degree of capacity utilisation. This implies that there is scope for improving the profitability of the enterprises by increasing the capacity utilisation.

8.1.3 Conclusions regarding productivity

In the central public sector enterprises in India while the labour productivity increased significantly, capital productivity showed a slight decline. This can be explained by the increase in capital intensity over time for almost all the

industries. But total factor productivity showed an increase. The average growth rate of total factor productivity indices was 3.62 per cent per annum.

Among the selected enterprises in Kerala CRL showed a lower rate of value added than fixed cost, both at the current and at the constant prices. CRL showed an increase in labour productivity as well as a marginal decline in capital productivity. At the same time total factor productivity showed a decline. In CSL also the growth rate of value added is lower than the growth rate of fixed cost. The company showed a falling trend in labour, capital and total factor productivities. On the contrary, FACT showed a higher growth rate of value added than that of fixed cost. The company showed a significant increase in labour, capital and total factor productivities. A similar trend is shown by HLL. The company showed a higher rate of growth of value added than that of fixed cost. There is significant increase in labour, capital and total factor productivities. TCC also showed a higher rate of growth of value added than that of fixed cost. There is significant increase in labour, capital and total factor productivities.

Thus among the selected central public sector enterprises, all except CSL, showed an increasing labour productivity. The highest rate of growth is accorded to HLL. This growth rate is almost double of the growth rate of labour productivity of central public sector enterprises on the whole. FACT also kept almost the same pace of growth as in the national

level. Labour productivity of CSL showed a negative growth rate. But the growth rate of labour productivity of TCC is less than that of HLL and that of central public sector enterprises in general.

But capital productivity depicts a different picture. Here TCC shows the highest rate of growth. Among the central public sector enterprises under study only FACT and HLL alone show positive growth rates with regard to capital productivity.

Total factor productivity is highest in TCC among the enterprises under study. Among the selected central public sector enterprises with regard to TFP, only FACT and HLL show positive growth rates and they are more or less on the same footing if we compare the growth rates of total factor productivity. The remaining two show negative growth rates.

Except in the case of CRL and CSL capital intensity of these enterprises is declining. The increasing capital intensity in CRL and CSL may be one of the reasons for the declining capital productivity. Except in the cases of CRL and HLL in all other cases capital labour ratio is declining. The increasing labour productivity of these enterprises may be due to the increasing capital labour ratio. On the other hand, there is a declining trend in labour productivity in CSL which may be due to the declining capital labour ratio.

The estimation of production function shows that FACT and HLL are having increasing returns to scale and CRL, CSL and TCC are having diminishing returns to scale. Marginal

productivity of labour shows an increasing trend in FACT, HLL and TCC. But there is a stagnating tendency in the case of CRL and CSL. Marginal productivity of capital shows an increasing trend in FACT and declining trend in TCC. But in the case of CRL, CSL and HLL the marginal productivity of capital is showing a stagnating tendency.

In sum the efficiency of central public sector enterprises in Kerala measured by the parameters - capacity utilisation, profitability and productivity - has been showing relatively better performance than the central public sector enterprises in India as a whole. Cochin Shipyard Ltd. alone is an exception to this. Power shortage and labour problem are the two important problems that hindered the still better performance of these enterprises. Power problem became acute especially after the 1980s.

8.2 Recommendations

The following recommendations are given in the light of the study.

1. Long term and short term measures should be taken to ease the crippling power shortage in the state.
2. Modernisation of the plant in FACT Ltd. (Udyogamandal Division) should be made at the earliest.
3. Power conservation measures should be taken especially in TCC Ltd.

4. Aggressive marketing strategy to arrange timely disposal of products in FACT and TCC.
5. More emphasis should be given to utilise the idle capacity and underutilised capacity especially in CSL to increase profitability and productivity.
6. Immediate financial assistance should be given and strict financial control should be maintained in the case of CSL to get rid of its impending crisis.
7. Wasteful and unproductive expenditure should be cut down to ensure better profitability in these enterprises.
8. Workers should be motivated to achieve targets in these enterprises through proper incentive systems linked with productivity.
9. Product diversification is to be given emphasis in the case of Hindustan Latex Ltd.
10. Steps should be taken to improve managerial excellence in these enterprises.

The conclusions that emerge from the study have important policy implications. The general notion that public sector enterprises cannot function efficiently is not correct. What is more urgent is the formulation and adoption of a package of reforms both within the public enterprises and among the ministries and in other related governmental agencies which would bring about a substantial improvement in the performance of public sector enterprises. Privatisation is only a short term rather

than a long term solution to efficiency. Public sector should remain in the economy in order to satisfy the larger interests of the majority.

B I B L I O G R A P H Y

- Agarwal M.D., Efficiency of Public Enterprises in India, Prateeksha Publications, Jaipur, 1987.
- Agarwal, Surya Prakash, Parliamentary Control over Public Enterprises in India, Chugh Publishers, 1985.
- Ahluwalia, Isher Judge, Industrial Growth in India. Stagnation Since the Mid-sixties, Oxford University Press, Oxford, 1985.
- , Productivity and Growth in Indian Manufacturing, Oxford University Press, Oxford, New York, 1991.
- Alagh, Yoginder K., "Utilisation of Industrial Capacity in Indian Economy", in J.C. Sandesara (ed.), The Indian Economy: Performance and prospects, Bombay University, 1974.
- Banerji, A., Capital Intensity and Productivity in Indian Industry, Macmillan, New Delhi, 1975.
- Bergstom, Gary L., Resource Utilisation in Indian Manufacturing: A Mathematical Analysis, Progressive Corporation Private Limited, Bombay, 1973.
- Beri, G.C., Measurement of Production and Productivity in Indian Industry, Asia Publishing House, New Delhi, 1962.
- Betancourt, Roger P. and Clague C.K., Capital Utilisation : A Theoretical and Empirical Analysis, Cambridge University Press, 1981.
- Brahmananda, P.R., Productivity in the Indian Economy : Rising Inputs for Falling Outputs, Himalaya Publishing House, Bombay, 1982.
- Brews, Hans, Labour, Capital and Growth, Lexington Books D.C.Heath and Company, London, 1973.
- Brown M., On the Theory and Measurement of Technological Change, Cambridge University Press, Cambridge, 1966.
- Chamberlin, Edward H., The Theory of Monopolistic Competition : A Reorientation of the Theory of Value, Cambridge, 1938.
- Chitale, V.P., Capital-output Ratio in the Indian Economy, Himalaya Publishing House, Bombay, 1986.

- Chopra, R.N., Public Sector in India, Intellectual Publishing House, New Delhi, 1982.
- Connellan Thomas K., How to Improve Human Performance, Harper and Row, 1978.
- Das N., The Public Sector in India, Orient Longmans, Bombay, 1956.
- Dholakia, Bakul H., The Changing Efficiency of Public Enterprises in India, Somaiya Publications Pvt.Ltd., Bombay, 1980.
- Diewert W.E., "The Theory of Total Factor Productivity Measurement in Regulated Industries", in Thomas E.Cowing and Rodney E.Stevenson, (ed.) Productivity Measurement in Regulated Industries, Academic Press, New York, 1981.
- Dunlop, John T., Labour Productivity, Mc Graw Hill Book Company, USA, 1964.
- Fabricant Solomon, Basic Facts on Productivity Change, National Bureau of Economic Research, Columbia University Press, New York, 1959.
- , Basic Facts of Productivity Change, NBER, Columbia University Press, New York, 1961.
- , A Primer on Productivity, Prentice-Hall of India Private Ltd., New Delhi, 1973.
- Frisch, Ragnar., The Theory of Production, D.Reidel Publishing Company, Holland, 1965.
- Gift, Richard E., Estimating Economic Capacity : A summary of conceptual problems, University of Kentucky Press, Lexington 1968.
- Goldar B.N., Productivity Growth in Indian Industry, Allied Publishers Pvt. Ltd., New Delhi, 1986.
- Gupta, Arvind Kumar, Public Enterprises: Economic Development & Resource Mobilisation, Criterion Publications, New Delhi, 1984.
- Gupta L.N., The Profitability of Government Companies, Oxford & IBH Publishing Co., New Delhi, 1987.
- Hanson A.H., Public Enterprise and Economic Development, Routledge and Kegan Paul, London, 1960.
- Hasim S.R., and Dadi M.M., Capital-output Relations in Indian Manufacturing (1946-64), M.S.University of Baroda, University Publications, Sales Unit, Baroda 1973.

- Kaldor, N., "Capital Accumulation and Economic Growth", in Lutz Faud Hague D., (ed.), The Theory of Capital, IEA, Macmillan, London, 1961.
- Kehar Sangha, Productivity and Economic Growth, Asia Publishing House, Bombay, 1964.
- Kendrick J.W., Productivity Trends in the United States, National Bureau of Economic Research, Princeton University Press, Princeton, 1961.
- , Understanding Productivity - An Introduction to the Dynamics of Productivity Changes, The Hopkins University Press, Baltimore, London, 1982.
- , (ed.) International Comparisons of Productivity and Cases of Slow down, Cambridge University Press, Cambridge, 1984.
- Khan A.Q., Productivity Dynamics in Public Enterprises, Vohra Publishers and Distributors, Allahabad, 1991.
- Khera S.S., Government in Business, National publishing House, New Delhi, 1977.
- Kolesov, V., The Public Sector : An Effective Means of Development, Sterling Publishers Pvt.Ltd., New Delhi, 1980.
- Krishna K.L., "Industrial Growth and Productivity in India", in Brahmananda P.R. and Panchamukhi V.R. (ed.) Development Process of the Indian Economy, Himalaya Publishing House, Bombay, 1987.
- Lakshmipathy, V., Performance Appraisal in Public Enterprises, Himalaya Publishing House, Bombay, 1985.
- Laxmi Narain, Principles and Practice of Public Enterprise Management, S.Chand & Company Ltd., New Delhi, 1982.
- Mallya N.N., Public Enterprise in India, National Publishers, Delhi, 1971.
- Manne, A.S., Investments for Capacity Expansion: Size, Location and Time Phasing, M.I.T. Press, Massachussets, 1967.
- Marris, Robin, The Economics of Capital Utilisation : A Report on Multiple Shift Work, Cambridge University Press, 1964.
- Mehta S.S., Productivity, Production Function and Technical Change, Concept Publishing Company, New Delhi, 1980.

- Melman S., Dynamic Factors in Industrial Productivity, John Wiley and Sons, New York, 1956.
- Nayar G.K., Applied Productivity, Newman Group of Publishers, New Delhi, 1979.
- Panic, M., Capacity Utilisation in UK Manufacturing Industry, National Economic Development Office, London, 1978.
- Patil S.M. and Raj K.Nigam, We and the Public Sector:Nehru's Gift to the Nation,(ed.) Documentation Centre for Corporate & Business Policy Research, New Delhi, 1988.
- Rajaiah B., Returns to Investment and Efficiency in Public Enterprises in India, Mittal Publications New Delhi, 1989.
- Ramanadham V.V., The Structure of Public Enterprises in India, Asia Publishing House, Bombay, 1961.
- , (ed.) Efficiency of Public Enterprise, Allied Publishers, Bombay, 1963.
- Ramaswamy T., Public Enterprises in India. Objectives & Performance, Meenakshi Prakashan, Meerut, 1972.
- Rastogi, P.N., Productivity, Innovation, Measurement and Development, Sage Publications, New Delhi, 1988.
- Salter W.E.C., Productivity and Technical Change, Cambridge University Press, England, 1966.
- Sankar et.al., Public Enterprises in India, Himalaya Publishing House, Bombay, 1983.
- , Public Enterprise Policy in India and UK in 1980's, Himalaya Publishing House, Bombay, 1987.
- Singh V.S., The Structure of Public Enterprise in India, Deep & Deep Publications, New Delhi, 1986.
- , Public Enterprises in India: Financial Policy and Performance of Government Companies, Deep & Deep Publications, New Delhi, 1986.
- Sinha J.N. and Sawhney P.K., Wages and Productivity in Indian Industries, Vikas Publications, Delhi, 1970.
- Solomon M.J., Better Plant Utilisation in India :A Blue Print for Action, Asia Publishing House, Bombay, 1963.

Srinivasa Murthy, A.P., "The Problem of Underutilisation of Productive Capacity in Indian Industry", in P.R.Brahmananda (ed.), Indian Economic Development and Policy, Essays in honour of Prof.V.L.D.Souza, 1979.

Ziauddin Khan, Arora R.K.,(ed.) Public Enterprise in India, Associated Publishing House, New Delhi, 1975.

II.ARTICLES

Agrawal V.K., "Problems of Public Enterprises in India : Underutilisation of Capacity and Poor Profitability", Indian Journal of Marketing, Vol. XX, No.7, March 1990.

Arrow, K., Chenery H.B., Minhas B.S., and Solow R.M., "Capital Labour Substitution and Economic Efficiency", Review of Economics and Statistics, August 1961.

Artus, Jacques R., "Measures of Potential Output in Manufacturing for Eight Industrial Countries, 1955-78", IMF Staff Papers Vol.XXIV No. 1, 1977.

Ayyar, J.M., "Role and Objectives of Public Enterprises in Developing Economy", Lok Udyog, Vol.14, No.1, April 1980.

Baldeo Sahai, "Fresh Categories for Public Sector Units", The Economic Times, Bombay, January 25, 1989.

Banerjee S., "Profitability and Problems in Public Undertakings", Management Accountant, Vol.3, No.12, December 1968.

Bert G. Hickman, "On a New Method of Capacity Estimation ", Journal of the American Statistical Association , Vol.LIX, June 1964.

Betancourt, Roger R. and Clague C.K., "Multiple Shifts and the Employment Problem in Developing Countries", International Labour Review, Vol.114, No.2, 1976.

_____, "The Theory of Capital Utilisation in Labour-Managed Enterprises", Quarterly Journal of Economics, Vol.91, 1977.

_____, "An Econometric Analysis of Capital Utilisation", International Economic Review, Vol.19, No.1, February 1978.

Bhandari, Ashok & Singh D.V., "Factors Affecting Productivity of Indian Workmen : A Contextual Analysis", Indian Management, Vol.25, No.8, August 1986.

- Bhaskaran, P.S., "Operational Efficiency of Public Sector Industry: A Study", Lok Udyog, Vol.X, No.8, November 1976.
- Bhatt N.K., "Technology, Productivity, Employment ", Indian Worker, May 5, 1986.
- Bischoff, Charles W. and Kokkelenberg, Edward C., "Capacity Utilisation and Depreciation-in-use", Applied Economics, Vol.19, 1987.
- Biswanath Lahiri, "Growth and Performance of Public Sector in India", Yojana, July 1, 1980.
- Buddin Morris & Samuel Paul, "The Utilisation of Indian Industrial Capacity 1949-59", Indian Economic Journal, Vol.IX, No.1, July 1961.
- Chakravorthy S., "Nehru and Public Sector", Mainstream, Vol.XIX, No.13, Nov.29, 1980.
- Chandy K.T., Factors Which Hinder or Help Productivity Improvement - Country Report on India, Asian Productivity Organisation, Tokyo, 1980.
- Chatterji A.K., "Productivity in Selected Manufacturing Industries", Economic and Political Weekly, November 24, 1973
- Chatterji M.K., "Wage Share Constancy Hypothesis- A Regional Experience", Artha Vinana, 1965.
- Chatterjee S.R., "Profitability : A Potential Yardstick for Performance Appraisal", The Indian Journal of Commerce, Vol.XXII, Part IV, No.82, June 1969.
- Chen K.Y.Edward, "Factor inputs, Total Factor Productivity and Economic Growth: The Asian Case", The Developing Economics, June 3, 1977.
- Christensen, Jorgenson and Lau, "Conjugate Duality and the Transcendental Logarithmic Production Function", Econometrica, Vol.39, No.4, 1973.
- Dholakia, Bakul H."Relative Performance in Public and Private Manufacturing Enterprises in India", Economic and Political Weekly, Vol.I, No.8, Feb.25, 1978.
- _____, "Growth of Factor Inputs and Total Factor Productivity in Indian Public Sector Enterprises" Vikalpa, Vol.II, No.2, April, 1977.
- Domar, E.D., "On the Measurement of Technological Change", Economic Journal, December, 1961.

- _____, "On Total Productivity and All That", Journal of Political Economy, Dec., 1962.
- Dutt R.C. and Nigam R.K.(ed.) "Towards Commanding Heights", SCOPE, New Delhi, 1975.
- Epstein, L.G. and Denny, M.G.S., "Endogeneous Capital Utilisation in a short-run production model", Journal of Econometrics, Vol.12, 1980.
- Fernandes, Praxy J., "Promise and Performance : A search for a credible system of evaluating the efficiency of public enterprises", International Centre for Public Enterprises in Developing Countries, Ljubljana, 1981.
- Foss, Murray F., "The Utilisation of Capital Equipment: Postwar Compared with Prewar", Survey of Current Business, Vol.43, 1963.
- Frank de Leeuw, "The Concept of Capacity", Journal of American Statistical Association, 1962.
- Ganguly S., "Public Enterprises : Learning Strategies", The Economic Times, January 5, 1987.
- Ghosh A., "Efficiency and Productivity of Indian Manufacturing Industry : A few case studies", Economic and Political Weekly, Vol.XIX, No.31, 32 & 33, August 1984.
- Ghosh B.N. and Ghosh, Roma, "Public Enterprise and Economic Development: Some Observations", Lok Udvog, Vol.14, No.1, April 1980.
- Goldar B.N., "Productivity Trends in Indian Manufacturing Industry : 1951-1978", Indian Economic Review, Vol.XVIII, No.1, 1983.
- Gupta K.R., "Profit Making in Public Undertakings", The Asian Economic Review, Vol.X, No.2, Feb. 1968.
- Gupta, T.K. "Human Resource Development - Key to Improve Productivity", Management Review, 1986.
- Hari B., "Industrial Capacity: A Concept", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- Hogan, W.P., "Capacity Creation and Utilisation in Pakistan Manufacturing Industry", Economic Development Report No. 84, Development Advisory Service, Centre for International Affairs, Harvard University, Cambridge, Sept. 1967.
- Huges, Helen et al., "Capital Utilisation in Manufacturing in Developing Countries", Bank Staff Working Paper, No.242 IBRD, 1976.

- IIPO, "Central Public Sector Enterprises, An overview: 1980-81 to 1988-89", Quarterly Economic Report of the Indian Institute of Public Opinion, 126, Vol.XXXI, No.4, Jan-Mar., 1989.
- Jha, L.K., "Challenges of Development and Dynamics of Productivity", Labour Gazette, Oct. 1986.
- Joshi N.C., "Managing Capacity in Indian Industries", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- , "Perspectives on Capacity Utilisation", Lok Udyog, Vol.XIX, No.8, Nov., 1985.
- Kale V.T., "Industrial Capacity: Concepts and Measurement", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- Kanungo, Rabindra N., "Management People for Productivity", Productivity, July-Sept., 1986.
- Karim, Bazle & B.T.Bhide, "Capacity Utilisation in Public Sector Enterprises: Problems and Prospects", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- Kedia Y.P., "Capacity Utilisation in Multi-products Industry- Need for Better Estimation", Journal of the Institution of Engineers (India), Feb., 1980.
- , "Improving Capacity Utilisation", Productivity, Vol.XXII, No.4, Jan.- Mar., 1983.
- Kim, Y.C.and Kwon, J.K., 1973, "Capital Utilisation in Korean Manufacturing 1962-1971 : Its Level, Trend and Structure", A Final Report, Agency for International Development, May, 1973.
- Klein, Lawrence R., "Some Theoretical Issues in the Measurement of Capacity", Econometrica, Vol.28, No.2, April 1960.
- Klein, L.R.and Preston, R.S., "Some New Results in the Measurements of Capacity Utilisation", American Economic Review, Vol.57, March 1967.
- Klein and Virginia Long, "Capacity Utilisation: Concept, measurement and Recent Estimates", Brookings Papers on Economic Activity, Vol.3, 1973.
- Koti, Reghunath K. "Utilisation of Industrial Capacity in India, 1967-68", Gokhale Institute of Politics and Economics, Series No.9, 1968.

- Krishna K.L., "Industrial Capacity and Production", in C.R.Rao (ed.) Database of the Indian Economy, The Indian Econometrics Society, 1973.
- _____, "Total Factor Productivity Concept and measurement", Productivity, Vol.10, 1975.
- Krishnamurthy V., "Industrial Productivity :Upgrading Human Resources", The Economic Times, Dec. 15, 1986.
- _____, "Planned Development through Public Sector", The Economic Times, Bombay, January 25, 1989.
- Lal B.B., "Measurement of Productivity in the Manufacturing Industries in India - A review of methodology adopted in different studies", Indian Labour Journal, July 1967.
- Latham G.P., "Behavioural Strategies to Improve Productivity", Organisational Dynamics, 1982.
- Lehman, David H., "Improving Employee Productivity Through Incentives", Journal of Systems Management, March 1986.
- Lim, David, On the Measurement of Capital Utilisation in Less Developed Countries, Oxford Economic Papers 28, 1976.
- Lobel E. and Das p., "A Report on Capacity Utilisation ", (mimeographed) Indian Statistical Institute, Calcutta, 1955.
- Majumdar Paresh, "This Thing Called Productivity", Indian Journal of Labour Economics, Jan., 1961.
- Mathur, B.L., "Capacity Utilisation in Public Sector Steel Plants", Productivity, July-September 1981.
- Mathur, Naresh Dutt, "Profitability of Public Enterprises", Lok Udyog, Vol.13, No.1, April 1979.
- Mathur P.N., "Explanations in Making Programme of Full Capacity Utilisation". Artha Vinana, June 1969.
- Meena Gupta and Thavaraj M.J.K., "Capacity Utilisation and Profitability: A Case Study of Fertiliser Units", Productivity, Vol.XVI, No.3, 1975.
- Mishra R.K., "Profitability of Public Enterprises in India", Lok Udyog May, 1974, New Delhi.
- _____, "Capacity Utilisation in Public Enterprises", Productivity, Vol.XV, No.2, July-Sept.,1974.

- Mishra, R.K. et.al., "Capacity Utilisation in Indian Industry", Indian Journal of Commerce, Vol.XXXI, Part II, No.115, June, 1978.
- Mukherjee I.N., "Productivity Trends in Large scale Manufacturing Industry : A comparative Study", Productivity, April-June, 1975.
- Nadiri M.I., "Some Approches to the theory and Measurement of Total Factor Productivity : A survey", Journal of Economic Literature, Vol.VIII, No.4, December 1970.
- Nayyar D., "Industrial Development in India: Some reflections on growth and stagnation " Economic and Political Weekly, Vol.XII, 1978.
- Omprakash, Kajipet "Capacity Utilisation:A Measure of Efficiency in Public Enterprises", Southern Economist, January 15, 1986.
- _____, "Public Sector Performance Evaluation", The Economic Times, June 20, 1981, Bombay.
- Paranjape H.K., "The Role of the Public Sector in the Indian Economy, paper presented in a seminar at IIPA, New Delhi, 1978.
- Paul Samuel, "Utilisation of Capacity in Indian Industry: A Cross-section Analysis", Golden Jubilee Seminar, Department of Economics, Bombay University, 1972.
- _____, "Growth and Utilisation of Industrial Capacity", Economic and Political Weekly, Vol.IX, No.49, Dec., 1974.
- Perry, George L., "Capacity in Manufacturing", Brookings Papers on Economic Activity, Vol.3, 1973.
- Philips, A., "An Appraisal of Measures of Capacity", American Economic Review, Vol.53, No.2, May 1963.
- Raj, K.N., "Growth and Stagnation in Indian Industrial Development", Economic and Political Weekly, Annual Number, Vol.XI, Nos.5, 6, and 7, February 1976.
- Rajalakshmi K., "Productivity Performance of Some Major Industries of Rajasthan as compared to all India", Margin, January 1981.
- Ramaswamy R.Iyer, "The Profitability of Public Enterprises", The Economic Times, Bombay, January 25, 1989.
- Rangarajan C. " Industrial Growth: Another look" Economic and Political Weekly, Annual Number, April 1962.

- Rao P.V. and Akhilesh Kumar, "Capacity Utilisation in Indian Industries: A Review of Existing Literature", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- Rastogi, P.N., "Culture of Productivity", Indian Journal of Industrial Relations, Oct., 1986.
- , "Motives and Conditions for Human Productivity : The Missing Factor", Indian Journal of Industrial Relations, April 1987.
- Reddy Y.R.K. and Rao P.K., "Performance Evaluation of Public Sector", The Economic Times, July 24, 1976.
- Romeo, M.Boutista et al., "Capital Utilisation in Manufacturing", World Bank Research Publication, 1981.
- Sastry D.U., "Capacity Utilisation in Cotton Mill Industry in India (Mimeo), Indian Institute of Economic Growth, University of Delhi.
- Sastry K.S., "Performance Evaluation in Public Enterprises", Chartered Accountant, Vol. XXXV, No.2, August 1986.
- , "Models for Performance Evaluation of Public Enterprises - A Global Survey and Analysis", The Chartered Accountant, Vol.XXXVII, No.7, January 1989.
- Satya Narayana J.& K.R.K. Sharma, "Capacity Utilisation in Public Enterprises", Indian Journal of Commerce, Vol.XXXII, No.118, March 1979.
- Sau Ranjit K., "On Profit Maximisation in Public Enterprises in India", Economic and Political Weekly, Vol.VII, No.22, May 1972.
- Sawhney P.K.and Sawhney B.L., "Capacity Utilisation, Concentration and Price-cost Margins : Results on Indian Industries", The Journal of Industrial Economics, Vol.XXI, No.2, April 1973.
- Seth V.K., "Trends in the Utilisation of Capacity in the Indian Manufacturing Industries", The School of Economics, Vol.2, No.2, December 1986.
- , "Concepts and Measures of Capacity Utilisation", The School of Economics, Vol.2, No.1, September 1986.
- Singh R.R., "Productivity Trends and Wages", Eastern Economist, April 1966.
- Smith K.R., "Risk and the Optimal Utilisation Of Capital", Review of Economic Studies, Vol.37, No.2, 1970.

- Subramanyan K.K. and Mohanan Pillai, "Kerala's Industrial Backwardness: Exploration of an Alternative Hypothesis", Economic and Political Weekly, Vol.XXI, No.14, April 5, 1986.
- Sureshkumar, "Phenomenal Growth of Public Sector", The Economic Times, Bombay, January 25, 1989.
- Tandon G.L., "Improvement in Capacity Utilisation", Lok Udyog, Vol.XVIII, No. 4, July 1984.
- Taubman, P. and Wilkinson M., "User cost, Capital Utilisation and Investment Theory", International Economic Review, Vol.11, No.2, June 1970.
- Trivedi P., "Evaluating the Evaluators : Performance of Bureau of Public Enterprises", Economic and Political Weekly, Vol.XX, No.35, 1985.
- _____, "Public Enterprises in India : If not for profit then what for?" Economic and Political Weekly, Vol.XXI, No.48, Review of Management, November 1986.
- _____, "Sengupta Report on Public Enterprises", Economic and Political Weekly, Vol.XXII, No.22, Review of Management, May 1987.
- Udai Pareek, "Training Public Enterprises in Human Resource Management", Institute of Public Enterprise Journal, 1981.
- Venkataraman C., "Productivity Trends of Key Industries in the Public Sector", Productivity, Vol.XXIV, No.3, Oct-Dec., 1983.
- Venkataraman R., "Productivity-A Great Challenge Where Resources are Scarce", Indian Worker, Oct. 6, 1986.
- Venugopal, K., "On Utilising Capacity", Productivity, Vol.XVI, No.3, Oct-Dec., 1975.
- Victor Powel, "Improving Public Enterprises Performance: Concepts and Techniques", Management Development Series, No.22, ILO, Geneva.
- Vijayachandran, "Public Sector in India", The Marxist, Vol.VI, No.3-4, July-Dec.1988.
- Willimore, L.N., and Acheson K., "Capital Utilisation in Economic Development : A Comment", Economic Journal, Vol.84, No.33, 1974.
- Winston Gordon C., "Capital Utilisation in Economic Development", Economic Journal, Vol.81, No.321, March 1971.

_____, "Capacity: An Integrated Micro and Macro Analysis", American Economic Association Papers and Proceedings, Vol.67, February 1971.

_____, "The Theory of Capital Utilisation and Idleness", Journal of Economic Literature, Vol.12, No.4, 1974.

Zabel Edward, "On the Meaning and Use of a Capacity Concept", Naval Research Logistics Quarterly, Vol. 2, No.4, Office of Naval Research, Washington D.C., 1955.