TIME AND COST OVERRUNS OF INDUSTRIAL PROJECTS IN KERALA

Thesis submitted to
the Cochin University of Science & Technology
for the award of the Degree of Doctor of Philosophy
under the Faculty of Social Sciences

by

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.....to my parents

CERTIFICATE

Certified that the thesis "**Time and Cost Overruns of Industrial Projects in Kerala**" is the record of bona fide research work done by Sri. Suresh V.N. under my supervision and guidance. The thesis is worth submitting for the award of the degree of Doctor of Philosophy under the Faculty of Social Sciences.

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DECLARATION

I hereby declare that this thesis is the record of bona fide research work carried out by me under the supervision of Prof. (Dr.) P.R. Wilson, School of Management Studies, Cochin University of Science & Technology. I further declare that this thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title of recognition.

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ACKNOWLEDGEMENT

I bow my head to the Almighty for enabling me in completing my research and acknowledge with deep gratitude the blessings of my parents and teachers.

This study was done in the School of Management Studies, Cochin University of Science & Technology, under the guidance of Prof. (Dr.) P.R.Wilson. It was indeed a matter of privilege and pleasure to do research under him. I express my deep sense of gratitude to him for being extremely considerate and helpful to me during the course of the work and also for his scholarly guidance, valuable suggestions, helpful criticism and unstinted co-operation.

I owe my heart felt thanks to the member of my Doctoral Committee Prof. (Dr.) C.A. Francis, School of Management Studies, for his effective direction and the timely help extended to me throughout the research.

I am deeply obliged and thankful to Prof. (Dr.) K.C. Sankaranarayanan, Dean, Faculty of Social Sciences, Cochin University of Science & Technology, for his inspiring guidance, constant encouragement and invaluable help at every stage of my research.

I take this opportunity to express my sincere thanks to all the members of the faculty of School of Management Studies, especially, Prof. (Dr.) K. George Varghese, Director, School of Management Studies, Prof. (Dr.) P.Sudarsanan Pillai, Dr. K. Krishnan Nampoothiri, for their encouragement and valuable suggestions at various stages of my research.

I express my heart felt thanks to the librarians and non-teaching staff of the School of Management Studies, Department of Applied Economics, their sincere co-operation and assistance.

I express my sincere thanks to the executives and staff of the various organisations for their co-operation in furnishing the necessary information required for the study.

I am indebted to the University Grants Commission, New Delhi, for granting me Junior Research Fellowship.

I am obliged and thankful to the Principal, Cochin College, Cochin-2. Prof. (Dr.) S. Venugopal, Head of the Department of Commerce and my colleagues in the department for their co-operation and sincere help all along my research.

I shall be failing in my duty if I do not refer in this context the invaluable help and assistance received from my friends, particularly, Mr. Praveen Kumar.P.V. Research Scholar, School of Management Studies, Dr. S. Rajasekharan, Lecturer, NSS College Vazhoor, Dr. Ajith Kumar. Centre for Socio Economic and Environmental Studies, Ernakulam.

I am thankful to my fellow research scholars for their inspiring affection and generous help.

I wish to express my warmest feeling of intimacy towards my wife Pramada. It would have been impossible for me to complete the thesis without her support.

Kochi - 22
2 June 2000.

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CHAPTER 1

INTRODUCTION

In India, industrialisation has resulted in a fundamental change in industrial activities and thus paved the way for broadening of the entrepreneurial base. Right from the first five-year plan, the planners of India have been paying much attention to widening of the industrial base. As a result there has been significant growth in investment and industrial projects in public, private and joint sectors.

However, the industrial growth rate was not commensurate with the rising levels of investment in the first four decades of planning. This was largely due to increase in incremental capital out put ratio, especially in the public sector. This can be attributed to a variety of factors, the most important among them being 'inefficiency in resource use'. The inefficiency in the utilisation of available resources will adversely affect the socio-economic development of any country.

A cursory look at the utilisation of resources by our public sector projects gives a gloomy picture. There are hardly any instances of projects which have not come within the grip of time and cost overruns. Such delays have often occurred due to defective project planning, implementation and control. As early as 1965, the Government of India, in one of its circulars rightly observed "Cases have come to notice where due to inadequate or limited investigation in regard to suitability of a site, availability of required natural resources, other raw materials, etc., the execution of projects has subsequently been delayed considerably, resulting in substantial increase in cost and adversely affecting their economies".

The gravity of the inadequacies in project planning were highlighted by the Administrative Review Committee (ARC), in its Report of Public Sector Undertakings (1967), as follows:

- One of the main reasons for this delay and cost overruns has been the lack of proper attention being paid to the initial planning of projects.
- While planning projects, all the steps required to be taken during the project formulation stage are not followed, with the result that projects have been executed on the basis of incompletely conceived plans and estimates.
- Planning has proceeded in a piecemeal fashion i.e., all the technical and economic aspects of the projects have not been considered together at one time. This has necessitated revisions of the project proposals and led to inordinate delays in the initial stage of project formulation.
- Often, during initial planning, decisions have been taken on the basis of assumptions which have not been verified or supported by thorough analysis of the situation, facts and past experience.
- Specifically, the more significant difference have been: (a) Lack of detailed analysis on scope and pattern of product-mix, (b) Selection of site based on inadequate soil investigation, (c) Underestimation of several elements of the projects, (d) lack of proper assessment of demand for the product and (e) incomplete analysis of commercial profitability and national economic benefits.
- At times, two or three projects are inter-related or inter-dependent. In such cases, there is a lack of coordination and sufficient effort to dovetail the different stages of inter-dependent projects with the result that a particular project, though completed, cannot start its operation till another connected project is also complete.

- There is a lack of uniformity in the steps through which a project has to be processed, during its formulation stage. Some projects have been approved on the basis of preliminary project analysis and some have not been approved, till after the preparation of the Detailed Project Report (DPR).

Similar observations have been made by the Committee on Public Undertakings in its various reports presented to the Lok Sabha. The Committee has pointedly mentioned that in most of the public enterprises, the Planning Division has not been setup to take care of their planning needs. (Committee on Public Undertakings, 1973-74 Report.

Deficiencies in project implementation are also found in the public sector causing slippages in schedules, cost overrun and poor performance. In this connection the Sixth Plan Document correctly observed "Attention to detail in project formulation and implementation, and promotion of a work culture, where there is pride in performance, are the twin instruments of achieving efficiency. This is the task to which every one involved in implementation should give utmost attention". Above all, the importance of strengthening the project implementation machinery so as to complete projects according to time schedules and targets, has been emphasised by all the successive Five Year Plans.

In spite of the fact that various commissions and committees at the government level have identified details about the structural, procedural and institutional weaknesses in the implementation of projects and suggested specific remedies, the problem still persists. In fact, the root cause of ineffective implementation arises from weaknesses at all levels of implementing machinery, starting from government departments to project organisation at unit level.

There are a number of factors responsible for the ineffective implementation of projects. The important ones among them are:

- Lack of perspective project planning.
- Delays in obtaining approval on various aspects of projects from the concerned agencies.
- Non-availability of materials and non-commitment to financial resources.
- Unrealistic scheduling.
- Lack of cost planning, budgeting and accounting.
- Frequent changes in design, drawings and specifications.
- General apathy to application of modern project management techniques, etc.

An effective monitoring system which helps the project managers in detecting the actual and potential trouble spots through-out the life span of projects quite often becomes a ritual. This, in turn, results in situation where organisations have to pay heavy price in terms of time and cost overruns.

The anguish of citizens with regard to the dismal performance of public sector projects, is a glaring example of the absence of any monitoring system. A study carried out by the United Nations Development Programme (UNDP) (1979) has held that the project monitoring system has been given very little attention in theoretical and applied work on project management. The Working Group on Monitoring and Information System of the Seventh Five Year Plan identified the following methodological weaknesses in the existing monitoring system.

- Ineffectiveness in identifying/reducing likely delays and problems.
- Large data gaps, delays in data generation and transmission, inadequate data.
- Analysis feedback not reaching proper users.
- Inadequate information on inter-linked projects.
- Information difficult to retrieve in the absence of data bank.
- Information not reflecting the true picture.
- More emphasise on reporting than on action.
- Inadequate use of monitored information in decision making.

From the discussions made so far, it can be seen that projects in India are subject to various deficiencies in different phases of project management. As a result of these shortcomings, projects suffer heavily due to time and cost overruns.

A review of 187 Central Sector Projects, each costing more than Rs.100 crores, by the Department of Programme Implementation (DPI) showed: "as on February 1997, as many as 118 projects were running behind schedule and the time overruns varied from one month to 200 months. A study with respect to certain projects indicated that the cost overrun, for reasons other than inflation and changes in the duty/exchange rate regimes, ranged from 40 percent to 75 percent of the original estimates. Cost overruns take away about 20 percent of the total financial outlay on industrial and infrastructural development projects".

The sectoral analysis of overruns in the ongoing 314 Central Public Sector Projects given in Table 1.1 will give a clear idea about the range of overruns in different sectors and the colossal waste of time and resources.

Table 1.1

Sectoral Analysis of Time and Cost Overruns in the Ongoing Large Central Public Sector Projects

Sector	No. of projects	Time Overrun (TOR)		Cost Overrun (COR)	
		No. of projects	Range of TOR In percent	No. of projects	Range of COR In percent
1. Atomic Energy	7	4	3 - 130	3	18 - 183
2. Coal	65	44	11 - 229	48	8 - 213
3. Fertiliser	2	2	75 - 325	2	250-788
4. Civil Aviation	1			1	11
5. Information Broadcasting	7	5	12 - 171	3	66 - 375
6. Mines	3			1	20
7. Steel	6	4	7 - 54	5	1.5 - 270
8. Chemical & Petrochemicals	4	3	25 - 141	3	40 - 190
9. Petroleum & Natural gas	23	18	7 - 243	10	2 - 60
10. Power	38	31	2 - 224	30	10 - 588
11. Cement, Paper, Newsprint & Sundry public sector industries	11	6	25 - 187	6	18 - 237
12. Railways	97	58	2 - 229	58	1 - 848
13. Surface Transport	30	27	1 - 115	23	2 - 108
14. Telecommunication	20	10	6 - 56	3	19 - 47

Source: Report of the Ministry of Programme Implementation, Govt. of India New Delhi.1991

Although there are number of factors of responsible for time and cost overruns, the Planning Commission (1992) has identified the following reasons in public sector projects.

- Inadequate investigation and project formulation, frequent changes in scope and revision of drawings due to inadequate project preparation.
- Delay in clearance from various regulatory agencies.
- Delays in land acquisition.
- Delays in supply of equipment by suppliers.
- Inadequate release of funds.
- Management problems such as personnel, labour and contractor disputes, mis match of equipment, etc., and
- Unforeseeable reasons such as adverse geo-mining conditions, natural calamities, etc.

The problem of time and cost overruns is applicable not only to the Central Public Sector Projects but also to other projects such as private sector projects, joint sector projects, state sector projects, etc. A study made by the Industrial Development Bank of India (IDBI), on 298 private projects assisted by it during the period 1964-1980 has shown that as many as 76 percent of the assisted projects had suffered cost overrun. This cost overrun, on an average, had been as much as 23 percent of the initial project costs. As per the study, the average time overrun was 10 months.

The study further reveals the following: the private projects belonging to the intermediate goods industry had the highest cost overrun and longest time overrun. Time and cost overruns depicted contrasting behaviour in backward areas. While projects in backward areas had the longest delay, cost overrun was the highest in non-backward areas.

Projects promoted by MRTP companies had fewer overruns both in time and cost, as compared to projects promoted by non-MRTP companies. New projects were more vulnerable to overruns than expansion and diversification projects of existing companies. Projects promoted by new entrepreneurs faced larger overruns as compared to projects promoted by existing entrepreneurs.

High construction costs, high cost of indigenous machinery, import and customs duties were the most important causes of cost overrun. A component wise analysis has indicated that margin money for working capital had the highest cost overrun followed by land and buildings. Delays in delivery of machinery, finalising financing arrangements, etc., were the most important reasons for time overrun. (IDBI Study)

Cost and time overruns of public sector projects have been persisting and mounting, despite repeated studies and reports highlighting the pitfalls to be avoided and the care to be taken in formulating, evaluating, selecting and implementing the projects. Unproductive investments of high magnitudes with sizeable initial cost overrun and subsequent accumulation of losses cannot but result in huge budgetary deficits, retarding the nation's economic development.

The implications of time overrun on project performance are many. Some of them are:

- The longer the completion time, the larger the accumulated recurring cost or period costs of the non-productive category.
- Delay in training and placement of technical and operating personnel at appropriate times will result in idling of heavy investment already committed, and project costs are bound to rise, even as revenue generation is getting deferred.

- In the national context, many projects have inter-linkages and delays in some will lead to corresponding delays in the others, adversely affecting economic progress.
- Delays might also provide opportunities to other enterprises to acquire and reap benefits from more current technologies. Market conditions might change, dampening the prospects of the projects.

Again, some of the many adverse effects of cost overrun of projects are:

- Cost overrun upsets national planning and resource allocation by demanding continuos funding support from the government for meeting cost overrun and formulating good the losses in operating phases.
- The major objectives in promoting these projects, such as import substitution, export promotion, etc., remain unfulfilled and with the inevitable high cost of operation and high product costs, and low volumes of outputs due to low capacity utilisation, the nation finds itself in a predicament, where it has to import more and export less.
- The massive cost overrun are a direct drain on the national exchequer.
- Public enterprises are committed to discharging a wide range of social obligations, but they are unable to take up these obligations with a degree of consistency and success, in view of their non-profitable operations.
- Huge cost overrun push up the domestic prices of commodities and fuelling inflation.
- At the enterprise level, there are problems of securing finance to meet the cost overrun. The projects suffer further adverse effects, because of inadequacies of funds and substantial procedural delays in obtaining funds.
- With more funds to be borrowed to finance cost overruns, there is also the need to meet the increased commitment towards interest payments, and in the face of unprofitable

functioning, many projects fail to meet their payment obligations in respect of principal and interest. Where the project cost overruns are excessively high, the units become sick right from the start.

Federation of Indian Chamber of Commerce and Industry (FICCI, 1989) made an estimate of economic losses in Central Public Sector projects and private sector projects on account of time delay in implementation. Table 1.2 indicates the cost of delay in public sector and private sector projects.

Table 1.2

Cost of delay in Public and Private Sector Projects (Rs. Crores/annum)

Economic Losses	Public Sector		Private Sector
	39 completed projects	174 ongoing projects	
Loss in Production	4763	22521	7460
Loss in Revenue to Govt.	977	4617	1567
Loss in Exports	294	1389	448

Source: Cost of time, FICCI, 1989, pp.3, 4 & 9.

From the above discussion, we can get a clear-cut picture of the gravity of the incidence of time and cost overruns in public and private sector projects in India. The root cause of this malady can be traced to the various inadequacies in project planning, implementation and control. Even though this depicts the general picture of industrial projects, we cannot jump to the conclusion that in India, no project, especially in the public sector, is completed on schedule. There are evidences to the fact that effective project planning, implementation and control by

the project authorities have resulted in completion of projects with out any time and cost overruns. Table 1.3 reflects some of these projects.

Table 1.3

Central Projects Completed on Schedule

Name of Projects
Projects completed without any time and cost overruns
(1) Kudremukh Iron Ore Project
(2) Auraiya Gas-based Power Plant
(3) Salem Steel's Plant Phase II expansion
(4) Durgapur Steel Plant's Coke Oven Battery No.I
Ongoing projects ahead of schedule
(1) Dudhichna Open Cast Coal Mine in Sidhi (MP)
(2) Siho - Ramdayalnager Railway Project
(3) EIOB Exchange Project (Chandigarh) of the Telecommunications Department.

Source: Various Reports of the Ministry of Programme Implementation, Govt. of India, New Delhi.

Most of the projects in Kerala have been faced with problems relating to planning, implementation and control which in turn, invariably resulted in time and cost overruns in these projects. The annual reports of the Comptroller and Auditor General of India (1980-1998) came out with a number of conclusive evidences of poor project planning, implementation and control in public sector industrial projects in Kerala.

The quality of project planning in state public sector projects was rightly gauged by a High Level Committee on Industry, Trade and Power constituted by the Government of Kerala (1984) - "some of the industries in the public sector have been established without adequate pre-investment survey, market research or examination of suitable technical alternatives."

The Eighth Plan Proposal of Kerala State Electricity Board (1991) pinpoints several cases of time lag and cost overruns in its generation and transmission projects.

Baby Thomas (1994) in his research study on the time lag and cost overruns of infrastructure investment in Kerala, has highlighted that both irrigation and hydal projects are affected considerably by time and cost overruns. The table 1.4 indicates the degree of overruns in these projects.

Table 1.4

Time and Cost overruns of Infrastructure Investment in Kerala

Projects	Time lag %	Cost overrun %
12 Completed hydro electric projects of Kerala	62.71	115.89
15 Ongoing hydro electric projects	127.47	85.46
10 Completed Irrigation projects	191.66	27.33
17 Ongoing Irrigation projects	359.0	532.64

While highlighting the problems and deficiencies related to public sector enterprises, the White Paper presented by the Government of Kerala (1998) has emphasised the need for simplification and streamlining of government procedures, pay patterns, appraisal of technology and monitoring of project implementation.

It is obvious from the discussions so far made that the industrial projects in India have been faced with multifarious problems regarding planning, implementation and control, leading to colossal time and cost overruns. This has invariably retarded the industrial progress. Kerala is also under the clutches of the malady of overruns.

In a capital scarce state like Kerala, well-conceived projects and their efficient execution is an effective measure in the use of limited resources. Though several studies were conducted at the national level to examine the problems of overruns, no serious attempt has been made at the state level to study the various aspects of overruns with respect to industrial projects. Hence the present study "Time and Cost Overruns of Industrial Projects in Kerala" is worth noting.

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CHAPTER 2

REVIEW OF LITERATURE

The purpose of the present chapter is to have an overview of the various studies, both national and international relating to project planning, implementation and control. This is done with a view to get a clear picture of the problems of time and cost overruns and their impact on industrial projects and to ascertain the gap prevailing in the available literature.

There are a number of studies on industrial projects being conducted by various individuals and institutional bodies to have a cursory glance of project planning, implementation and control mechanism in India and abroad. These studies stress the need for effective utilisation of the nation's scarce and limited resources.

UNIDO in its report (1997) points out that many developing countries and economies in transition, during the 1970's, invested a large proportion of public funds in typically capital intensive projects which were low quality.

The study conducted by Lawrence, Gary and William (1978) on capital budgeting techniques of U.S firms reveals that project risk is usually assessed subjectively and most firms require a higher rate of return for more risky projects.

Vijay and Ashwani (1997) in their study highlighted that the use of subjective, judgemental and non-standard techniques in the estimation of cash flows, risk analysis and the estimation of the appropriate cost of capital, had adversely affected the strategic nature of the capital budgeting process in Canada.

L.S. Porwal (1975) had made an empirical study on the various aspects of capital expenditure programmes in large manufacturing public limited companies in the private sector in India. According to him, "the most significant change in the capital budgeting process during the last one decade was that, in case of most large companies, the rule of - thumb practices were being superceded by more detailed analysis of the capital expenditure proposals, with the help of better techniques, before finally accepting or rejecting them".

S.C. Bensel (1980) points out that there exists a wide gap between theory and practice of capital budgeting, though it is being bridged over time and that capital budgeting is becoming more and more sophisticated day-by-day.

The Capital Budgeting Practice of Indian companies (I.M. Pandey: 1989) has showed that the evolving of investment idea is primarily a bottom-up procedure in Indian companies. Regarding, project evaluation methods, it is pointed out that pay back method is used in India as a primary method and IRR/NPV as a secondary method. The Indian managers have felt that pay back was a convenient method of communicating an investment's desirability and it best protected the recovery of capital - a scarce commodity in developing countries.

In his study, A.B.C. Raj (1977) had observed that in India, the public sector investment decision making was clouded by time consuming and cumbersome formalities.

P. Babu and A. Sharma (1995) in their study point out that quite a few companies have been violating one or more of the principles in determining the cash flows for capital budgeting analysis.

S.K. Singh (1990) brings to light the fact that number of agencies are involved in the planning and control of financial management of public enterprises in the country, viz., Board of Management, Administrative Ministry, Ministry of Finance, Bureau of Public Enterprises, Planning Commission, Director General of Technical Department and Public Investment Board. The multiplicity of agencies creates more hurdles for public enterprises and involves a lot of duplicacy of work leading to time lag.

N.P. Srinivasan (1981) in his study claimed that all types of investment decisions of the units studied, irrespective of the amount involved, are made only with the approval of the government. It causes much delay and at times provides opportunities to politicians and bureaucrats to influence the investment decisions of the selected units.

In another study, S.S. Khera (1977) had indicated that capital budget estimates are knowingly kept low so as to get the project through the several financial and other hurdles that would hold up its start.

S.S.A. Aiyar (1998), in his study highlighted that many companies still inflate project costs up to 25 percent, and use this over invoicing to reduce their own contribution to the project cost.

A study conducted by the Punjab, Haryana and Delhi Chamber of Commerce and Industry (PHDCCI) in 1995 shows that, during 1991-1994, 3093 projects were proposed, involving an aggregate investment of Rs. 7,76,466 crores. Forty Five percent of the investment proposals were either awaiting approval or yet to be executed. And during that period, about 51 percent of the investment proposals were from the private sector while 42 percent were from the public sector, and the remaining 7 percent in the joint sector.

M. Ramachandran (1998) came out with the finding that the failure of development projects are mainly the result of poor identification and preparation of projects which form the first two stages of the project planning process.

A High Level Committee on Industry, Trade and Power constituted by the Government of Kerala in 1984 observed that some of the industries in the public sector have been established with out adequate pre-investment survey, market research or examination of suitable technical alternatives.

The Annual Reports of the Comptroller and Auditor General of India (1980-1998) came out with a number of constructive evidences of poor project planning and control in public sector industrial projects in Kerala.

The annual report of the Comptroller and Auditor General of India (CAG) 1995 gives yet another dimension to the problem of delays in project implementation by citing several instances of non-achievement of targets, unproductive expenditure on the procurement of equipment and non-judicious placement of purchase orders and delays in supply and recovery.

P.R. Wilson (1981) in his study highlighted the problems of the public sector in project formulation, implementation and control. Poor project planning and control in state public sector result in increase in debt financing, increase in interest charges, idle machinery and high break even point.

The International Bank for Reconstruction and Development (1980) in its report observed that their projects in underdeveloped countries take longer than similar projects in developed

countries. Due to uncontrolled delays and poor management of resources, the number of unfinished projects has been rising from year to year. The observation further indicates that this situation is largely due to an almost complete absence of modern management techniques in the implementation of projects.

The Operations Evaluation Department of the World Bank (1987) has conducted sector wise and region wise evaluation of 187 projects. The study shows that the average time overrun is 60 percent and the average cost overrun is around 2 percent. Table 2.1 shows the average time and cost overruns.

Table 2.1

Average Cost an Time Overruns - World Bank Projects

Particulars	**Average Overruns***	
	Cost %**	**Time %**
Sector :		
Agriculture and Rural Development	0	51
Industry and Energy	8	53
Human Resource and Technical Assistance	0	83
Infrastructure and Urban Development	2	73
Structural Adjustment lending		24
Region :		
Africa	-6	60
Asia	-3	44
Emena	5	76
Latin America	16	61
Total	2	60

* Unweighted average of the percent discrepancy between actual and appraisal values for individual projects.
** Excludes DFC, agricultural credit, SAL and technical assistance projects, for which the concept of project cost is applicable.
Source: Project performance results for 1987, A World Bank Operations Evaluation Study, p. 13.

The study further points out that the contributory factors of delay in implementing the projects are unrealistic scheduling at the time of appraisal; in particular at the start up phase, including procurement, unanticipated shortages, borrower resources both internally generated and contributed by the government, and change in project scope during implementation.

Bromilow (1974) in his study conducted in the building industry of Australia found that only one-eighth of building contracts were completed within the scheduled completion dates and that the average time overrun was 40 percent.

Chalabi and Camp (1984) in their study on overruns of construction projects in developing countries, have suggested that adequate construction planning at the very early stage of the projects is important to limit delays and cost overruns.

Sebastian Morris (1990) in his study outlines that delays in project implementation and the attendant cost overruns have become a regular feature of public sector projects in India. Inadequate project preparation, leading to change in scope during implementation is the most important reasons for cost and time overruns.

N.J. Jhaveri (1977) had observed that "a sizeable increase in interest cost due to cost overrun on industrial units is compounded by the fact that a significant part of the capacity remains underutilised and there is no sustained growth in demand for industrial goods".

In 1978, the Industrial Credit and Investement Corporation of India Ltd (ICICI) made a review of the performance of joint sector projects assisted by it. It examined the financial profitability of these projects in general and their time and cost overrun in particular. It found that the

performance of joint sector projects was quite comparable with the performance of both the public sector and private sector.

The study of B.M. Naik (1981) indicates that slippages in project time and cost schedules are a matter of serious concern to managers and the government. This study emphasises the significance of effective scheduling and monitoring to bridge the project gap.

The study by Prof. S.C. Kuchal (1984) has identified that the factors responsible for the success and sickness of new projects. The success rate of new industrial projects is 33 percent in the joint sector, 6 percent in the public sector and 61 percent in the private sector. The study further indicates that only 6 units implemented their projects without any time and cost overruns. The average cost overrun in these projects is 57.3 percent and time overrun is 27 months. The causes of overrun are: location in backward areas, size of the project, inflation and lengthy implementation period.

Guruprasad Murthy (1985) found out that the high capital-output ratios compounded with delays in completion of projects and inflation acts as a drag on the economic performance of the individual projects and therefore, the national economy.

M. Krishnankutty (1986) conducted an analysis of 15 companies of different industrial groups belonging to the private, public and joint sectors during the period 1984 to 1986. These projects were new and had incurred cost overruns to the tune of 24.I percent.

A.K.A. Rathi and A. Tripathy (1986) undertook a survey of the project managers to have their view on Indian private and public sector projects. The major findings of this study are:

(a) All projects, irrespective of their size and completion schedule, have cost and time overruns ranging from 2.8 percent to 68.8 percent and 11.5 percent to 80 percent respectively.

(b) Cost and time overruns are prevalent both in the public as well as private sectors.

(c) Delays are not limited to new projects alone. Projects under modernisation as well as expansion also had time overruns to the extent of 33 percent.

(d) No correlation could be established between the size of projects and overruns; and between the type of projects (new, expansion and modernisation) and overruns.

The Arjun Sen Gupta Committee (1986) on public enterprises commented that, " despite such rigorous scrutiny and government intervention, in practice, the system does not really provide greater leverage in regulating the public sectors drift on resources. Unforeseen cost overruns, which have to be financed, losses which require budgetary support and delays in the implementation of projects actually increase the uncertainty with regard to budget formulation whereas excessive government intervention prove to be time consuming and at the same time erode the autonomy and responsibility of the public enterprise management in implementing the projects".

A study conducted by the Industrial Development Bank of India (1987) to assess the cost and time overruns in 298 private sector projects assisted by it during 1964-65 to 1979-80, has indicated that nearly 76 percent of the assisted projects have cost overrun around 23 percent of the initial project cost, and it is much higher at 30 percent for projects where cost overruns have occurred. The average time overrun in these projects is 10 months. The trend in cost and time overruns of these project are depicted in tables 2.2 and 2.3.

Table. 2.2

Trends in Cost Overruns

Year	Average Cost Overruns (%)
1964 - 65 to 1969 - 70	19.7
1970 - 71 to 1974 - 75	30.2
1975 - 76 to 1979 - 80	20.7

Source: IDBI Study, 1987

Table 2.2 shows that the maximum cost overrun of 30.2 percent was registered during 1970-71 to 1974-75 in private sector projects.

Table. 2.3

Frequency Distribution of Delay in Implementation

Delay in Completion (Months)	No. of Projects	% of Distribution
37 and more	14	5.2
25 to 36	33	12.3
13 to 24	65	24.2
7 to 12	67	24.8
1 to 6	51	19.0
1 and less	26	9.7
0	I3	4.8
Not available	20	
Total	**289**	**100**

Source: IDBI Study, 1987

Table 2.3 indicates that in private sector, 24.8 percent of the projects had a time delay of 7 to 12 months and 24.2 percent of the projects had 13 to 24 months time delay.

A study by the Federation of Indian Chamber of Commerce and Industry (FICCI) (1989) on 297 central public sector projects revealed that the time overrun was around 20 months and the cost overrun amounted to 59 percent of the estimated costs of projects. As per the study, delay in implementing the projects occurred due to various reasons such as inaccurate estimation of project cost, delay on account of environmental clearances, inadequate planning for infrastructure development, poor selection of consultants, delay in finalisation of detailed engineering, delay in industrial licences, import licences, foreign exchange release and other clearances and ultimately delays in supply of critical equipment.

Another study conducted by the FICCI (1989) on 400 private sector projects has indicated that the time overrun was around 6 months and cost overruns worked out to 22 percent of the initial project cost. This study highlighted the important causes of overrun in private sector projects, as delay by Government in giving various clearances, delay by financial institutions in granting finance through security and documentation formalities, delay due to change in project concept and layout and late supply of critical equipment to the plant site, etc.

V.P. Chitale (1991) brings out the fact that 68 out of the 88 overrun industrial projects belong to the five years 1973-74 to 1977-78 and barely 4 projects were reported to have overruns in the late sixties.

Pahwa (1991) in his study claimed that about 50 percent of projects suffer from the cost overrun evil. The inability of the promoter to raise his contribution in time or as per the requirement of the conditions stipulated at the time of sanction is the reason behind this.

Ravi Varma Tampuran (1992) has pointed out the existence of high time and cost overruns in the ongoing hydroelectric projects in Kerala.

The Annual Reports of the Kerala State Electricity Board (1973-92) contain certain cases of delay and cost overruns in its generation and transmission projects of KSEB. The Eighth Plan Proposal of KSEB (1991) analyses some cases of time lag and cost overrun in its projects.

Baby Thomas (1994) in his study has analysed the time lag and cost overruns of infrastructure investment in Kerala. The results of the study are depicted in table 2.4. The table clearly illustrates that both hydroelectric and irrigation projects in Kerala are affected considerably by the time lag and cost overruns. The problems of time and cost overruns are very acute in ongoing irrigation projects.

Table 2.4

Time Lag and Cost Overruns of Infrastructure Investment in Kerala

Projects	Time Lag (%)	Cost Overruns (%)
12 Completed hydroelectric projects of Kerala	62.71	115.89
15 Ongoing hydroelectric projects	127.47	85.46
10 Completed irrigation projects	191.66	27.33
17 Ongoing irrigation projects	359.00	532.64

A study made by Capital Market (1996) on large projects nearing fruition revealed that many of them have raised sizeable funds from the public in the recent past and that as per the projections made in various prospectus, projects worth Rs. 22,500 crores, Rs. 19,000 and Rs. 18,500 crores were to fructify in 1994-95, 1995-96 and 1996-97 respectively. Of these projects, many are delayed, some were on schedule, while a few odd ones were ahead of schedule. Due to huge cost and time overruns, some projects turned non-viable.

H.B. Bhattacharya (1997) in his study outlines that the planned outlay on 254 projects in the Eighth Plan was in the order of Rs. 78,879 crores, but actual investments up to the end of March 1995 were Rs. 44,228 crores. The projects' implementation has been postponed due to the non-availability of funds from external sources. 61 out of the total number of projects got external assistance - World Bank (21 projects), Asian Development Bank (17 projects) and through the bilateral assistance route (23 projects). But more than 30 of these projects have suffered cost overrun.

The Ministry of Programme Implementaion in its report (1997) brings out the fact that the total costs of 410 central projects have escalated by over Rs. 27,771 crores. While 90 percent of this is accounted for by 207 delayed projects, a sector-wise analysis indicates that power projects lead the list of overrun projects, with the anticipated costs exceeding the latest approved cost by Rs. 15,727 crores; railways, and Iron and steel occupy the second and third positions with cost overruns of Rs. 3546.1 and 2681.4 cores respectively. (Table 2.5) The report further reveals that the most important factor contributing to the delay is sanction without adequate studies and investigations and without due regard for the state of preparedness. This calls for re-prioritisation, so that projects nearing completion or those strategically important from inter-sectoral or other linkages point of view are adequately funded.

Table 2.5

Cost Overrun in Central Projects

Sectors	No. of Overrun Projects		Total Anticipated Cost Less Latest Approved Cost	
	Cost Overrun	Time Overrun	Rs. (Crores)	Percentage
Power	39	29	15727.2	51.4
Railways	123	63	3546.1	16.6
Steel & Iron	12	4	2681.4	26.0
Petroleum & Natural Gas	42	21	1662.3	6.6
Coal	72	20	1464.0	12.0
Atomic Energy	6	5	1104.5	27.3
Surface Transport	38	26	1037.5	22.1
Civil Aviation	13	11	191.8	9.6
Fertiliser	7	4	118.2	2.4
Heavy Industry	1	0	115.8	60.5
I & B	7	5	27.0	9.6
Chemical & Petrochemical	4	4	20.6	0.5
Finance	1	1	0.0	0.0
Telecommunication	39	10	0.0	0.0
Others	6	4	75.0	31.9
Total	**410**	**207**	**27771.4**	**22.7**

Source: Report of the Project Monitoring Division, Ministry of Planning and Programme Implementation. New Delhi, 1997.

A study by Mirdul Kanti Biswas (1989) reviewed the performance of industrial, agricultural and other projects in Bangladesh. In this study, 50 public sector projects and 25 agricultural and other projects were evaluated which indicated poor performance of these projects. The major factors responsible for this unsatisfactory performance have been summarised were, poor project selection and appraisal, delay in implementation due to procurement delays, poor

pricing decisions, anomalies in the overall structure of industrial incentives, weak public sector management, poor selection of project managers and inadequate assignment of responsibility to the project team.

Chan and Kumaraswamy (1997) in their study on the causes of time overrun in Hong Kong construction projects bring out the fact that poor site management and supervision, unforeseen ground conditions, low speed in decision making involving all project teams, client oriented variations and necessary variations of works appear to be five significant sources of construction overruns.

A report published by the Economic Times (1998) on the overruns of public sector projects in India, pointed out the reasons of project overruns. In the first place, the overruns are based on project cost estimates that do not take in to account inflation. Secondly, the detailed project reports are not really detailed enough to cover all costs. Under funding leads to time overrun, which in turn, results in cost overrun. Project monitoring is often turns to be a ritual. By the time information reaches the final monitoring authority, after it is collated, approved and passed on by one level of government to the immediately superior layer for stage by stage transmission further upwards, effective monitoring has already been lost.

K. Rajeshwar Rao (1998) outlines that most of the problems in project management of public enterprises in India arise from the loopholes involved in the organisation structure, uncertainty about availability of materials and work flow, remoteness regarding location, resource constraints and frequent changes in Government policies.

Rao and Prasad (1987) claimed that in spite of the utmost care taken and the definite procedure that is outlined, experience and empirical evidence show that there is lack of an adequate working out of project economics.

Prasad, Rao and Kiranmayi (1987) in their study came out with the findings that there are enough number of cases where the projects are not well-conceived, which results in complete non-commissioning or commissioning after taking so much time, sudden abandonment of the proposals and the total irrelevance of the project in the changed circumstances.

M.S. Murugan (1991) in his study found out that time overruns for industrial projects resulted in loss of production, loss of revenue and loss of profit. The impact of overruns not only affects the individual projects at micro level but it also affects them at macro level in the form of hindrances to industrial and economic growth. As per the study, the public sector projects were more vulnerable to cost and time overruns compared to private and joint sector projects.

P.K. Joy (1996) after analysing a number of projects, points out that the project overruns is a frightening economic problem facing India. It wastes away much of our scarce financial resources, delays the development process and also makes our products costlier.

Gopalakrishnan (1996) claimed that unproductive investment of large magnitude, with sizeable initial cost overrun and subsequent accumulation of losses cannot, but result in huge budgetary deficits, retarding the nation's economic development.

D.C. Murphy and B.N. Baker (1974) conducted a study on the factors affecting project effectiveness in U.S.A. Their study identified that the major variables which affected the

success of projects include project manager, project team, parent organisation, client organisation and managerial techniques.

Rajan (1969) in his study points out that, very often the rosy picture painted in the project reports of public sector companies, doesn't actually materialise, resulting in psychological frustration and even public criticism.

T.R. Ardhanari (1979) in his study has suggested that the Indian engineering firms should be encouraged to undertake total responsibility of the entire project for cost, time and quality, with all necessary back up guarantees from foreign contractors.

White paper on Public Sector Enterprises in Kerala (1998) stresses the need for simplification and streamlining of government procedures, pay patterns, technology appraisal and project implementation monitoring.

N.G. Nair (1986) in his study has revealed that the positive role of the government would bring down the cost of investment. There are instances where issue of import licence, industrial licence, approval of foreign collaboration etc., get unduly delayed. In collaborations involving foreign credit arrangement, the situation is much worse.

A review of the literature so far made clearly shows that poor project planning, implementation and control and the subsequent cost and time overruns are ubiquitous features that have been posing serious concern at all levels - state, national and international. It results in wastage of the nation's scarce resources and retards the socio-economic progress. Although several studies peripheral on project overruns have been made at the national level, no serious attempt has

been made at the state level to identify the magnitude of overruns, their causes and impacts on industrial projects.

The present study "Time and Cost Overruns of Industrial Projects in Kerala" is an earnest attempt to probe in depth the time and cost overruns and their impact on industrial projects. The study places emphasise on the identification of the real reasons behind the cost and time overruns. It also covers the present project management practices of industrial projects in Kerala.

The next chapter deals with design of the study covering statement of research problem, significance of the study, objectives, hypotheses, methodology, scope and limitations and scheme of the report.

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CHAPTER 3

RESEARCH DESIGN

3.1 Statement of Research Problem

Projects are basic building blocks of development of a nation. They consume a considerable amount of its scarce resources. Therefore, sound planning and efficient executions of projects are vital for sustaining the process of socio-economic development. Completion of projects within the time and cost schedules is a must for success. Empirical evidences indicate that time and cost overruns are the major causes for project failures. These overruns are mainly the result of poor project planning, implementation and control.

The quantity and quality of investments are adversely affected by time and cost overruns. The time and cost overruns affect not only the economic growth but also the utilisation of scarce resources. The dictum " resource saved is resource generated", is most relevant in a resource crunch country like India in general and Kerala in particular.

In an economy like Kerala which is charecterised by low level of development and poor supply of investible funds; the adverse impact of overruns on growth is high. Slippages of the projects and the consequent overruns seemed to be high in most of the projects, especially, in public sector industrial projects. This is all the more paradoxical when we realise the fact that such things are happening while the state has been experiencing acute shortage of funds. Hence the problems focussed in this study are:

(1) Whether the industrial projects are properly planned, implemented and controlled?

(2) What is the magnitude of time and cost overruns in industrial projects?

(3) What are the causes of time and cost overruns?

(4) What is the impact of time and cost overruns on industrial projects?

3.2 Significance of the Study

Investment decisions assume significance because they form the core and critical component of the process of industrial growth. Therefore, it becomes a matter of paramount importance that investments undertaken with the limited resources available, are to be selected and executed with utmost care. Project overruns and their impact aggravates the scarce capital situation, causing structural deformities in the economy with consequential adverse effects on the development process. This critical situation has tempted an enquiry in to the time and cost overruns and their impact on the industrial projects in Kerala.

3.3 Objectives of the Study

The study sets the following objectives:

1. To study the project management practices of industrial projects in Kerala.
2. To examine the magnitude of time and cost overruns in industrial projects.
3. To identify the causes of time and cost overruns.
4. To evaluate the impact of overruns on industrial projects.

3.4 Hypotheses

1. Defective project planning, implementation and control have resulted in time and cost overruns, which in turn, have affected adversely the viability of industrial projects.
2. The magnitude of overruns is not significantly different between projects in different categories, viz., sector wise, industry group, purpose wise and promoter wise.
3. The relationship between time and cost overruns is not significant within categories of projects.

3.5 Methodology

The study is partly descriptive and partly analytical in nature. It employs descriptive methodology for studying certain aspects of project management practices and identifying the causes of overruns. The study is analytical with respect to the magnitude of overruns and their impact on industrial projects.

The study covers overrun industrial projects in Kerala. The sample consists of 24 medium and large scale industrial projects. Out of the total samples, 12 projects belong to the public sector and 12 projects are from the private sector (Appendix I). Random sampling method is used for collection of samples. The study pertains to industrial projects commissioned during a period of 15 years from 1983 to 1998. During the period of study, 57 public sector industrial projects were commissioned, out of which 20 percent was selected as the sample and the same percentage of samples was collected from 63 private sector overrun industrial projects. The public sector overrun projects were compiled from various governmental reports and private

sector overrun projects were identified from the project memorandum files of Kerala State Industrial Development Corporation (KSIDC).

Both primary and secondary data were used for the study. Primary data relating to project management practices and causes of time and cost overruns have been collected from project managers through a pre-tested structured interview schedule (Appendix II). Interviews and discussions were also made to get a deep insight into the problems in project planning, implementation, monitoring and control. Secondary data were used to assess the magnitude of overruns and their impact. Details of sample projects were collected from project reports and project completion reports (Appendix III). Reports of the Comptroller and Auditor General of India, reports of governmental and non-governmental agencies, journals, books etc., also form the sources of secondary data.

For the purpose of analysis, industrial projects were classified sector wise (i.e., public and private), industry group (capital, consumer and inter mediate), promoter wise (new and existing) and purpose wise (i.e., new projects and expansion, modernisation and diversification). Number of projects in each category is presented in table 3.1.

Table 3.1

Classification of Sample Projects

Sl .No	Classifications	No. of Projects
1	**Sector Wise:**	
	Public Sector Projects	12
	Private Sector Projects	12
2	**Purpose Wise:**	
	New projects	14
	Expansion, Modernisation & Diversification (EMD)	10
3	**Promoter Wise:**	
	New Promoters' Projects	12
	Existing Promoters' Projects	12
4	**Industry Wise:**	
	Capital Goods Projects	5
	Intermediate Goods Projects	9
	Consumer Goods Projects	10

Data collected were edited, processed and appropriately presented. Mean and percentages have been used to analyse the project management practices, magnitude of overruns and identification of causes of overruns and their impact. Correlation is applied to study the relationship between time and cost overruns. In order to test the significance of correlation, 't' test is used. Mann-Whitney 'U' test is employed to test the significance of the difference in overruns between public and private sector projects, new promoters' and existing promoters' projects, and new and expansion, modernisation and diversification projects. The significance of the difference in overruns of industry group projects is tested with the help of Kruskall-Wallis 'H' test.

The impact of time overrun has been studied in terms of loss of production, loss of revenue, loss of profit and loss of employment. The percentage variation in pre-overrun and post-overrun ratios is taken for assessing the impact of cost overrun. The ratios used in this connection are: Debt-Equity Ratio, Debt-Service Coverage Ratio (DSCR), Return On Investment (ROI) and Net-Profit Ratio (NPR). In addition, percentage variations in pre-overrun and post overrun Break-Even Point (BEP), Internal Rate of Return (IRR) and Pay-Back Period (PBP) were computed. On the basis of analysis, conclusions are drawn and recommendations are made.

3.6 Scope and Limitations of the Study

The study is confined to 24 medium and large-scale overrun industrial projects. Both public and private sector projects are covered under the study. The project management practices, magnitude of overruns, causes of overruns and their impact form part of the study.

Projects in the joint and co-operative sectors are outside the scope of the study. The focus of the study is on overrun industrial projects. Infrastructural projects, public utility projects and underrun projects are not covered under the study. The post investment performance of the project is out side the purview of the study.

3.7 Scheme of the Report

The thesis is presented in seven chapters. The First chapter provides an introduction to the study. The Second chapter presents a review of literature. The Third chapter is concerned with research design. It includes statement of research problem, significance of the study,

objectives, hypotheses, methodology, and scope and limitations of the study. The Fourth chapter deals with project management practices. The Fifth chapter deals with the analysis of overruns and their causes. The impact of overruns on industrial projects is discussed in the Sixth chapter. Chapter Seven presents the conclusions and recommendations.

CHAPTER 4

PROJECT MANAGEMENT PRACTICES

This chapter deals with the project management practices and financing of industrial projects under study. The project management practices covers the various phases of project planning, implementation and control.

4.1 Concept of a Project

A project is a unique and non-repetitive activity, aims at systematically coordinating inputs activity for intended output. According to Quirin (1967), a capital investment project may be defined as "any project, which involves the outlay of cash in return for an anticipated flow of future benefits." This definition tells us that while the probability of sacrifice, in terms of resource commitment, is one, the probability of realising the future benefits, expected or anticipated, lies between zero and one. In the words of Middleton (1965), "capital expenditure projects are those which frequently involve an enterprise in large outlays and usually commit it to a particular course of action for a number of years." Again, he continues "……..once made, these decisions cannot easily be revoked and wrong decisions may prove very injurious to the enterprise." The above definitions depict the characteristics of an investment project as:

(a) Resource commitment is definite;

(b) Resources committed are inflexibly tied for a long period of time and cannot be easily reversed or revoked except at a loss;

(c) Returns are probabilistic and may occur or may not occur, thus raising the question of risk and uncertainty; and

(d) Returns are expected to occur over a long period of time in the future, resulting in a long gestation period for the recovery of the committed cash outlay.

The inherent risk and complexities attached to projects paved the way for the emergence of a separate discipline called 'Project Management'. The introduction of project management approach has a lasting impact in bringing about new decision making process, new organisational interface and relegating the performance of individual department to the total project. Project management involves harnessing many skills in a cohesive manner to accomplish a task within cost and time schedules. It deals with planning, scheduling, monitoring and controlling the complex non-routine activities that must be completed to attain the pre-determined objectives of the project.

4.2 Practice of Project Management

There is no doubt that sound planning and efficient execution of industrial projects is a vital requirement for industrial development. Since the introduction of Five Year Planning in our economy, we have been investing large sums of money in various projects with a view to improve the socio-economic conditions of the people. These projects are designed with the aim of earning adequate returns through efficient management, to provide for future development. But our experience shows that there are several shortcomings in attaining the objectives of the proposed projects. It is observed that a number of projects have taken longer time to complete than initially estimated, benefits realised have later than expected, incurred larger capital cost than originally planned and, consequently, the returns on capital invested have been lower than expected, at the time of initial approval of projects. The inadequacies in project planning were highlighted by the Administrative Reforms Commission (ARC) in its report of the Public

Sector Undertakings (1967). The report says ".....one of the main reasons for the poor performance of public sector projects has been the lack of proper attention being paid to the initial planning of projects. While planning projects, all the steps required to be taken during the project formulation stage are not followed with the result that projects have been executed on the basis of incompletely conceived plans and estimates." Therefore, it is necessary to have a scientific and systematic management in projects planning, implementation and control.

It is observed that the practice of project management varies widely in Kerala, depending upon the size of the project, organisations involved in it and their experience in handling projects and related factors. In order to get an overall perspective of project management practices, the views of project managers, belonging to public as well as private sectors were gathered through a structured interview schedule.

4.3 Project Planning

4.3.1 Project Identification

This is the first step in project planning. Project identification is concerned with the collection, compilation and analysis of economic data for the eventual purpose of locating possible opportunities for investment and with the development of the characteristics of such opportunities (Vasant Desai 1992). The impetus to set up a project can come from different sources such as own source, research and development, technical consultancy organisations, state industrial development corporations, foreign collaborators, etc. The table 4.1 depicts the sources of the project identification of the industrial projects under study.

Table 4.1

Project Identification

Sources of Identification	Private Sector	Public Sector
Own Sources	8 (66.66)	8 (66.67)
Foreign Collaborators	2 (16.67)	
Kerala State Industrial Development Corporation (KSIDC)	2 (16.67)	
Technical Consultancy Organisation		3 (25.0)
Research and Development		1 (8.33)
Total Projects	**12 (100.0)**	**12 (100.0)**

Note: Figures in brackets indicate percentages.

The table reveals that out of the total 24 sample projects, 8 projects each from private and public sectors were identified with the help of own source. In public sector, the projects were identified at the unit level or government level. In private sector, the own source of identification is the entrepreneur or the promoter. It is also seen from the table that 3 public sector projects were identified by technical consultancy organisation and the remaining 1 project was identified with the help of research and development wing. In the private sector, foreign collaborators and KSIDC identified 2 projects each. It is revealed from the analysis that for identification of projects, both private and public sectors were depended more on own source rather than external sources.

The classification of sample projects based on purpose is given in table 4.2.

Table 4.2

Purpose wise Classification of Projects

Classification of Projects	Private Sector	Public Sector
New Projects	8 (66.67)	6 (50.0)
Expansion Projects	2 (16.67)	2 (16.67)
Modernisation Projects	1 (8.33)	
Diversification Projects	1 (8.33)	4 (33.33)
Total Projects	**12 (100.0)**	**12 (100.0)**

Note: Figures in brackets indicate percentages.

The table indicates that out of the total 24 projects 14 are new projects. These 14 new projects are drawn from private sector (8) and public sector (6). The remaining 10 projects belong to expansion, modernisation and diversification projects. There are two expansion projects, each from public and private sectors, and the only modernisation project belongs to private sector. It is also noted that there are 4 diversification projects in public sector and only one in private sector. Hence it could be inferred that both public and private sectors have undertaken more number of new projects than projects for expansion, modernisation and diversification.

4.3.2 Project Formulation

Project formulation refers to a series of steps to be taken to convert an idea or aspiration into a feasible plan of action. The functions in the formulation stage are to study the technical, economic, financial and managerial aspects of all the alternative ways of accomplishing the

objectives of the project idea and to present the findings and supporting data in a systematic and logical order.

The problems in project formulation of public sector projects were clearly highlighted by ARC (1967), in its report. The ARC observed that planning has preceded in a piecemeal fashion, i.e., all the technical and economic aspects of the projects have not been considered together at one time. This has necessitated revisions of the project proposals and led to inordinate delay in the initial stage of project formulation.

The practice of project formulation in public and private sectors have been illustrated below:

(a) Estimation of Project Cost

This is an important step in project formulation. While determining the various costs involved in the projects, the factors such as market price of various fixed assets, government policy towards import of machineries, exchange rate fluctuations, market rate of interests, project implementation period, inflation rate, working capital requirements etc., should be taken in to consideration. The determinations of promoters' contribution, negotiations with various financial institutions etc., are based on project costs. Under-estimation of cost would lead to pumping of more funds, which are difficult to obtain and it may result in escalation of cost at a later stage. Over-estimation of costs, on the other hand, would end up in the rejection of the project, thus throwing away an investment opportunity.

Table 4.3 provides a view of the estimated costs of the public and private sector industrial projects under study. In the public sector projects, the share of the cost of plant and machinery

in the total project cost is 55.26 percentage. It includes both imported and indigenous plant and machinery. The technical know-how and engineering fees stands second with a share of 9.07 percent and the cost of building and civil works occupies the third position with a share of 8.91 percent of total estimated cost. The share of preliminary and pre-operated expenses forms 8.28 percent of the total cost. It is also seen that the provision made for meeting contingencies is only 5.41 percent of the total estimated cost. Though the projects in public sector are being experienced by high time overrun, the provision created for meeting escalations in capital cost is very meagre. It is also noted that land and site development cost constitutes 1.37 percent of the total estimated cost.

Table 4.3

Estimated Project Cost

Components	Public Sector		Private Sector	
	Rs. in crores	%	Rs. in crores	%
Land & Site Development	4.39	1.37	1.40	3.73
Building and Civil Works	28.52	8.91	3.39	9.02
Plant and Machinery	176.84	55.26	15.92	42.37
Technical Know-how- & Engineering Fees	29.01	9.07	2.53	6.73
Miscellaneous Fixed Assets	23.93	7.48	6.43	17.12
Preliminary and Pre-operative- Expenses	26.51	8.28	3.49	9.29
Provision for Contingencies	17.31	5.41	2.27	6.04
Margin money for Working - Capital	13.49	4.22	2.14	5.70
Total Project Cost	**320.00**	**100.0**	**37.57**	**100.0**

Regarding the estimated cost of projects in private sector, it is seen that the cost of plant and machinery constitutes 42.37 percent of total cost. The cost of miscellaneous fixed assets occupies the second position with 17.12 percent and preliminary and pre-operative expenses shared 9.29 percent of the total estimated cost. The contingency provision constitutes only 6.04 percent and the share of land and site development cost is 3.73 percent. From the above analysis it is observed that both in public and private sectors plant and machinery constitutes the major share of project cost and land and site development constitutes the lowest share.

It is revealed from survey of project managers that in most of the cases, project cost estimates were prepared on the basis of the previous experience and also with the help of the consultants. But in some cases, the estimates were made with reference to the quotations from suppliers. The project managers in public and private sectors are of the view that it was not at all possible to have a realistic cost estimate at the feasibility report stage, since soil investigations, detailed engineering design of plant and equipment, etc have not been completed and the rates of major suppliers/construction agencies were not available. In certain cases, the exact location of the project was not finalised at the feasibility report stage. Under these circumstances, the time and cost projections in the feasibility report could only be considered as an adhoc or intelligent guess.

(b) Contingency Allowance

Contingency provision has been an important component of project cost in every industrial projects. The project managers put forward various reasons for maintaining contingency provision in the project cost estimates.

(i) To cover the inflationary trend and unfavourable variation in foreign exchange rates during the implementation of projects.

(ii) To provide for changes that take place during the execution of engineering works.

(iii) To meet unforeseen developments and events during implementation of projects.

If these are the reasons for maintaining contingency provision in the project cost estimates, it is advisable to maintain a much higher level of provision than what it is. This is because of the fact that our economy has been faced with the problems of serious foreign exchange rate variations and high rates of inflation. But the analysis of project cost estimates pinpoints the fact that the sample industrial projects, both public and private sectors, have maintained only low amount as contingency provision. It is 5.41 percent in public sector and 6.04 percent in private sector projects (Table 4.3). Moreover, there are instances of non-incorporation of contingency provision in the project cost estimates.

(c) Project Time Estimation

The time required to complete a project depend upon the various factors such as size and scale of operations intended, type of technology to be adopted, liquidity position of promoters etc.

The study indicates that the average expected time for completing the all projects taken together came to 21 months. The estimated time for completing the public sector projects was very high as compared to the private sector projects. The average expected time for completing the public sector projects was 28 months, but it was only 13 months in private sector projects. It is also observed from the study that the estimated time for completing private sector projects

ranged from 6 months to 20 months. But in public sector projects, the estimated time ranged from 12 months to 54 months. This is mainly due to the strategic nature of public sector projects in the economy and the huge amount of money required for investments in these projects.

(d) Detailed Project Report (DPR)

A DPR contains information regarding economic, technical, financial, managerial and production aspects of the project proposed to be set-up. A well-perceived and well-made project report is essential for the success of a project. Although DPRs were prepared by all the projects under study, it is significant to observe that these reports contained numerous flaws and deficiencies, especially in the public sector projects. The various CAG Reports highlighted several instances of these serious problems. A few of them are summed up below:

In the case of Vitamin 'A' project of the Kerala State Drugs and Pharmaceuticals Ltd., the projection given in the DPR regarding the local availability of raw materials (i.e., Lemon Grass Oil), which prompted the establishment of the factory at Alleppey were belied. Even at the stage of trial production, the company was concentrating on production, utilising the imported raw materials. (CAG Report 1989, p. 84)

In the case of Kerala State Wood Industries Ltd., while formulating the DPR, the non-suitability of the Kerala teak for veneering was not considered. Due to non-suitability/non-availability of sufficient quality of wood, the main objective of the company, viz., utilisation of state forest resources for which the company was formed would not be achieved. (CAG Report 1989, p. 190)

(e) Cash Flow Estimation

It is revealed from the project reports of public sector sample units that they lack clarity as far as cash flow estimation is concerned. A number of projects mixed financial flows with operating flows. The problem of conceptual confusion has been observed in the treatment of depreciation, interest, tax etc. Although, the sample projects were claimed to have estimated cash flows on incremental basis, no adjustment had been made for opportunity costs and their incidental effects in many of the public sector projects. It is also observed from the study that for forecasting cash flows, many of the sample projects have chosen an arbitrary period of 5 to 10 years. It is significant to note that the economic life of the projects was not at all considered while forecasting the cash flows.

(f) Cost of Capital

In evaluating capital investment proposals, the importance of the cost of capital/cut-off rate cannot be undermined. It is seen from the study that the arbitrary judgement of the management seems to play a role in the computation of the cost of capital. A number of public sector projects used 12 percent as the cut-off rate. This is because of the stipulation given by the Planning Commission. The fallacious tendency of equating borrowing rate with minimum rate of return was also noticed in the case of some projects. The concept of weighted average cost of capital was not used by many of the public sector sample projects.

(g) Project Appraisal and Selection

Project appraisal and selection form another important step in the formulation of industrial projects. The important techniques of projects appraisal and selection are the following:

Non-discounted cash flow method:

(a) Pay-Back Period. (PBP)

(b) Average Rate of Return (ARR)

Discounted cash flow method:

(a) Internal Rate of Return (IRR)

(b) Net Present Value (NPV)

(c) Benefit Cost Ratio

(d) Risk and Sensitivity Analysis

Other methods:

(a) Return On Investment (ROI)

(b) Break-Even Point (BEP)

Pay back period represents the time required to recover the initial investment in a project out of its savings. The ARR is the ratio of net profit in a normal year to the initial investment. NPV takes into account the entire life of project by discounting the future cash inflows to their present values. The IRR is the rate of discount that reduces the NPV of a project to zero. Profitability index (Benefit Cost Ratio) indicates the ratio of the present value of future cash inflows to the cost of investment. In sensitivity analysis, IRR or NPV of a project is computed under different situations such as pessimistic, normal and optimistic. The element of uncertainty can be reduced by applying sensitivity analysis, at the project planning stage, by

finding the optimistic and pessimistic alternatives. Other methods like BEP and ROI are also important for evaluating projects. The proper applications of these methods are very important for ascertaining the financial viability of projects.

Table 4.4

Project Appraisal and Selection Techniques

Techniques	Private sector	Public sector
Non-discounted cash flow method:		
(a) Pay-Back Period. (PBP)	12 (100.0)	12 (100.0)
(b) Average Rate of Return (ARR)	3 (25.0)	2 (16.67)
Discounted cash flow method:		
(a) Internal Rate of Return (IRR)	12 (100.0)	6 (50.0)
(b) Net Present Value (NPV)	3 (25.0)	2 (16.67)
(c) Benefit Cost Ratio		
(d) Risk and Sensitivity Analysis	6 (50.0)	2 (16.67)
Other methods:		
(a) Return On Investment (ROI)	12 (100.0)	12 (100.0)
(b) Break-Even Point (BEP)	12 (100.0)	12 (100.0)

Note: Figures in brackets indicate percentages.

It is apparent from the data contained in table 4.4 that all the sample projects, whether in public or private sector, rely exclusively on pay back period for project evaluation. But another non-discounted cashflow technique, i.e., ARR is not popular as an appraisal technique. It is gratifying to note that IRR is the most popular discounted cash flow technique used by the

projects under study. All the private sector projects used the IRR method. But only 3 projects in the private sector employed NPV and none of them used benefit cost ratio. As far as public sector projects are concerned, IRR is applied by 6 projects and 2 projects used NPV. It is clear from the table that none of the projects adopted benefit cost ratio. It is also found that risk and sensitivity analysis is undertaken rarely in public sector projects. Sensitivity analysis is used by two public sector projects only. However, 6 projects in the private sector have undertaken sensitivity analysis. Both BEP and ROI are applied by all the projects under study.

It could be concluded from the above analysis that the public sector projects relied heavily on traditional project ranking techniques such as pay-back period, BEP and ROI. On the contrary, the private sector projects used both discounted and non-discounted cash flow techniques. Besides this, 50 percent of the private sector projects adopted sensitivity analysis. It is significant to note that in the public sector projects there has been a growing awareness towards theoretically superior discounted cash flow method and risk and sensitivity analysis.

4.4 Project Implementation

Project implementation involves allocation of tasks to various groups within the project organisation. This stage has to be given utmost importance by the planners and decision makers to attain the intended objectives. To quote the Planning Commission, "the success of the Plans will rest very largely on the efficiency with which it is implemented". The purpose of any successful project implementation is to ensure that the project activities are completed within the time schedule, and within the budgeted provisions, leading to desired quantum of benefits flowing there from.

Project implementation steps are repetitive and each project manager has to adopt procedures according to his own requirements, depending on the nature of the project and the organisational structure. The various steps in project implementation are discussed below:

4.4.1 Approval of Projects

The selection of a project for implementation invariably requires a formal approval from a competent authority (s). There are a number of governmental agencies associated with the approval of public private sector projects. The public sector projects require a formal approval from legislative organs, cabinet, administrative departments, functional departments, planning agency, funding agency, other contributing agencies, etc.

The study indicates that the public sector sample projects had taken a long time in obtaining the approval of the project proposals from the various agencies. For instance, the delay in getting approval of contract in the Ammonium Sulphate Caprolactam Project was 4.5 years between the date submission of Techo Economic Feasibility Report (TEFR) (1980), and approval of contract by Government of India (Nov. 1984) (Project Completion Report). Similarly, two years delay in obtaining approval of project from the Kerala Government was noticed in the case of Edarikode Spinning Mill of the Kerala State Textile Corporation Ltd. (CAG Report 1986-87, p.116)

It is also noticed in the public sector projects that there was procrastination in getting approval from authorities such as the Public Investment Board (PIB), Planning Board, Finance Ministry, Department of Industry, etc. This was mainly due to the cumbersome procedural formalities. Whenever foreign credits were moved for the project, further delays were likely to creep in on

account of prolonged discussions and deliberations between the government and foreign credit agencies regarding loan agreement, terms and conditions. The study further reveals that the legal clearances by governmental agencies and cumbersome documentation formalities on the part of the financial institutions were some of the major hindrances faced by the private sector projects regarding approval of projects.

4.4.2 Project Manager.

Projects manager is a person who co-ordinate the activities of many varied project participants. By virtue of being the live wire of the organisation, the project manger functions as a single point contact, dealing with a number of divisions and establishments. The project manger has a major role to play in implementing the project within the budgeted cost and time schedules.

In this study, the project managers of public and private sectors were interviewed. It is revealed from the study that in private sector projects, the project managers were technocrats in 80 percent of the cases and non-technocrats in the remaining 20 percent. But in public sector projects, 70 percent of the project managers were non-technocrats and the remaining 30 percent were technocrats. There were project management committees in all the sample projects under study. For every project, even if the job was given on a turnkey basis, there was a project manager. The project managers were responsible for monitoring the day to day affairs of the industrial projects during their implementation.

The study also brings out the fact that the private sector project managers were armed with sufficient financial and administrative powers to carry out the project implementation work. On the other hand, public sector project managers were not delegated adequate financial and

administrative powers, which might be one of the hindrances to effective project implementation.

It is noticed that the public sector project managers were not stationed at project sites, but they had been posted at administrative offices. Moreover, the frequency with which the project managers visited the project sites was very low. But in private sector projects the project managers were posted at project sites and also provided with adequate financial and decision making powers. But this point has been conspicuously absent in the case of public sector project managers. It is of paramount importance that the project managers should be stationed at project sites, so as to have a close association and co-ordination with the project teams with the aim of implementing the projects in time.

4.4.3 Appointment of Consultants

Consultants are needed for the formulation of project concepts and preparation of feasibility report, detailed project report (DPR), process design, systems design and technological requirements. The industrial projects can be implemented either by the project organisation or by the turnkey consultants. It may also be possible that a part of the work can be handled by the project organisation and the remaining can be assigned to the technical turnkey consultants. Table 4.5 shows the implementation of project by project organisation or consultants. It depicts that the private sector projects depend more on their own project organisations for implementation (i.e., 8 projects were implemented by own organisation). But in the case of public sector projects, consultants were more preferred for implementation than their own project organisation, (i.e., in 10 projects).

Timely fulfilment of assignments, adherence to the schedule, issue of sequential work designs and specifications, and completeness of documents are some of the areas where consultants are normally failed. Instances of failures were noticed significantly in the public sector sample projects. Here it is worthwhile to cite a classical example of the inordinate delay in performing services by the consultants in a public sector sample project i.e., the Kerala State Salicylates and Chemicals Ltd.

The company had engaged (November 1982) the Kinetics Technology India Ltd. (KTI), New Delhi, as the engineering consultants of its projects to undertake the complete responsibility of carrying out detailed design and project execution. Though the detailed design and engineering of equipment should have been completed by the end of November 1984, KTI had not submitted details and designs in respect of reactors, towers, heat exchangers, driers, etc., till March 1992. The operating manuals supplied by them were incomplete. A technical committee consists of officials of the holding company and the KSSC Ltd. assessed that the services rendered by KTI were totally inadequate and ineffective in various areas such as drawings to vendors for design and fabrication of equipment, non-supply of the design calculations, incomplete material take-off list, etc. (CAG Report 1991, p. 52)

Table 4.5

Project Implementation

Implementation	Private Sector	Public Sector
Self	8 (66.67)	2 (16.67)
Consultants	4 (33.33)	10 (83.33)

Figures in brackets indicate percentages

4.4.4. Project Scheduling

Project scheduling is principally the exercise of laying out and integrating time, resources and the main work elements of engineering, procurement and construction in the most efficient manner to carry out the project execution work. Resources availability and their economic levels of distribution, time duration for individual activities and for the total project and the estimated costs are inter-related through the scheduling exercise.

While implementing the projects, project execution-planning techniques and project scheduling and co-ordination techniques are vital to project management system. Project execution planning techniques include project execution plan, work breakdown structure, project responsibility matrix and project management manual.

Table 4.6 indicates the project execution planning techniques used by industrial projects under study.

Table 4.6

Project Execution Planning Techniques

Methods	Private Sector	Public Sector
Project Execution Plan	10 (83.33)	4 (33.33)
Work Breakdown Structure	11 (91.67)	4 (33.33)
Project Responsibility Matrix	8 (66.67)	2 (16.67)
Project Management Manual	9 (75.00)	6 (50.00)

Figures in brackets indicate percentages

The table reflects that most of the private sector projects have been utilising all these techniques to a considerable extent in comparison with the public sector projects. One of the techniques i.e., work breakdown structure is little more popular than other techniques. Project responsibility matrix is the least popular among the techniques.

The gigantic size and high level technology have made the modern projects more complex. For complex projects of super size, bar chart, the commonly used project scheduling and co-ordination technique does not suffice. It falls short of the actual requirement. In such contexts, superior techniques like PERT/CPM are found more useful. The Government of India has almost made it compulsory for project organisations to follow these techniques

The opinion survey regarding project scheduling and co-ordination techniques among the project manages is presented in table 4.7. The table highlights that both public and private and public sector projects have been utilising bar chart considerably. But the most scientific project scheduling and co-ordination technique, i.e., network analysis, has been used sparingly in public sector. It is also noted that none of the projects in public sector has used the life cycle chart. But in private sector projects, the network analysis is very popular, while life cycle chart is used rarely.

Table 4.7

Project Scheduling and Co-ordination Techniques

Techniques	Private Sector	Public Sector
Bar chart	11 (91.67)	7 (58.33)
Milestone Chart	8 (66.67)	5 (41.67)
Life Cycle Chart	3 (25.00)	
Network Analysis	10 (83.33)	5 (41.67)

Figures in brackets indicate percentages

It is worthwhile to note here that due to the strategic nature of public sector projects and the high order of investment, it is necessary to apply the network analysis and life cycle chart for implementing these projects in time. But the fact is that the public sector with massive investments have not been widely utilising these sophisticated scheduling and co-ordination techniques, which in turn, takes a longer duration of time for project implementation.

4.4.5 Project Implementation Meetings

Project implementation meetings hold the key for the success of project implementation. These meetings include routine meeting, reviewing the progress, meeting for decision-making and fault finding meetings. It is through these meetings that a good rapport and understanding are established at all levels amongst the various functionaries. With the help of these meetings, the planners and decision-makers are made aware of the existing status, progress and direction in which the project is leading to.

The project managers' opinions about project implementation meetings are presented in table 4.8. This table reflects that these meetings were conducted by all the projects in public and private sectors. It is significant to note that the private sector project managers have been conducting these meetings more frequently when compared to the public sector. The private sector project managers opined that they have been conducting such meetings at weekly, fortnightly, monthly and quarterly basis, as demanded by the nature and circumstances of the projects. But in public sector projects, these meeting were conducted, usually, on a quarterly basis.

Table 4.8

Project Implementation Meetings

Meetings	Private Sector	Public Sector
Routine	12 (100.0)	6 (50.00)
Reviews with Progress	10 (83.33)	3 (25.00)
Fault Finding	10 (83.33)	2 (16.67)
Making Decision	11 (91.67)	2 (16.67)

Figures in brackets indicate percentages

It is observed that all the private sector sample projects had convened routine meetings. But in public sector, only 50 percent of the sample projects conducted routine meetings during project implementation. Most of the private sector projects convened other meetings such as review with progress (10), fault finding (10) and making decisions (11) during the period of project implementation.

It is significant to observe that during the implementation of the projects, only a few projects in public sector convened meetings such as review with progress (3), fault finding (2) and making decision (2). It clearly reveals the fact that there has been no proper interaction among project personnel regarding the progress of projects in the public sector projects under study, while in the private sector, there exists proper and timely interaction among project personnel.

4.4.6 Revised Cost Estimates

Revision of estimated cost of a project is essential when there is cost overrun. The project cost should be updated to account for the cost overrun and its impact on additional financial resources. It is revealed from the study that all the public sector sample projects except one

revised their project costs to accommodate for the heavy cost overrun. The frequency of revision in public sector projects ranges from one to four times as is shown by table 4.9.

Table 4.9

No. of Revisions in Cost (Public Sector Projects)

Sl. No	Name of Projects	No. of Revisions
1	Titanium Dioxide Pigment Project - KMM Ltd.	3
2	Integrated Casting Unit- Autokast Ltd.	3
3	Kerala Wood Industries Ltd.	1
4	Keltron Control Project	3
5	Vitamin 'A' Project - KSDP Ltd.	2
6	Kerala State Salicylates & Chemicals Ltd.	4
7	Edarikode Spinning Mills Ltd.	2
8	Malabar Cements Ltd.	2
9	Kerala Feeds Ltd.	2
10	Oil Palm India Ltd.	3
11	Steel and Industrial Forgings Ltd.	
12	Ammonium Sulphate Caprolactam Project-FACT Ltd.	3
	Average Revisions	**2.33**

The table also reveals that the average number of revisions in the public sector projects was 2.33. But no such revision was made in the private sector projects due to less cost and time overruns.

4.4.7 Project Time Overrun

The time overrun in the private and the public sector sample projects is depicted by table 4.10.

Table 4.10

Time Overrun in Projects (Average)

Projects	Actual time (Months)	Time Overrun (Months)	% of Time Overrun
Public Sector Projects	68	40	142.86
Private Sector Projects	19	6	46.15
All Projects (Average)	44	23	109.52

The public sector projects had taken on an average, 68 months for completion but it was only 19 months in the private sector sample projects. The table also brings out the fact that the public sector projects were delayed by 40 months (i.e., 142.86 percent of the estimated time) on an average. It is worth noting that in the private sector, the delay in project completion was only 6 months (i.e., 46.15 percent). The study further indicated that the time overrun ranged from one month to ten months in 75 percent of the private sector sample projects. Whereas in public sector, the range of time overrun was 31 months to 90 months in 50 percent of the sample projects. This is a clear indication of better project planning and implementation in private sector than public sector projects.

4.4.8 Actual Cost of Projects

Table 4.11 provides a view of the actual cost of the public and the private sector projects. The table highlights that the cost of plant and machinery constitutes 57.22 percent of the total cost of public sector projects. This is the most dominant item in total cost. The preliminary and pre-operative expenses increased considerably and stand second with 13.29 percent of the total cost. Buildings and civil works occupies the third position with 9.88 percent and technical

know-how and engineering fees stands fourth with 7.76 percent. The cost of land and site development occupies the last position with 1.29 percent of the total cost.

Table 4.11

Project Cost - Actual

Components	Public Sector		Private Sector	
	Rs. in crores	%	Rs. in crores	%
Land & Site Development	8.24	1.29	1.62	3.52
Building and Civil Works	63.08	9.88	5.11	11.12
Plant and Machinery	365.21	57.22	19.32	42.03
Technical Know-how- & Engineering Fees	49.53	7.76	2.32	5.05
Miscellaneous Fixed Assets	41.00	6.42	8.43	18.34
Preliminary and Pre-operative- Expenses	84.72	13.29	5.72	12.44
Provision for Contingencies			---	
Margin money for Working - Capital	26.43	4.14	3.45	7.50
Total Project Cost	638.21	100.0	45.97	100.0

Analysis of actual cost in the private sector projects reveals that plant and machinery shared 42.03 percent of the total project cost and miscellaneous fixed assets constituted 18.34 percent of the total cost. The preliminary and pre-operative expense stands next with 12.44 percent. Land and site development cost is only 3.52 percent of the total project cost.

The above analysis of actual cost of projects tells us that the cost of plant and machinery is the major component of total project cost in public and private sectors. But its percentage share in

the total cost is higher in public sector than private sector. Land and site development cost is the least contributing factor in the total cost of public and private sector projects.

4.4.9 Cost Overrun of Projects

The cost overrun in the sample projects in public and private sectors is indicated by table 4.12.

Table 4.12

Cost overrun of Projects

Projects	Actual Cost Rs in Crores	Cost overrun Rs in Crores	Percentage of Cost overrun*
Public sector	638.21	318.21 (97.43.)	99.44
Private sector	45.97	8.41 (2.57)	22.38
All projects taken together	684.18	326.62 (100.0)	91.35

Note: Figures in brackets indicate the percentage to total cost overrun
* Percentage of cost overrun is computed on estimated cost.

The table reveals that the public sector projects under study have a cost overrun of 99.44 percent on the estimate project cost. Whereas in private sector projects, the corresponding percentage is only 22.38 percent. A comparison of the percentage cost overrun of all projects taken together with the public and private sector projects reflects that the percentage overrun in public sector projects is higher than that of all projects' percentage. But in private sector, the percentage cost overrun is much less than that of all projects. The table further reveals that of the total cost overrun (all sample projects), 97.43 percent is accounted for by the public sector projects alone. From the above analysis it could be concluded that the public sector projects under study were more vulnerable to cost overrun as compared to the private sector projects.

4.5 Project Monitoring

In projects, things simply do not happen in the same way as they are planned and scheduled. Most of the activities either go ahead or lag behind. The actual expenditure is often different from what is budgeted. Internal as well as external factors are responsible for deviations and changes in schedules. How early these deviations are detected and adopted, taken as a base for corrective action depend upon the system employed. Project monitoring identifies the causes for variances and the persons responsible for taking corrective actions. It also periodically evaluates the effects of corrective actions taken from time to time.

Project monitoring also facilitates imparting of various constructive suggestions like project rescheduling, redeployment of the staff etc. Monitoring is thus inevitable for the success of any project. The state of monitoring mechanism in Central Government projects are clearly illustrated by the Planning Commission in its Eighth Plan Document. "Of late, the monitoring system at various levels has got into stereo-typed mechanism, handling routine information". As such, efforts will be made to evolve a system of regular flow of relevant information to make monitoring an effective tool of management action at all levels.

Some of the common monitoring techniques used by industrial projects are progress measurement technique, performance monitoring techniques, project status report, project financial status report and project schedule chart. Table 4.13 indicates the project managers' opinion about project monitoring techniques.

Table 4.13

Project Monitoring Techniques

Monitoring Techniques	Private	Public
Progress Measurement Technique	12 (100.0)	10 (83.33)
Performance Monitoring Technique	10 (83.33)	2 (16.67)
Project Financial Status Report	11 (91.67)	4 (33.33)
Project Status Report	10 (83.33)	5 (41.67)
Project Schedule Chart	10 (83.33)	3 (25.00)

Figures in brackets indicate percentages

This table highlights that the private sector project managers have the habit of developing an inbuilt monitoring machinery, which uses the aforesaid techniques to the maximum extent possible. The public sector project managers opined that they are using all the techniques marginally except the progress measurement technique. This is a clear indication of the poor project monitoring mechanism existing in the public sector projects.

4.6 Project Financing

One of the acid tests of a project manager's patience and ingenuity towards project implementation is his concerted efforts to manipulate the financial commitment of a firm in a bureaucratic environment. This can ensure timely availability of funds to a project. The flow of resources has to be planned in such a way that the activities of the project do not slow down or suffer a set back.

In a project, consumption of resources take place during all the 3 phases of the project life cycle. During the first phase (pre-investment), resources are required for investigating various

aspects of project idea and for developing the project design. In the second phase (construction), resources are needed in making the basic edifice of the project. In the last phase (normalisation), a project requires raw materials and other consumables. The nature and magnitude of resource requirement thus differ from phase to phase.

There are internal and external reasons, which have an adverse effect on project financing. The internal reasons are basically controllable, i.e., excessive expenditure on foreign technicians, overspending on non-productive activities, under-estimating the project cost to keep the promoters' contribution to the minimum possible, under-estimating the project costs for getting approval, additions/alterations in the project concept during the implementation stage, etc. On the other hand, the external factors such as delay in sanctions/disbursements of funds, foreign currency fluctuations, inflation, changes in government policies, market conditions etc., are quite uncontrollable. The inevitable consequences of the above causes which adversely affect project financing and the project as a whole, are:

(a) Increase in pre-operative expenses, mainly, interest on capital during construction.
(b) Inability to repay principal and interest as per the amortisation schedule.
(c) Adverse impact on viability of the project.
(d) Loss on account of lost market opportunities and
(e) Sickness at birth and a host of other unsavoury consequences associated with industrial sickness.

It is seen from the study that share capital contribution by promoters, public and financial institutions; term loans by financial institution and commercial banks; unsecured loans; internal accrual; grants and subsidies from government are the major sources of project finance.

The estimated sources of finance, actual sources of finance and source of overrun finance of the industrial projects under study are illustrated below:

4.6.1 Estimated Sources of Project Financing

The table 4.14 reflects the estimated sources of finance in public and private sector sample projects. In public sector projects, 51.82 percent of the total estimated cost of project was expected to be financed in the form of term loans from financial institutions such as IDBI, IFCI, LIC, GIC, OECF, etc. The term loans expected from commercial banks constituted 3.24 percent of total project cost. The expected percentage of share capital contribution by the government; and grant and subsidy by the government was 42.36 percent and 2.58 percent respectively.

In private sector sample projects, 49.56 percent of the total estimated cost of the projects was expected to be financed in the form of term loans from financial institutions. Term loans from commercial banks expected to be 9.58 percent. The expected contribution by the promoters, by the public and financial institutions were 27.60 percent 9.05 percent and 0.96 percent respectively. The table also reveals that unsecured loans primarily from promoters formed 3.25 percent of total estimated costs of projects.

Table 4.14

Estimated Sources of Finance (Total)

Source of Finance	Public Sector		Private Sector	
	Rs in Crores	%	Rs in Crores	%
Share Capital:				
Promoters	135.56	42.36	10.37	27.60
Public			3.40	9.05
Financial Institutions			0.36	0.96
Subsidy	0.25	0.08	---	
Grant from Government	8.00	2.50	---	---
Internal Accruals			---	
Loans & Advances:				
Term Loans from Financial Institution	165.81	51.82	18.62	49.56
Term Loans from Commercial Banks	10.38	3.24	3.60	9.58
Unsecured Loans			1.22	3.25
Total Project Finance	**320.00**	**100.00**	**37.57**	**100.00**

From the above analysis of the expected sources of finance, it is revealed that term loans from financial institutions and commercial banks occupied a dominant share of project finance in both the public (55.06 percent) and private sector projects (59.14 percent).

4.6.2 Actual Sources of Project Financing

The table 4.15 indicates the actual sources from which finance was mobilised by the sample industrial projects. The table reflects that the share capital constitutes 44.13 percent of total

finance in public sector projects. This fund was exclusively provided by the government. Term loans from financial institutions which formed a major source of finance was 48.92 percent of total finance. The term loans from commercial banks formed only 2.39 percent and, subsidy and grants was 1.36 percent of total finance. The table also reveals that the funded interest constituted 1.83 percent of total finance. The share of unsecured loans and internal accruals was 0.71 percent and 0.66 percent respectively in public sector projects.

Table 4.15

Actual Sources of Finance (Total)

Source of Finance	Public Sector		Private Sector	
	Rs in Crores	%	Rs in Crores	%
Share Capital:				
Promoters	281.61	44.13	11.12	24.19
Public			3.40	7.40
Financial Institution			0.36	0.78
Subsidy	0.69	0.11	0.16	0.35
Grants from Government	8.00	1.25	---	
Funded Interest	11.75	1.83	---	---
Internal Accruals	4.20	0.66	---	---
Loans & Advances:				
Term Loans from financial Institution	312.19	48.92	23.10	50.25
Term loans from Commercial Banks	15.23	2.39	4.97	10.81
Unsecured Loans	4.54	0.71	2.86	6.22
Total Sources of Finance	**638.21**	**100.00**	**45.97**	**100.00**

In the private sector sample projects, the main portion of the total share capital was contributed by promoters (24.19 percent) themselves, followed by public (7.40 percent) and financial institutions (0.78 percent). Like public sector projects, term loans from financial institution occupied the first position with 50.25 percent of total finance in private sector sample projects. Term loans from commercial banks accounted for 10.81 percent and 6.22 percent is in the form of unsecured loans. The share of subsidy was only 0.35 percent of the total finance.

It is observed from the above analysis that the private sector sample projects depended heavily upon loan funds rather than own funds. The term loans from financial institutions and commercial banks constituted 51.31 percent and 61.06 percent of the total project finance of the public and private sector projects respectively.

4.6.3 Sources of Project Overrun Financing

The analysis of cost overrun indicates that it is prevalent in the public as well as private sector projects. If there exists cost overrun, overrun financing is imperative, to complete and commission the project at the earliest. The overrun financing of the public and private sector projects is depicted by table 4.16. While going through table, it is revealed that 46 percent of cost overrun was financial with the help of term loans from financial institutions in public sector. The promoters' capital contribution to finance overrun was 45.90 percent. These are the two important sources of overrun finance in public sector sample projects. Another source of overrun finance was funded interest. Its share was only 3.69 percent. Term loans from commercial banks constituted 1.52 percent, unsecured loans 1.43 percent, internal accruals 1.32 percent and subsidy was 0.14 percent of total overrun finance.

Regarding private sector projects, it is observed that overrun was financed mainly with the help of term loans from financial institutions. Its share was 53.27 percent unsecured loans stood second with 19.50 percent and term loans from commercial banks stood next with 16.29 percent. The promoters' contribution to cover up the overruns was 9.04 percent in private sector sample projects.

Table 4.16

Overrun Financing

Source of Finance	Public Sector		Private Sector	
	Rs in Crores	%	Rs in Crores	%
Share Capital:				
Promoters	146.06	45.90	0.76	9.04
Internal Accruals	4.20	1.32	---	---
Subsidy	0.44	0.14	0.16	1.90
Funded Interest	11.75	3.69	---	---
Loans & Advances:				
Term Loans from financial institution	146.37	46.00	4.48	53.27
Term loans from Commercial Banks	4.85	1.52	1.37	16.29
Unsecured Loans	4.54	1.43	1.64	19.50
Total Sources of Overrun Finance	**318.21**	**100.00**	**8.41**	**100.00**

It is observed from the above analysis that term loans constituted the highest share of overrun finance in public and private sector projects. The term loans from financial institutions and

commercial banks formed 69.56 percent of total overrun finance in private sector projects. It clearly shows more dependence on borrowed funds than own funds in the overrun financing on the part of the private sector projects under study. But the public sector projects used both own funds and borrowed funds in more or less equal proportions for financing cost overrun.

4.7 Project Evaluation

In an effort to minimise the project slippage and cost escalation, the project management obviously has to evolve control techniques such as performance budgeting technique, budgetary control and value engineering as project cost control systems. To overcome slippage of time in projects, the industrial projects apply systematically project communication and clean up techniques, namely, establishing project control room and computerised information systems.

The application of project cost control techniques in sample industrial projects based on the opinions of the project managers has been presented in table 4.17. The table indicates that the public sector projects sparingly apply project cost control system and this has resulted in maximum time and cost overrun. Whereas these control techniques are mostly applied in private sector projects.

Table 4.17

Project Cost Control Techniques

Cost Control Techniques	Private Sector	Public Sector
Budgetary Control	12 (100.0)	5 (41.67)
Value Analysis	4 (33.33)	1 (8.33)
Performance Budgeting	6 (50.00)	---

Figures in brackets indicate percentages

The project communication and clean up system is one of the effective media of project evaluation and early implementation of industrial projects. To achieve this end, project control room and computerised information systems are the important project control systems/ methodologies which ought to be applied by the industrial projects to avert project time escalation. The project communication and clean up techniques adopted in the public and private sectors are presented in table 4.18.

Table 4.18

Project Communication and Clean-up Techniques

Project Communication Techniques	Private Sector	Public Sector
Project Control Room	2 (16.67)	9 (75.00)
Computerised Information System	4 (33.33)	9 (75.00)

Figures in brackets indicate percentages

The project evaluation study of industrial projects clearly indicates that the private sector projects had utilised these systems to the maximum extent possible, and as a result, they bring

forth rewards in the form of minimum cost and time overruns when compared to the public sector projects.

Conclusion

The study highlights that the public sector projects have not adopted proper and adequate project planning, implementation and control mechanism. On the other hand, private sector projects employed better project planning, implementation and control system. A number of procedural flows are noticed in the public sector projects in project formulation, regarding cash flow estimation and cost of capital. The public sector projects relied heavily on traditional project planning techniques such as PBP, BEP and ROI. On the contrary, private sector projects used both traditional and modern project ranking techniques.

The study indicates that the public sector sample projects had taken a long time in obtaining the approval for the project proposals from the various governmental agencies. The legal clearances by the governmental agencies and cumbersome documentation formalities by the financial institutions are some of the major hindrances faced by the private sector projects in respect of getting approval for projects.

In private sector projects, the project managers are posted at project sites and also delegated with adequate financial and decision making powers. But this has been conspicuously absent in the case of public sector project managers.

Inordinate delay on the part of consultants in performing services is noticed in public sector sample projects. The sophisticated project scheduling and co-ordination techniques are not

popular in the public sector projects. But the private sector projects had used these techniques to a considerable extent.

The study of project implementation meetings reveals that there has been no proper interaction among project personnel regarding the progress of projects in the public sector projects. While in private sector, there exists proper and timely interaction among project personnel.

Regarding project monitoring the private sector project managers have the habit of developing an in-built monitoring system which uses the various monitoring techniques to the maximum extent possible. But the public sector project managers used the project monitoring techniques only marginally. This indicates the poor project monitoring mechanism in the public sector projects.

The private sector projects depended more on borrowed funds than own funds for financing cost overrun. But the public sector projects used both own funds and borrowed funds in more or less equal proportions for financing cost overrun.

The project evaluation study reflects that the private sector projects have made use of the project cost control and communication techniques to a greater extent when compared to public sector projects.

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CHAPTER 5

ANALYSIS OF TIME AND COST OVERRUNS

The previous chapter was focussed on the project management practices prevailing in the projects covered under the study. The present chapter deals with the magnitude of time and cost overruns and their causes.

Projects are the basic building blocks of development. It makes use of the nation's scarce resources. Therefore it becomes imperative to complete the project within time and cost schedules. But it is unrealistic to expect a total conformity with time and cost schedules. Performance can, and normally is different from expectations. But these deviations are expected to be within bounds, provided the estimates of time and cost have been carefully prepared. Such modest deviations do not materially affect the feasibility of the project. The revisions of time and cost can be incorporated so as to complete the project, to achieve the stated goals. Where the deviations in time and cost are of a sizeable magnitude, that can cause headache as they are bound to impair the profitability of the project and upset the initial expectations.

Unfortunately, many industrial projects in India, in general, and Kerala in particular, have been experiencing massive time and cost overruns due to a plethora of reasons. While there are instances of overruns in private sector projects, this malady is widespread in the case of public sector projects. Most of the developmental projects in Kerala have been facing enormous time and cost overruns, thereby leading to erosion of financial outlays and delays in the state's industrial and infrastructural development. Reports of the Comptroller and Auditor General of

India, (Commercial), Government of Kerala, carry alarming information on overruns in state public sector projects which have become a serious economic problem.

This chapter highlights the analysis of time and cost overruns in all the sample projects combined together and in the different categories of projects viz., sector wise (public and private), purpose wise (new and EMD), promoter wise (new and existing) and industry wise (capital, intermediate and consumer). Analysis has been undertaken under four heads. The magnitude of overruns; relationship between time and cost overruns; causes of cost overrun; and causes of time overrun.

5.1 Magnitude of Cost and Time Overruns

Table 5.1 presents a brief summary of the cost and time overruns of all projects and the various categories of projects. It is revealed from the table that 91.35 percent is the average cost overrun of all the projects taken together. The average time overrun in all projects came to 109.52 percent. Sector wise, the public sector projects have an average cost overrun of 99.44 percent and time overrun of 142.86 percent. But in the private sector projects, cost and time overrun were 22.38 percent and 46.15 percent respectively.

The purpose wise comparison of projects shows that new projects are having cost and time overrun of 49.16 percent and 105.26 percent respectively. But in the expansion, modernisation and diversification projects, the cost and time overruns are 113.18 percent and 122.73 percent respectively.

In promoter wise comparison, the projects promoted by new promoters recorded an average cost overrun of 47.71 percent and time overrun of 113.33 percent. But in the case of existing promoters, the average cost and time overrun came to 107.97 percent and 115.39 percent respectively.

Table 5.1

Average Cost and Time Overruns in Industrial Projects

Categories of Projects	**Number of Projects**	Cost overrun %	**Time overrun %**
All Projects	24	91.35	109.52
Sector Wise:			
Public	12	99.44	142.86
Private	12	22.38	46.15
Purpose Wise:			
New Projects	14	49.16	105.26
Expansion, Modernisation, & Diversification (EMD)	10	113.18	122.73
Promoter Wise:			
New	12	47.71	113.33
Existing	12	107.97	115.39
Industry Wise:			
Capital Goods	5	54.08	86.96
Intermediate Goods	9	104.99	143.48
Consumer Goods	10	35.10	100.0

The industry wise comparison reveals that projects belonging to intermediate goods category are having an average cost and time overruns of 104.99 percent and 143.48 percent respectively. In the capital goods projects, cost and time overruns recorded 54.08 percent and

86.96 percent respectively. In the consumer goods projects, the average cost overrun is 35.10 percent and time overrun is 100 percent.

5.1.1 Overrun Analysis - All Projects

A detailed picture of time and cost overruns of all projects combined together, is presented in table 5.2. The table highlights that the total cost overrun of all projects was to the tune of Rs. 32661.62 lakhs. The average cost overrun came to Rs. 1360.90 lakhs, i.e., 91.35 percent of the estimated project cost. This is a clear indication of the fact that the industrial projects in Kerala were suffered heavily from the problem of cost overrun.

Table 5.2

Overruns of Projects (All Projects)

Particulars	Rs in Lakhs
Total Estimated Cost	35755.96
Average Estimated Cost	1489.83
Total Actual Cost	68417.58
Average Actual Cost	2850.73
Total Cost Overrun	32661.62
Average Cost Overrun	1360.90
Percentage of Cost Overrun	91.35
Average Time Overrun	23 Months
Percentage of Time Overrun	109.52

Regarding the delay in completion of projects, it is also observed that the time overrun ranges from 1 month to 86 months (Appendix III). The average time overrun of all projects taken

together was 23 months. This was 109.52 percent of the estimated time for completing the projects (table 5.2).

5.1.2 Sector Wise Analysis

There are equal numbers of projects (i.e., 12) belonging to public and private sectors covered the study. It is seen from table 5.3 that the estimated cost of public sector projects was recorded at Rs. 31999.48 lakhs, whereas in private sector projects it was Rs. 3756.48 lakhs. But the actual cost of implementation, in public sector projects increased alarmingly to the level of Rs. 63820.47 lakhs. This had resulted in a cost overrun of Rs. 31820.99 lakhs. It is 99.44 percent of the estimated cost.

Table 5.3

Sector wise Overruns of Projects

(Rs. in Lakhs)

Particulars	Public Sector	Private Sector
Number of Projects	12	12
Total Estimated Cost	31999.48	3756.48
Average Estimated Cost	2666.62	313.04
Total Actual Cost	63820.47	4597.11
Average Actual Cost	5318.37	383.09
Total Cost Overrun	31820.99	840.63
Average Cost Overrun	2651.75	70.05
Percentage of Cost Overrun	99.44	22.38
Average Time Overrun	40 months	6 months
Percentage of Time Overrun	142.86	46.15

In the private sector projects, the actual cost of implementation came to Rs.4597.11 lakhs, whereas the estimated cost was Rs. 3756.48 lakhs. This has resulted in a cost overrun of Rs.

840.63 lakhs and it is 22.38 percent of the estimated project cost. The average cost overrun in the public sector projects was Rs. 2651.75 lakhs whereas in the private sector projects, the average cost overrun came to Rs. 70.05 lakhs.

Regarding the time overrun, the public sector projects, on an average, lagged by 40 months. This is 142.86 percent of the estimated time for completion. But in private sector, the projects on an average, delayed by 6 months. This is only 46.15 percent of the estimated time. It could be observed from the analysis that the public sector sample projects are more vulnerable to time and cost overruns than the private sector projects.

In order to study the significance of difference in the percentage cost overrun between public and private sector projects, Mann-Whitney 'U'-test is employed. The study sets the following null hypothesis.

Ho = There is no significant difference in the percentage cost overrun between public and private sector projects.

The Mann-Whitney 'U'-test results of cost overrun is depicted in table 5.4

Table 5.4

Sector wise Percentage Cost Overrun

Sector	Median	Mann -Whitney 'U' Value	'P' Value
Private	9.53	16.0	0.0007*
Public	68.18		

*significant at 0.05 level

The test results rejected the null hypothesis by establishing that there is significant difference in the percentage cost overrun between public and private sector projects as the 'P' value is significant at 0.05 level.

For the purpose of analysing the significance of difference in the percent time overrun between public and private sector projects, the following hypothesis is formed:

Ho = There is no significant difference in the percentage time overrun between public and private sector projects.

Table 5.5 contains results of the Mann-Whitney test showing significance of the difference in the percentage time overrun of projects in the private and public sectors. The null hypothesis is rejected as the P-value is significant at 0.05 level.

Table 5.5

Sector Wise Percentage Time Overrun

Sector	Median	Mann-Whitney 'U' Value	'P' Value
Private	35.417	11.5	0.0001*
Public	142.130		

*significant at 0.05 level

5.1.3 Purpose Wise Analysis

In this analysis, the projects are classified on the basis of the purpose for which they are implemented. Here the projects are grouped into two, viz., new projects and EMD projects (i.e., expansion, modernisation and diversification). The cost and time overruns of these respective groups are presented in table 5.6.

The table indicates that the average estimated cost of the new projects was Rs. 871.08 lakhs and it was Rs. 2356.09 lakhs in the projects belonging to expansion, modernisation and diversification category. The average actual cost of projects was Rs. 1299.26 lakhs and Rs. 5022.79 lakhs respectively for the new projects and EMD projects. The amount of cost overrun was very high in EMD projects than the new projects (i.e., Rs. 2666.70 lakhs). The average cost overrun in new projects amounted to Rs. 428.18 lakhs. The percentage of cost overrun in the new projects was 49.16, whereas in the EMD projects, it was 113.18.

Table 5.6

Purpose wise Overruns of Projects (Rs in lakhs)

Particulars	New Projects	EMD Projects
Number of Projects	14	10
Total Estimated Cost	12195.05	23560.91
Average Estimated Cost	871.08	2356.09
Total Actual Cost	18189.70	50227.88
Average Actual Cost	1299.26	5022.79
Total Cost Overrun	5994.65	26666.97
Average Cost Overrun	428.18	2666.70
Percentage of Cost Overrun	49.16	113.18
Average Time Overrun	20 months	27 months
Percentage of Time Overrun	105.26	122.73

EMD = Expansion, Modernisation and Diversification

Table 5.6 also shows the incidence of time overrun. The time overrun was 105.26 percent in the new projects but it was 122.73 percent in EMD projects. Therefore, it could be concluded that the incidence of time and cost overruns was high in the EMD projects when compared to the new projects.

The study sets the following hypothesis regarding time and cost overruns of the new projects and EMD projects.

Ho = The incidence of cost and time overruns did not differ significantly between the new and EMD projects.

Table 5.7

Purpose wise Cost Overrun (Percentage)

Purpose	Median	Mann -Whitney 'U' Value	'P' Value
New	18.25	52.0	0.3119
EMD	61.16		

The Mann-Whitney 'U' test provides the inference that the two types of projects, new and EMD (i.e., expansion, modernization and diversification), did not differ significantly with regard to the percentage of cost overrun as the 'P' value is not significant at 0.05 level (Table 5.7).

Table 5.8

Purpose wise Time Overrun (Percentage)

Purpose	Median	Mann -Whitney 'U' Value	'P' Value
New	71.652	55.5	0.347
EMD	110.417		

The test results show that (table 5.8) there does not exist significant difference in the percentage of time overrun between new projects and projects belonging to expansion, modernisation and diversification, since the P value is higher than the significance level of 5 percent.

5.1.4 Promoter Wise Analysis

The ability of the promoters in planning and implementation of projects is crucial for completing the projects within the time frame and cost estimates. Table 5.9 depicts the overruns of projects executed by new promoters and existing promoters. In new promoters' projects, the average estimated cost amounted to Rs. 821.80 lakhs, whereas in existing promoters' projects the average estimated cost came to Rs. 2157.87 lakhs. The average actual cost is Rs. 1213.84 lakhs and Rs. 4487.63 lakhs respectively for these projects.

Table 5.9

Promoter wise Overruns of Projects

(Rs in lakhs)

Particulars	New Promoters	Existing promoters
Number of Projects	12	12
Total Estimated Cost	9861.56	25894.4
Average Estimated Cost	821.80	2157.87
Total Actual Cost	14566.07	53851.51
Average Actual Cost	1213.84	4487.63
Total Cost Overrun	4704.51	27957.11
Average Cost Overrun	392.04	2329.76
Percentage of Cost Overrun	47.71	107.97
Average Time Overrun	17 months	30 months
Percentage of Time Overrun	113.33	115.39

It is clear from the table that the cost overrun is very high in the existing promoters' projects, i.e., Rs. 2329.76 lakhs (on an average), when compared to the new promoters' projects i.e., Rs.

392.04 lakhs (on an average). The percentage cost overrun is 107.97 and 47.71 respectively for the existing and new promoters' projects.

The table further reveals that the time overrun is higher in the existing promoters' projects than the new promoters' projects. The time overrun is 115.39 percent (i.e., 30 months) and 113.33 percent (17 months) respectively for these projects. Therefore, it could be concluded from the analysis that both time and cost overruns are higher in the projects promoted by existing promoters than new promoters' project.

The study has made the following hypothesis:

Ho = The cost and time overruns did not differ significantly between new promoters' projects and existing promoters' projects.

The Mann-Whitney 'U' test results of the percentage cost overrun of new and existing promoters' projects is presented in table 5.10.

Table 5.10

Promoter wise Cost Overrun (Percentage)

Promoters	Median	Mann-Whitney 'U' Value	'P' Value
New	14.91	53.0	0.2913
Existing	61.16		

The test results show that there does not exist any significant difference in the percentage cost overrun between the new promoters' projects and existing promoters' projects as the P-value is not significant at .05 level.

The Mann-Whitney 'U' test results comparing the time overrun of new and existing promoters' projects is given by table 5.11

Table 5.11

Promoter wise Time Overrun (Percentage)

Promoters	Median	Mann-Whitney 'U' Value	'P' Value
New	59.615	60.0	0.585
Existing	110.417		

In time overrun also, the test results indicate that there does not exist any significant difference in the percentage time overrun between the new promoters' projects and existing promoters' projects, as the P-value is not significant at 0.05 level.

5.1.5 Industry Wise Analysis:

Here the total sample projects are classified on the basis of industry group i.e., capital, intermediate and consumer goods. The table 5.12 reflects the cost and time overruns of various industry group projects.

The average estimated cost of the capital goods projects amounted to Rs.506.65 lakhs, Rs.3120.74 lakhs in intermediate projects and Rs. 513.60 lakhs in the case of consumer goods

projects. The average actual cost is Rs.780.65 lakhs, Rs.6397.27 lakhs and Rs.693.89 lakhs respectively for the capital, intermediate and consumer goods projects. This has resulted in cost overrun, on an average, of Rs.274 lakhs in the capital goods projects, Rs.3276.53 lakhs in intermediate goods projects and Rs.180.29 lakhs in consumer goods projects. The percentage of cost overrun of these projects is 54.08percent, 104.99percent and 35.10percent respectively.

Table 5.12

Industry wise Overruns of Projects

Particulars	Capital	Intermediate	Consumer
Number of Projects	5	9	10
Total Estimated Cost	2533.26	28086.7	5136.0
Average Estimated Cost	506.65	3120.74	513.6
Total Actual Cost	3903.24	57575.41	6938.93
Average Actual Cost	780.65	6397.27	693.89
Total Cost Overrun	1369.98	29488.71	1802.93
Average Cost Overrun	274.0	3276.53	180.29
Percentage of Cost Overrun	54.08	104.99	35.10
Average Time Overrun	20 months	33 months	16 months
Percentage of Time Overrun	86.96	143.48	100

As far as time overrun is concerned, the capital goods projects lagged by 86.96 percent, intermediate projects by 143.48 percent and consumer goods projects by 100 percent. Hence, the analysis of industry wise projects indicates that the intermediate goods projects are the most affected by time and cost overruns among the projects in the industry groups. The capital goods projects stand next to intermediate goods projects with in terms of cost overrun. But in percentage time overrun, consumer goods projects occupy the second position.

For the purpose of analysing the difference in the percentage of overruns in industry wise projects (i.e., capital, intermediate and consumer), the following hypothesis is formed.

Ho = There is no significant difference in the incidence of overruns among the different industry group projects.

The Kruskall-Wallis 'H' test is employed to test the null hypothesis. Test results of both cost and time overruns are depicted in Table 5.13 and 5.14 respectively.

Table 5.13

Industry wise Cost Overrun (Percentage)

Industry groups	Median	Kruskall-Wallis 'H' Value	'P' Value
Capital	17.40		
Intermediate	47.15	1.662	0.436
Consumer	18.30		

The test results show that there exists no significant difference in cost overrun among the different industry group projects, as the P-value is not significant at 0.05 level. Hence, the null hypothesis is rejected.

Table 5.14

Industry wise Time Overrun (Percentage)

Industry groups	Median	Kruskall-Wallis 'H' Value	'P' Value
Capital	28.0		
Intermediate	9.0	1.4096	0.4942
Consumer	14.50		

The test results on time overrun provides the inference that the time overrun of industry group projects does not differ significantly as the P-value is higher (0.4942) than the significance level of 0.05. Here also the null hypothesis is rejected.

Conclusion

The study on the magnitude of overruns reveals that the average cost overrun in all the projects taken together is Rs.1360.90 lakhs and it is 91.35 percentage of the estimated project costs. The average time overrun in all the projects is 23 months and it is 109.52 percentage of estimated project time schedule. The sector wise analysis reflects that the public sector projects are more vulnerable to cost and time overruns when compared to the private sector projects. The average cost overrun in the public sector project is Rs.2651.75 lakhs and it is 99.44 percent of the estimated cost. The average time overrun in the public sector is 40 months and it is 142.86 percent of the estimated time. Both cost and time overruns in public sector projects are above the all projects' average. But in the private sector, the average cost overrun is Rs.70.05 lakhs (i.e., 22.38 percent) and average time overrun is only 6 months (i.e., 46.15 percent). In the private sector projects both these overruns are much less than the all projects' average. The test results indicate that there exists significant difference in the percentage cost and time overruns between public and private sector projects.

The purpose wise study highlights that the expansion, modernisation and diversification projects (EMD) are affected more by cost and time overruns when compared to the new projects. The cost and time overrun are 113.18 percent and 122.73 percent respectively, in the expansion, modernisation and diversification projects. These percentages are higher than the all projects' percentages. The test results provides, the inference that there is no significant

difference in the percentage cost and time overruns between the new projects and expansion, modernisation and diversification projects.

Promoter wise analysis of projects reveals that the existing promoter's projects are hardly hit by overruns. The percentage of cost and time overruns in the existing promoter's projects is 107.97 percent and 115.39 percent respectively. Both these percentages are higher than the all projects' percentages. The test results reflect that there exists no significant difference in the percentage cost and time overruns between the new and existing promoter's projects.

The industry group study pinpoints the fact that the projects in the intermediate goods category are more exposed to cost and time overruns than the projects in capital and consumer goods groups. In the intermediate goods projects, the cost overrun is 104.99 percent and time overrun is 143.48 percent. The percentage of cost and time overruns of the intermediate goods projects is higher than the all projects' percentages. The hypothesis test results prove that there exists no significant difference in the percentage cost and time overruns among industry wise projects.

5.2 Causes of Cost Overrun

Underestimation of project cost would inevitably lead to a perceptible cost overrun in the matter of completion of the project. It may be owing to unforeseen escalations in investment costs emanating from inflationary tendencies, change in exchange rates, change in import duty structure etc. Other factors could be ascribed to defective project planning, change in project concept itself and under-estimation in other important items like margin money for working capital etc. It would therefore be useful to study cost escalation in different items of project costs before discussing their impact on the project. Depending upon the nature and

complexities of the project, cost overrun may be due to any or all of the factors briefly explained hereunder:

(i) Cost Escalations:

Increase in price is primarily due to the increase in cost of inputs i.e., materials, labour and overheads. The adverse effect of this get magnified further due to the inadequate or non-provision in the project budget, for the probable hike in costs owing to inflationary conditions. Price increase is ubiquitous in the case of almost all the elements of project cost such as land and site development, building and civil works, plant and machinery, engineering fees, pre-operative expenses, etc.

For instance one of the public sector sample projects under study (i.e., Ammonium Sulphate Caprolactam project, ASCP), escalation in cost is the prime factor, which contributed to cost overrun. The cost overrun on account of escalation in this project is Rs. 83.62 crores and it is 56.52 percent of the total approved cost i.e., Rs. 147.94 crores and 37.9 percent of the total cost overrun i.e., Rs.220.43 crores. The specific variations are due to the escalation in cost of the imported equipment, escalation in cost of the equipment in India, escalation in cost of erection, subcontracts, engineering and other labour intensive items, and escalations in the cost of civil works. (Project Completion Report)

The CAG Report (1983-84, p. 102) indicates that in Titanium Dioxide Pigment Project, the cost of building was increased by 97.3 percent mainly on account of escalation in the prices of steel and cement and escalation in general overhead. Here, the margin money also increased by 76.8 percent due to the increase in the cost of materials.

(ii) Time Overrun

Time overrun can be traced to the improper time scheduling or poor project administration. Delay in project implementation necessitates the intervening cost, price increase in inputs and other services etc. Incidence of time overrun and it causes in sample projects are discussed in the end part of this chapter.

(iii) Increase in statutory taxes and duties

Another seminal reason for cost escalation is the rise in the rates of statutory taxes and duties like customs duty, excise duty, sales tax etc. This happens mainly on account of the change in government's fiscal policies and taxation laws, which are difficult to predict precisely.

In the ASCP project of FACT Ltd., cost overrun on account of variation in taxes and levies was Rs.56.50 crores. It was 38.20 percent of the approved project cost of Rs.147.94 crores and 25.63 percent of the total cost overrun of the project. The variations, which occurred, are due to the increase in excise duty, variation in customs duty for varied classes of imports, etc. (Project Completion Report)

In Titanium Dioxide Pigment Project of KMM Ltd., it is reported that the increase in customs duty accounted for a major share of the 66 percent hike in the cost of plant and machinery (CAG Report 1983-84, p. 102).

(iv) Foreign exchange rate fluctuations

Adverse fluctuations in the value of foreign currencies, in terms of rupee equivalent, which occur while effecting payments towards the import of plant and machinery, catalysts and chemicals, remittance of royalty and know-how fees, etc., technical service fees, result in additional payment in Indian rupees, thereby shooting up the overall project cost to a higher level. The steep increase in the value of the U.S. dollars, Japanese Yen, Deutsche Mark, etc., as against the Indian rupee, has also caused considerable negative impact on the costs of the Indian projects. For example in the ASCP project, the cost overrun due to exchange rate variations was Rs.76.21 crores. This was 51.30 percent of the approved project cost and 34.57 percent of the total cost overrun of the project. Exchange rate variations of the Indian rupee in relation to U.S. dollar and Japanese Yen were the main cause for this cost overrun during the project implementation period. The exchange rate of U.S. dollar was increased from Rs.8 to Rs.18. The CAG Report (1992, p.45) indicates that in the Kerala State Salicylates and Chemicals Ltd., fees paid to the foreign collaborators were increased considerably due to the variations in exchange rates.

(v) Increase in financing costs

Increase in the cost of the project financing such as the interest rate on the long term loans advanced by the financial institutions for the project investment also leads to cost escalations. This is a common phenomenon, particularly, when the duration of the project extends to a fairly long period, within which the interest rate gets enhanced.

For instance, in the case ASCP project, increase in the interest on loan capital was 2 percent, from 11.5 percent per annum to 13.5 percent per annum. In this project, about 50 percent of the project cost was financed by OECF credit. (Project Completion Report)

(vi) Scope changes

The scope changes effected during the project implementation stage are expensive interruptions and boost up the project costs sizeably. Changes in project scope require additional equipment and facilities at extra cost. The study observed that many of the public sector projects were affected by scope changes, which in turn, resulted in time and cost overruns. The project completion report of the ASCP project of FACT Ltd., brings to light the fact that the change in scope and location increased the project cost by Rs.17.77 crores, i.e., 12 percent of the approved project cost and 8.06 percent of the total cost overrun. (Project Completion Report)

(vii) Under-estimations

Ambiguous definition of the project scope and inadequate technical and other data for project estimations, often result in gross under-estimation of project costs. It is also to be noted that under-estimation of project cost is practiced to get quicker clearance from the administrative authority.

(viii) Omissions

Lack of attention to project details result in omissions to provide for investments in certain facilities, and certain items of costs such as taxes, insurance, transport etc, which subsequently get reckoned and result as cost overrun.

(ix) Other factors

Unforeseen contingencies, managerial problems etc., also lead to cost overrun in industrial projects.

5.3 Component wise Analysis of Cost Overrun

Here an attempt is made to analyse the component wise cost overrun of the projects covered under the study.

5.3.1 Component wise Cost Overrun - All projects

Table 5.15 highlights the components of cost overruns of all the projects covered under the study. It is revealed from the table that the preliminary and preoperative expenses recorded the highest percentage of cost overrun, i.e., 201.46 percent, over the estimated project cost. Increase in preliminary and pre-operative expenses was mainly due to the delay in implementing the projects, which resulted in increase in the interest charges. The next important cause vitiating the project costs was the increase in the cost of building and civil works, which accounted for 113.70 percent of the estimated project cost. This was due to the

increase in prices of important construction materials such as steel, cement, etc. The cost of plant and machinery (both imported and indigenous), increased by 99.49 percent. Increase in imports, increase in customs duty and variations in foreign exchange rates triggered hike in the value of imported plant and machinery. The cost overrun of indigenous plant and machinery was due to the increase in the cost of machinery, enhancement in the excise duties and sale tax effected by the government. The margin money for working capital ranked fourth with an increase of 91.17 percent. This was mainly due to the inadequate provisions in project estimates for initial inventories of raw materials, consumables, components etc.

The cost of land and site development was increased by 70.33percent over the estimated project cost. This was mainly due to the real-estate boom and skyrocketing of market value of land. In addition to this, the inflation induced rise in labour costs and increased the compensation to be payable for land acquisition. The increase in technical know-how fees and engineering fees came to 64.36percent. This was on account of the hike in fees paid to foreign technicians and consultants.

The cost of miscellaneous fixed assets was increased by 62.84 percent. This was a heterogeneous item for which the suppliers were aplenty and widespread. Also, there might not be any standardisation, in both quality and prices.

Table 5.15

Component wise Cost Overrun in All Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	407.37	16.97 (1.25)	70.33	V
Buildings and Civil Works	3628.48	151.19 (11.11)	113.70	II
Plant and Machinery	19177.24	799.05 (58.72)	99.49	III
Technical Know-how- & Engineering Fees	2030.40	84.60 (6.22)	64.36	VI
Miscellaneous Fixed Assets	1907.32	79.47 (5.84)	62.84	VII
Preliminary and Pre-operative- Expenses	6043.98	251.83 (18.51)	201.46	I
Provision for Contingencies	-1957.75	-81.57 (6.0)	0.00	
Margin money for Working - Capital	1424.58	59.36 (4.35)	91.17	IV
Total	32661.62	1360.90 (100)	91.35	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

Table 5.15 also presents details of the percentage share of each component in the total project cost overruns. It is revealed from the table that the total cost overrun of all the projects under study came to Rs 32661.62 lakhs. Out of the cost total cost overrun, cost escalation in plant and machinery alone was Rs 19177.24 lakhs, i.e., 58.72 percent, of the total cost overrun. Cost overrun in preliminary and pre-operatives, stood next with Rs 6043.98 lakhs, which was 18.51percent of the total cost overrun. Another major item which contributed to the cost overrun was building and civil works. The cost of building and civil works increased by Rs.3628.48 lakhs (i.e., 11.11percent of total cost overrun). Land and site development was the

least significant component of total cost overrun that amounted to Rs 407.37 lakhs (i.e., 1.25 percent of total cost overrun).

This analysis points out two categories of major causes responsible for cost overrun. Under the first category there are causes which are uncontrollable, i.e., the incidence of which is beyond the control of the promoters or project authorities. Such causes are rise in prices, exchange rate variations, hike in import duty, excise duty etc. The second category of causes are controllable, i.e., they are resulted from the lapses on the part of promoters and project authorities.

The solution to the problem of cost overrun hinges on how much care the project authorities take while formulating the project proposals, with the entire gamut of details regarding location, suppliers of machinery, prices, technologies, capital cost, means of financing, foreign tie-ups, other vulnerable areas of the project, etc.

In India inflation is a crucial factor and this aspect has to be kept in mind when the estimates are chalked out, at the project formulation stage, to draw a more reliable and pragmatic picture. Care should be taken by the project authorities for providing sufficient contingency provision in the project cost estimates. More intensive project follow-up and close monitoring of project implementation would reduce cost overrun to the bare minimum.

The analysis of cost overrun of all the projects under study provides an insight into the factors responsible for it. In the same manner, the component wise cost overrun of various categories of projects are taken, inorder to have an in-depth analysis of the causes of cost overrun.

5.3.2 Sector wise Analysis

Under this section, the component wise analysis of project cost overrun is made to have an idea regarding the causes of cost overrun of the project in the public and private sectors under study.

(a) Component Wise Cost Overrun in Public Sector Projects

Table 5.16 depicts the components of cost overrun in the public sector project under study.

Table 5.16

Component wise Cost Overrun in Public Sector Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	385.11	32.09 (1.21)	87.68	V
Buildings and Civil Works	3456.15	288.01 (10.86)	121.18	II
Plant and Machinery	18837.64	1569.80 (59.20)	106.53	III
Technical Know-how- & Engineering Fees	2051.81	170.98 (6.46)	70.72	VII
Miscellaneous Fixed Assets	1707.19	142.27 (5.37)	71.36	VI
Preliminary and Pre-operative- Expenses	5820.46	485.04 (18.29)	219.54	I
Provision for Contingencies	-1731.10	-144.26 (-5.44)	0.00	
Margin money for Working - Capital	1293.73	107.81 (4.07)	95.94	IV
Total	31820.99	2651.74 (100)	99.44	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

The table highlights that preliminary and pre-operative recorded the highest percentage of cost overrun, i.e., 219.54 percent of estimated project cost. Increase in preoperative expenses was mainly due to the delay in completion of projects, which resulted a hike in the interest on borrowed funds.

For instance the CAG Report (1983-84, p.102) has revealed that delay in project commissioning is the reason for very high increase in preoperative expenses in the Titanium Dioxide Pigment Project of KMM Ltd. Payment of commitment charges due to the delay in drawal of loan amounts, the company paid Rs 26.22 lakhs to the IDBI, Rs 8.33 lakhs to the IFCI and Rs 3.18 lakhs to the LIC.

For example the CAG Report (1991, p.119) points out that the remuneration paid to the employees who were appointed even before the commissioning of the project was the main reason for the increased preoperative expenses in the Kerala Premo Pipe Factory Ltd.

In the Kerala State Salicylates and Chemicals Ltd. increase in the pre-operative expenses due to the delay in completion of the projects was Rs 352.74 lakhs, of which, interest on borrowed funds alone amounted to Rs 200 lakhs (CAG Report 1992, p.45). One of the reasons for the increase in preliminary and preoperative expenses in the Keltron Control project was the delay in sanctioning of loan by the IDBI which resulted in an avoidable payment of Rs. 10.93 lakhs as interest on overdraft (CAG Report 1989, p.146).

The cost of building and civil works was increased by 121.18 percent on the estimated project cost and ranked second. The main reasons for this high rate of cost overrun were the increase in the floor area, delay by the contractors, increase in the quantum of miscellaneous works,

increase in the scope of works, increase in prices of steel and cement, general cost escalations, construction of additional structures etc.

The CAG Report (1992, p.45) contains several examples of project cost overrun on account of increase in the quantum of building and civil work. For example, in the Kerala State Salicylates and Chemicals Ltd. increase in the cost of civil works (Rs 138.05 lakhs) was due to increase by 32 percent in the floor area and cost escalation. In the Titanium Dioxide Pigment Project of KMM Ltd. cost of building was escalated by 97.3 percent due to the increase in the scope of project work, price of steel and cement, general cost escalations, construction of additional structures etc. (CAG Report 1983-84, p.103)

Table 5.16 shows that plant machinery ranked third with a cost overrun of 106.53 percent over the estimated project cost. Increase in customs duty, exchange rate variations, defective cost estimates, delay in supply of machinery, delay in obtaining import licence for plant and machinery etc., were the reasons for cost overrun in the plant and machinery.

For instance, in the Titanium Dioxide Pigment Project of KMM Ltd., 60 percent of the increase in plant and machinery was due to increase in customs duty and exchange rate, and 24.6 of the cost increased due to the defective original estimate resulted in additional items, increase in cost, etc. (CAG Report 1983-84, p.103).

The margin money for working capital was ranked fourth with a cost overrun of 95.94 percent on estimated cost. One of the important reasons for this overrun was the increase in cost of materials.

Land and site development cost increased by 70.33 percent over the estimated cost and it was ranked as fifth. Change in scope or location, increase in cost of land acquisition and levelling and delay in land acquisition procedures were the major reasons for cost over run.

For example, in the Ammonium Sulphate Caprolactam project of FACT Ltd., change in scope and location has attributed to cost overrun. The piling work for foundations was not provided for in the original estimate due to the absence of detailed soil survey at the initial stage. Later this was identified and the total cost on this account was Rs 159.46 crores. It was also reported that the modification in plant layout for maintaining better safety standard increased the cost by Rs 1.46 crores. (Project Completion Report).

The cost overrun due to the miscellaneous fixed assets was 71.36 percent. The acquisition of items not envisaged in the original estimates, increase in the cost of other miscellaneous assets etc were the reason for this cost overrun. In the Titanium Dioxide Pigment Project of KMM Ltd., an extra expenditure of Rs 50.19 lakhs was incurred for the purchase of nine items, which are not envisaged in the original project report. Increase in the cost of railway siding was also noted in this project (CAG Report 1983-84, p.103).

The technical know-how and engineering fees in the public sector projects was increased by 70.72 percent. This was due to the extension of contracts with consultants, due to the delay in commissioning, increase in the fees paid to collaborators consequent to the variation in exchange rates and payment of additional fees, non-compliance with various provisions in the agreement by the consultants etc.

For instance, in the Titanium Dioxide Pigment Project of KMM Ltd., the extension of contract with MECON, the consultant, due to the delay in commissioning caused an increase in the expenses of foreign technicians and training of Indian technicians abroad by 120.9 percent (CAG Report 1983-84, p.102).

Transfer of obsolete technology was also reported in the cases of the Keltron Control project. As per the agreement, the Brown Boveri, Kent (UK) would supply complete technical know how documentation. Though the companies spent Rs 100 lakhs towards technical know-how, no, manufacturing facilities have been established, so far as the system was technically deficient when compared to the system offered by other manufactures (CAG Report 1989, p.141).

In the Kerala State Salicylates and Chemicals Ltd. it is reported that the increase in the fee paid to collaborators due to variations in the exchange rates and payment of additional fee were Rs 9.66 lakhs (CAG Report 1992, p.46).

While studying the component wise cost overrun of the public sector projects, it is necessary to analyze the contribution of each component to the total cost overrun. The table 5.16 reflects that total project cost overrun of public sector project came to a massive figure of Rs 31,820.99 lakhs. Out of the total cost overrun, escalation in the cost of plant ant machinery alone constituted Rs 18837.64 lakhs (i.e., 59.20 percent). The rise in preliminary and pre-operatives shared 89.29 percent and building and civil works 10.86 of the total cost overrun. An important observation that can be made is that, the combined overrun of the above three components forms 88.35 percent of the total cost overrun. Other component costs such as technical know-

how and engineering fees, miscellaneous fixed asset, margin money for working capital and land and site development cost, when taken together, accounts for only 70.11percent.

(b) Component Wise Cost Overrun in Private Sector Projects

Table 5.17 depicts the component wise cost overrun in the private sector projects. It is observed from the table that preliminary and pre-operative expenses formed 64.11 percent of estimated cost and stood first among the components. Though the percentage cost overrun on account of preliminary and pre-operative expenses was low in the private sector when compared to the public sector projects (219.54 percent), it occupied the first rank among the components of cost overrun, in both public and private sector projects. Like the public sector, accumulation of interest due to the delay in commissioning of projects was the main reason for increase in pre-operative expenses in the private sector projects.

Margin money for working capital ranked second, with a cost overrun of 61.13 percent of the estimated cost. It is revealed from the project authorities that the increase in cost of raw material and labour were the major reasons for such overrun. The cost of building and civil works increased by 50.81 percent. Increase in the price of construction materials and general cost escalations were the reasons reported for this overrun.

The cost overrun on account of miscellaneous fixed assets came to 31.15 percent and ranked the fourth. This was mainly due to the purchase of additional items. Escalation in the cost of plant and machinery was ranked fifth with a cost overrun of 21.33 percent. The reasons cited for escalation in the cost of plant and machinery in the case of public sector projects, were increase in customs duty, variation in exchange rates etc., which were equally applicable to the

private sector projects also. Increase in land and site development cost was ranked the last, with an overrun of 15.94 percent. When compared to the public sector (87.68 percent), the percentage overrun is very low in private sector projects. It is also revealed from the table that an underrun of 8.43 percent in respect of the technical know-how fees and engineering fees.

Table 5.17

Component wise Cost Overrun in Private Sector Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	22.26	1.86 (2.65)	15.94	VI
Buildings and Civil Works	172.33	14.36 (20.50)	50.81	III
Plant and Machinery	339.06	28.3 (40.40)	21.33	V
Technical know-how- & Engineering Fees	-21.41	-1.78 (-2.55)	-8.43	
Miscellaneous Fixed Assets	200.13	16.68 (23.81)	31.15	IV
Preliminary and Pre-operative- Expenses	223.52	18.63 (26.59)	64.11	I
Provision for Contingencies	-226.65	-18.89 (-26.97)		
Margin money for Working - Capital	130.85	10.90 (15.57)	61.13	II
Total	840.63	70.05 (100)	22.38	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

Regarding the share of each component of cost overrun in the total cost overrun, table 5.17 shows that the escalation in the cost of plant and machinery was the highest percentage i.e., 40.40 percent, of the total cost overrun. Though this item had a low percentage increase over

the estimated cost (21.33 percent), its incidence on total cost overrun is the highest. Preliminary and pre-operatives and miscellaneous fixed assets occupied the second and third positions in the total cost overrun. The contribution of land and site development was only marginal (2.65 percent) in the total cost overrun. It is interesting note that the technical know-how and engineering fees was underrun by 2.55 percent.

Conclusion

From the sector wise analysis of the components of project cost overrun, it is observed that in the public sector projects, preliminary and pre-operatives, building and civil works and plant and machinery are having the highest percentage of cost overrun. Whereas in the private sector, preliminary and pre-operatives, margin money for working capital and building and civil works are the components showing the highest percentage of cost overrun. Technical know-how and engineering fees and miscellaneous fixed assets recorded the least percentage of cost overrun among the components studied in the public sector projects. But in the private sector the corresponding components are land and site development and plant and machinery. It is also noted that in all components except one (preliminary and pre-operative), there exists divergence in the ranking of percentage cost overrun.

It is revealed from the analysis that the public sector projects have higher percentage cost overrun in all components than the private sector projects. A comparison of the public and private sector projects with all the projects taken together indicates that the component wise percentage cost overrun in public sector is much higher than that of all the projects and vice versa in the private sector projects. Therefore, it could be inferred that the private sector

projects have better project planning, implementation and control as compared to the public sector projects.

The study of the share of the component cost overrun to the total cost overrun highlights that the plant and machinery is the most prominent contributor of cost overrun both in public and private sector projects. Land and site development is the least contributor of cost overrun in both the cases. It is also seen that plant and machinery and preliminary and pre-operatives recorded the same order of magnitude of overrun among the various components. It is further observed that the share of plant and machinery (which is a dominant item) in the total cost overrun is slightly higher in the public sector projects than that of all the projects combined together. But in private sector, the respective share is much less than that of all projects.

5.3.3 Purpose wise Analysis

(a) Component Wise Cost Overrun in New Projects

Table 5.18 highlights the components of cost overrun in the new projects. The table shows that the increase in preliminary and pre-operative expense accounted for 173.53 percent and ranked the first. But this escalation is less than the average escalation in preliminary and pre-operatives in all the projects covered under the study (i.e., 201.46 percent). Cost of building and civil works stretched by 70.65 percent and ranked second among the components of cost overrun. The next major item, which contributed to cost overrun, was margin money for working capital (46.34 percent). Other components of cost overrun in the order of the magnitude were land and site development 43.04 percent, miscellaneous fixed assets 38.95 percent, plant and machinery 37.31percent and technical know-how and engineering fees 12.21percent respectively. A

comparison of the component wise cost overrun of new the projects with that of all the projects combined together, shows that the rates of cost overrun in all the components of project costs are less in new projects than all projects taken together.

Table 5.18

Component wise Cost Overrun in New Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	123.79	8.84 (2.07)	43.04	IV
Buildings and Civil Works	1212.72	86.62 (20.23)	70.65	II
Plant and Machinery	2249.38	160.67(37.52)	37.31	VI
Technical Know-how- & Engineering Fees	51.26	3.66 (0.86)	12.21	VII
Miscellaneous Fixed Assets	509.96	36.43(8.51)	38.95	V
Preliminary and Pre-operative- Expenses	2238.80	159.91 (37.35)	173.53	I
Provision for Contingencies	-629.37	-44.96 (-10.51)		
Margin money for Working - Capital	238.11	17.01(3.97)	46.34	III
Total	5994.65	428.18 (100)	49.16	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

The table also reveals the share of each component of cost overrun in the total cost overrun. The total cost overrun of all the new projects came to Rs 5994.65 lakhs. Plant and machinery and preliminary and pre-operative indicated almost the same percentage of cost overrun. Out of the total cost overrun, plant and machinery, preliminary and pre-operative, and building and

civil works constituted 37.52 percent, 37.35 percent and 20.23 percent respectively. The above components taken together formed 95.1 percent of the total cost overrun. The share of the remaining components were only marginal.

(b) Components of Cost Overrun in Expansion, Modernisation and Diversification Projects

The component wise cost overrun of the expansion, modernisation and diversification projects depicts (table 5.19) that preliminary and preoperative expenses stood first among the components of cost overrun with 222.54percent. Though this item was ranked first in the new projects (173.53 percent), the percentage increase was less than the EMD projects.

Hike in the cost of building and civil works was ranked second with 163.81percent. This component got a similar ranking in the new project also. Plant and machinery was increased by 127.79 percent, margin money for working capital by 113.14 percent, land and site development by 97.26 percent, miscellaneous fixed assets by 80.98 percent and technical know-how and engineering fees by 73.37 percent. It is also observed from the analysis that the components of cost overrun in the EMD projects were higher than that of all the projects taken together.

Table 5.19

Component wise Cost Overrun in EMD Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	283.58	28.36 (1.06)	97.26	V
Buildings and Civil Works	2415.76	241.58 (9.06)	163.81	II
Plant and Machinery	16927.86	1692.79 (63.48)	127.79	III
Technical Know-how- & Engineering Fees	1979.14	197.91 (7.42)	72.37	VII
Miscellaneous Fixed Assets	1397.36	139.74 (5.24)	80.98	VI
Preliminary and Pre-operative- Expenses	3805.18	380.52 (14.27)	222.54	I
Provision for Contingencies	-1328.38	-132.84 (-4.98)	----	
Margin money for Working - Capital	1186.47	118.65 (4.45)	113.14	IV
Total	26666.97	2666.70 (100)	113.18	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

Table 5.19 also reflects the share of each component of project cost overrun in the total cost overrun of the EMD projects. The EMD projects witnessed a massive cost overrun of 26666.97 lakhs, where plant and machinery alone constituted the highest share i.e., 63.48 percent. Preliminary and pre-operative formed 14.27 percent, which ranked second and building and civil works, occupied the third position with 9.06 percent on the total cost overrun. The contributions of the remaining components on total cost overrun were only nominal.

Conclusion

The purpose wise analysis of the components of project cost overrun indicates that preliminary and preoperative and building and civil works are having the highest rate of cost overrun both in the new and EMD projects. Technical know-how and engineering fees registered the least percentage cost overrun in both the categories of projects. The study also reflects that in all components of cost overrun except the three cited above, there exist difference in the ranking of percentage cost overrun.

The percentage cost overrun in all components is higher in the EMD projects than the new projects. A comparison of the component wise percentage cost overrun in all the projects (combined together), with the purpose wise projects shows that the EMD projects are having the highest percentage cost overrun in all components. Here it is concluded that the new projects are having better project management practices when compared to the EMD projects.

The analysis of the contribution of each component to total cost overrun depicts that plant and machinery and preliminary and preoperative are the dominant contributors of cost overrun in both new and EMD projects. Where as the least contributing factor is technical know-how and engineering fees in the new projects and land and site development in the EMD projects. Moreover in respect of three factors (i.e., plant and machinery, preliminary and pre-operative and building and civil works) uniformity in the order of magnitude exists. It is noticed that the share plant and machinery (which is a dominant component) in total cost overrun is higher in the EMD projects than all the projects taken together.

5.3.4 Promoter wise Analysis

(a) Components of Cost Overrun in New Promoters' Projects

Table 5.20 presents the components of cost overrun of the projects promoted by new promoters. Preliminary and pre-operative expenses recorded 144.01 percent increase of cost overrun and ranked first among the components of cost overrun. But this cost overrun was less than the percentage cost overrun of similar component in all the projects (i.e., 204.46 percent). Increase in building and civil works registered 76.69 percent and ranked next to preliminary and preoperative expenses. Margin money for working capital ranked third with a cost overrun of 57.95 percent. Land and site development (54.14 percent), miscellaneous fixed assets (43.23 percent), plant and machinery (34.20 percent) and technical know-how fees and engineering fees (11.58 percent) were ranked fourth, fifth, sixth and seventh respectively. It is observed from the comparison of the component wise cost overrun of the new promoters' projects with all the projects combined together, that the percentage of cost overrun in all the components were less in the new promoters' project than all the projects.

The table also shows the total cost overrun and the share of various components in the total. In new the promoters' projects, the total cost overrun amounted to Rs. 4704.51 lakhs. Here also, preliminary and pre-operative expenses contributed the highest share with 35.59 percent of total cost overrun. Plant and machinery stood just below preliminary and pre-operatives with a contribution of 33.59 percent. Buildings and civil works ranked third with 22.98 percent. Miscellaneous fixed assets shared 10.02 percent of total cost overrun and occupied the fourth position.

Table 5.20

Component wise Cost Overrun in New Promoters' Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	119.32	9.94 (2.54)	54.14	IV
Buildings and Civil Works	1081.17	90.10 (22.98)	76.69	II
Plant and Machinery	1580.21	131.68 (33.59)	34.20	VI
Technical Know-how- & Engineering Fees	48.27	4.02 (1.02)	11.58	VII
Miscellaneous Fixed Assets	471.36	39.28 (10.02)	43.23	V
Preliminary and Pre-operative- Expenses	1674.32	139.53 (35.59)	144.01	I
Provision for Contingencies	-516.47	-43.04 (-10.98)		
Margin money for Working - Capital	246.33	20.53 (5.24)	57.95	III
Total	4704.51	392.04 (100)	47.71	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

It is significant to note that preliminary and pre-operatives, plant and machinery and buildings and civil works together constituted 92.16 percent of the total cost overrun.

(b) Components of Cost Overrun in Existing Promoters' Projects

Analysis of the cost overrun in the existing promoters' projects (table 5.21) identifies that the hike in preliminary and pre-operative expenses resulted in a massive percentage of cost overrun (237.82 percent) and ranked first among the components. This was higher than the percentage

overrun in the same component in all the projects combined together. The main reason that could be ascribed to this was the accumulation of the interest due to the delay in commissioning of projects and payment of commitment charges on loan capital. Building and civil works ranked second with an overrun of 142.99 percent.

Table 5.21

Component wise Cost Overrun in Existing Promoters' Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	288.05	24 (1.03)	80.30	V
Buildings and Civil Works	2547.31	212.28 (9.11)	142.99	II
Plant and Machinery	17597.03	1466.42 (62.94)	120.07	III
Technical Know-how- & Engineering Fees	1982.13	165.18 (7.09)	72.40	VII
Miscellaneous Fixed Assets	1435.96	119.66 (5.14)	73.84	VI
Preliminary and Pre-operative- Expenses	4369.66	364.14 (15.63)	237.82	I
Provision for Contingencies	-1441.28	-120.11 (-5.16)		
Margin money for Working - Capital	1178.25	98.19 (4.22)	103.57	IV
Total	27957.11	2329.76 (100)	107.97	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

The third important element of cost overrun was plant and machinery (120.07 percent). It could be emphasised here that there had been hike in excise duty, customs duty and exchange rate variations, which was on the higher side. These are the probable reasons for very high cost

overrun with regard to this component. Margin money for working capital was increased by 103.57 percent, land and site developments by 80.30 percent, miscellaneous fixed assets by 73.84 percent. Technical know-how and engineering fees ranked the last with an increase of 72.40 percent. It is significant to note that while comparing the component wise percentage of cost overrun in the projects under existing promoters' category, with that of all the projects combined together that the existing promoters' projects recorded higher rates of cost overrun than all projects, with regard to all the components of the total project cost.

Regarding the total cost overrun and share of the components in total cost overrun, the table reveals that plant and machinery constituted 62.94 percent of the total cost overrun of Rs. 27957.11 lakhs. The share of preliminary and pre-operative expenses was 15.63 percent. It is significant to observe that these two elements together formed 78.57 percent of the total cost overrun.

Conclusion

From the promoter wise analysis of the components of cost overrun, it is revealed that both in new and existing promoters' projects, preliminary and pre-operatives, and buildings and civil works are having the highest percentage of cost overrun. Technical know-how and engineering fees recorded the least percentage of cost overrun, in both new and existing promotion of projects. The study also indicates that in all the components except the three cited above, there exist difference in the ranking of percentage cost overrun.

It is observed from the analysis that the existing promoters' projects have higher percentage cost overrun in all the components than the new promoters' projects. A comparison of the

component wise percentage cost overrun in all the projects (taken together), with promoter wise projects reflects that the projects promoted by existing promoters are having the highest percentage of cost overrun in all the components of cost overrun and vice versa, in the new promoters' projects. Therefore, it is concluded that the new promoters' projects are having the better practices regarding projects planning, implementation and control when compared to the existing promoters' projects.

The study of the share of component cost overrun in the total cost overrun highlights that the preliminary and pre-operative is the most dominant contributor of cost overrun in the new promoters' projects. But plant and machinery is the highest contributor in the existing promoters' projects. It is also noted that the technical know-how and engineering fees in the case of new promoters' projects and land and site development in the case of existing promoters' projects is the least contributor of cost overrun. There is no uniformity in the order of magnitude among various components observed in the study. The study further indicates that the share of preliminary and pre-operative (which is a dominant item) in the total cost overrun is higher in new promoters' projects than that of all projects (combined together). Similarly, the share of plant and machinery is higher in existing promoters' projects than that of all the projects combined together.

5.3.5 Industry Wise Analysis

(a) Components of Cost Overrun in Capital Goods Projects

Table 5.22 reflects the components of cost overrun of the projects belonging to capital goods industries. The increase in preliminary and pre-operative expenses resulted in very high rate of

cost overrun, i.e., 386.17 percent, and ranked first among the components of total project cost. The percentage cost overrun in other components was in no way reaches the percentage overrun in preliminary and pre-operative expenses. Plant and machinery registered a cost overrun of 48.75 percent and ranked second. Increase in buildings and civil works came to 42.70 percent and ranked as third. Hike in the cost of miscellaneous fixed assets is, only nominal, i.e., 2.95 percent and ranked the last among the components of total project cost.

Table 5.22

Component wise Cost Overrun in Capital Goods Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	13.80	2.76 (1.01)	25.10	V
Buildings and Civil Works	166.58	33.32 (12.16)	42.70	III
Plant and Machinery	683.22	136.64 (49.87)	48.45	II
Technical Know-how- & Engineering Fees	32.50	6.5 (2.37)	40.47	IV
Miscellaneous Fixed Assets	7.07	1.41 (0.52)	2.95	VII
Preliminary and Pre-operative- Expenses	571.16	114.23 (41.69)	386.17	I
Provision for Contingencies	-117.20	-23.44 (-8.56)		
Margin money for Working - Capital	12.85	2.57 (0.94)	13.87	VI
Total	1369.98	274.00 (100)	54.08	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

It is also observed that the rates of cost overrun in all the components of total project costs, except preliminary and pre-operative expenses were less in the capital goods projects than that of all the projects combined together.

It is also useful to study the various constituents of the total project cost and their share in the total cost overrun in projects belonging to capital goods industries. The table reveals that the total cost overrun was Rs.1369.98 lakhs. Out of it, plant and machinery constituted 49.87 percent and preliminary and pre-operative expenses 41.69 percent of total cost overrun. It means that these two components together form 91.56 percent of the total cost overrun. The share of technical know-how and engineering fees, land and site development, margin money for working capital and miscellaneous fixed assets was only nominal.

(b) Components of Cost Overrun in Intermediate Goods Projects

Table 5.23 portrays the component wise cost overrun in the projects belonging to intermediate goods industries. It is revealed from the table that the increase in preliminary and pre-operative expenses was recorded at 202.20 percent and ranked the first among the components of total project cost overrun. This was just above the percentage overrun in preliminary and pre-operative expenses in all the projects (201.46 percent) covered under the study. Hike in buildings and civil works came to 170.54 percent and ranked second. This cost overrun was much below the corresponding percentage in all the projects taken together. The third important components in cost overrun was increase in margin money for working capital (115.50 percent). When comparing with all projects, it was higher than that of all projects. Plant and machinery registered a cost overrun of 113.59 percent. But it was 99.49 percent in all the projects. Land and site development cost increased by 103.04 percent and ranked fifth. It

was 70.33 percent in all projects taken together. Escalation in miscellaneous fixed assets and technical know-how and engineering fees were 72.69 percent, 66.04 percent respectively and these were higher than the corresponding figures in all the projects combined together.

Table 5.23

Component wise Cost Overrun in Intermediate Goods Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	219.46	24.38 (0.74)	103.04	V
Buildings and Civil Works	3067.34	340.82 (10.40)	170.54	II
Plant and Machinery	17617.21	1957.47 (59.74)	113.59	IV
Technical Know-how- & Engineering Fees	1999.96	222.22 (6.78)	66.04	VII
Miscellaneous Fixed Assets	1673.98	186.00 (5.68)	72.69	VI
Preliminary and Pre-operative- Expenses	5186.06	576.23 (17.59)	202.20	I
Provision for Contingencies	-1558.11	-173.12 (-5.28)		
Margin money for Working - Capital	1282.81	142.53 (4.35)	115.50	III
Total	29488.71	3276.53 (100)	104.99	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

From the analysis of the contribution of component wise cost overrun in total cost overrun, it is revealed that a major share of the total cost overrun was that of plant and machinery (59.74 percent). Preliminary and pre-operative expenses constituted 17.59 percent and buildings and

civil works shared 10.40 percent of the total cost overrun. It is to be noted that these three components together, formed 87.73 percent of the total cost overrun.

(c) Components of Cost Overrun in Consumer Goods Projects

The table 5.24 points out the components of cost overrun in the projects belonging to consumer goods category. In preliminary and pre-operative expenses, the cost overrun was the highest (99.83 percent). But it was less than the percentage overrun in the same component in all the projects combined together (201.46 percent).

Table 5.24

Component wise Cost Overrun in Consumer Goods Projects

Components	Cost overrun (Rs in lakhs)		% of cost overrun	Rank*
	Total	Average		
Land & Site Development	174.11	17.41 (9.66)	55.95	II
Buildings and Civil Works	394.56	39.46 (21.88)	39.37	IV
Plant and Machinery	844.21	84.42 (46.82)	37.11	V
Technical Know-how- & Engineering Fees	30.54	3.05 (1.69)	24.38	VII
Miscellaneous Fixed Assets	226.27	22.63 (12.55)	45.88	III
Preliminary and Pre-operative- Expenses	286.76	28.68 (15.92)	99.83	I
Provision for Contingencies	-282.44	-28.24 (-15.67)		
Margin money for Working - Capital	128.92	12.89 (7.15)	35.86	VI
Total	1802.93	180.29 (100)	35.10	

Figure in bracket shows percentage of cost overrun on total cost overrun

* Ranks given on the basis of the percentage of cost overrun

Hike in land and site development cost got second rank with 55.95 percent. The cost of miscellaneous fixed assets was increased by 45.88 percent and ranked third. It was followed by building and civil works (39.37 percent), plant and machinery (37.11 percent), margin money for working capital (35.86 percent) and technical know-how and engineering fees (24.38 percent). The components wise cost overrun of the projects belonging to consumer goods category, when compared with all the projects taken together leads to the inference that the, percentage cost overrun in respect of all the components are less in the consumer goods projects than all the projects combined together.

Table also depicts that the total cost overrun of the projects in consumer goods category amounted to Rs.1802.93 lakhs. Out of the total cost overrun, 46.82 percent was accounted for plant and machinery. The share of buildings and civil works in the total cost overrun came to 21.88 percent and preliminary and pre-operative expenses constituted 15.92 percent. The share of other components of cost overrun were miscellaneous fixed assets (12.55 percent), land and site development (9.66 percent), margin money for working capital (7.15 percent) and technical know-how and engineering fees (1.69 percent) respectively. It is interesting to observe that plant and machinery and buildings and civil works together forms 68.70 percent of the total cost overrun of the projects.

Conclusion

The industry wise analysis of the components of cost overrun reflects that the preliminary and pre-operative expenses having recorded the highest rate of cost overrun in the capital, intermediate and consumer goods projects. Technical know-how and engineering fees showed the least percentage of cost overrun in the intermediate and consumer goods projects. But in

the capital goods projects, miscellaneous fixed assets is having the least percentage of cost overrun. It is also noted that in all the of cost overrun components except one (preliminary and pre-operative), there exists difference in the ranking of percentage cost overrun. It is revealed that the intermediate goods projects have higher percentage of cost overrun in all the components except one (preliminary and pre-operatives of capital goods projects) than the capital and consumer goods projects. A comparison of industry wise projects with all the projects taken together, shows that the component wise percentage cost overrun in the intermediate goods projects is much higher than that of all projects. Hence it could be inferred that the consumer and capital goods projects have better project planning, implementation and control as compared to the intermediate goods projects.

The analysis of the contribution of each component to total cost overrun highlights that plant and machinery is the most dominant contributor of cost overrun in the capital, intermediate and consumer goods projects. Whereas the least contributing factor is miscellaneous fixed assets in capital goods projects, land and site development in the intermediate goods projects and technical know-how and engineering fees in the consumer goods projects. In respect of two factors i.e., plant and machinery and margin money for working capital, uniformity in the order of magnitude exists. It is also seen that the share of plant and machinery (which is a dominant component) in total cost overrun is higher in the intermediate projects than all the projects taken together.

5. 4 Analysis of Time Overrun

Time is akin to money, time lost is equal to money lost. If the passage of a day can add to the costs with out creating any value, then keeping a vigil on time is a prime function of the project

management. This vigil has to be exercised through out all the stages of projects. Special attention is needed in the case of large projects with long gestation period. In large projects, slippages in time at different stages might look insignificant, if looked individually, but could add up to a sizeable lag in the overall schedule. But the fact is that not much attention is being bestowed up on the value of time, in the evaluation of projects, as it ought to be. It may happen that a project which is viable, may turn out to be the most unremunerative due to longer time taken in its execution. This is because of the reason that the longer the completion time, the larger will be the accumulated recurring costs or period costs of the non-productive category. Therefore, effective project time management can save enormous investment costs in the case of large and medium projects. In this section, an analysis is made on the time overrun of projects and its causes.

Table 5.25 highlights the time overrun of all the projects combined together and various categories of projects covered under the study. The average time estimated for the completion of all the projects was 21 months. But the actual time taken for the completion of the projects was 44 months. This has resulted in an average time overrun of 23 months, i.e., 109.52 percent of the estimated time. This clearly illustrates the high incidence of time overrun in the industrial projects under study.

The sector wise analysis of time overrun indicates that the estimated time for completion of the projects in public sector was 28 months. This was increased to 68 months at the time of completion of these projects. Therefore, the resultant time overrun in the public sector projects was 40 months i.e., 142.86 percent of the estimated time. But in the private sector projects, the average estimated time for completion of projects was only 13 months and the actual time taken for completion was 19 months, resulting in a time overrun of 6 months i.e., 46.15 percent

of the estimated time. This clearly indicates that in public sector, the time schedule for completion of projects is quite alarming and the time overrun is obviously of a high order.

Table 5.25

Average Time Overrun of Industrial Projects

(in Months)

Categories of Projects	Estimated Time	Actual Time	Time overrun
All Projects	21	44	23 (109.52)
Sector Wise:			
Public	28	68	40 (142.86)
Private	13	19	6 (46.15)
Purpose Wise:			
New Projects	19	39	20 (105.26)
Expansion, Modernisation, & Diversification (EMD)	22	49	27 (122.73)
Promoter Wise:			
New	15	32	17 (113.33)
Existing	26	56	30 (115.39)
Industry Wise:			
Capital Goods	23	43	20 (86.96)
Intermediate Goods	23	56	33 (143.48)
Consumer Goods	16	32	16 (100)

Figures in brackets indicate time overrun in percentage.

In purpose wise analysis, it is observed that in the new projects, the estimated time for completion of projects was 19 months. But these projects took 39 months, on an average, for completion. Therefore, the projects were delayed by 20 months. The percentage of time overrun was 105.26. In the expansion, modernisation and diversification projects, the average estimated time schedule was 22 months and it was lagged by 49 months, which resulted in a time overrun of 27 months, i.e., 122.73 percent of the estimated time. Thus, in purpose wise

comparison, projects belonging to the expansion, modernisation and diversification category were having higher time overrun than the new projects.

Regarding promoter wise comparison it is seen that the new promoters' projects were having 15 months as the average estimated time for completion of projects, whereas the average actual time was 32 months and thus the time overrun was 17 months. The percentage time overrun was 113.33 percent of the estimated time. But in the existing promoters' projects, the estimated, actual and time overrun were 26 months, 56months and 30months respectively. It indicates that 115.39 percent increase in the time schedule had occurred. It could be inferred that projects belonging to the existing promoters group are having marginally higher time overrun than the new promoters' projects.

It can be observed from the industry wise study that the estimated time for completion of projects belonging to the intermediate and consumer goods industry groups were 23, 23 and 16 months respectively. But the actual time came to 43 months (capital goods), 56 months (intermediate goods) and 52 months (consumer goods). The time overrun in the capital goods projects was 20 months (86.96 percent), 33 months in the intermediate goods projects (143.48 percent) and 16 months in the consumer goods projects (100 percent). It is thus observed that the projects belonging to intermediate goods category were having the highest percentage of time overrun among the industry wise projects.

5.5 Relationship Between Time overrun and Cost overrun

In order to study the relationship between time overrun and cost overrun of the projects under study, correlation coefficients are worked out and then 't' test is employed to test the following null hypothesis.

Ho = The relationship between time and cost overruns is not significant in the various categories of projects.

The correlation coefficients and P values of computed 't' values of all the projects combined together, and various categories of projects are depicted in table 5.26. It is revealed from the table that the coefficient of correlation between time and cost overruns, of all the projects (combined together) is 0.3903 and the P value of computed 't' value is 0.059. Since the 'P' value is higher than the significance level of 0.05, we can conclude that there exists no significant correlation between time and cost overrun, in all the projects covered under the study.

Regarding sector wise analysis, the correlation coefficient between time and cost overruns in the public sector projects is 0.3143. The 'P' value of 0.320 is higher than the significant level of 0.05. Hence the correlation between time and cost overruns, is not significant in the public sector projects. But in the private sector projects, the relationship between time and cost overruns is negative (i.e., -0.2253). Here also the correlation is not significant at 5 percent level. This is because of the fact that the 'P' value (i.e., 0.481) is higher than the significant level of 0.05.

In purpose wise analysis, the correlation coefficient of the new projects comes to 0.7940. This shows that there exists a fairly high degree of correlation between time and cost overruns. This correlation coefficient is significant at 5 percent level, because the 'P' value (0.001) is less than the significance level of 0.05. But in the expansion, modernisation and diversification projects, the relationship shows negative (i.e., –0.0412). The correlation is not significant at 5 percent level, since the 'P' value of 0.91 is higher than the significance level of 0.05.

Table 5.26

Correlation Between Time Overrun and Cost Overrun of Projects

Categories of projects	Correlation coefficient	'P' value
All Projects	0.3903	0.059
Sector Wise:		
Public	0.3143	0.320
Private	-0.2253	0.481
Purpose Wise:		
New	0.7940	0.001
Expansion, Modernisation, & Diversification (EMD)	-0.0412	0.910
Promoter Wise:		
New	0.9083	0.000
Existing	-0.1035	0.749
Industry Wise:		
Capital Goods	0.1107	0.859
Intermediate Goods	0.6574	0.054
Consumer Goods	-0.1331	0.714

Significant at 0.05 level

In promoter wise study, the projects promoted by new promoters are having a correlation coefficient of 0.9083. It means a high degree of correlation exists between time overrun and

cost overruns. This relationship is significant at 5 percent level, because the 'P' value (0.00) is less than the significance level of 0.05. In the existing promoters' projects, negative relationship between time and cost overruns is observed (i.e., - 0.1035). The relationship is not significant at 5 percent level, since the 'P' value of 0.749 is higher than the significance level of 0.05.

In industry group study, it is revealed that the coefficient of correlation between time and cost overruns in the capital goods projects is 0.1107. The relationship is high in the intermediate goods projects (r = 0.6574). But in both these categories of projects, the correlation is not significant at 5 percent level, because the 'P' values of 0.859 (capital goods) and 0.054 (intermediate goods) are less than the significance level of 0.05. In the consumer goods projects, the relationship is negative (–0.1331). This relationship is not significant at 5 percent level, because the 'P' value (0.714) is above the significance level of 0.05.

Conclusion

The above analysis of time overrun reflects that the average time overrun of all the projects taken together was 109.52 percent. The sector wise study shows that the public sector projects were more prone to time overrun than the private sector projects. The percentage time overrun in the public sector projects was higher than the all the projects percentage. It is found that the EMD projects were affected more by time overrun as compared to the new projects. Here also the percentage time overrun was higher than the all projects percentage. In promoter wise analysis, it is seen that the existing promoters' projects were having marginally higher time overrun than the new promoters' projects. In the new and existing promoters' projects, the percentage time overrun was higher than the all projects' percentage. It is also observed that

the projects belonging to intermediate category were having the highest percentage of time overrun than the capital and consumer goods projects. The percentage time overrun in the intermediate projects was higher than the all projects' percentage.

The relationship study reflects that the coefficient of correlation between time and cost overruns of all the projects combined together is 0.3903. It indicates the existence of low positive correlation between them. Test results show no significant correlation at 5 percent level. In the public sector projects there exists a low positive correlation, but in the private sector projects the relationship shows negative. The correlation coefficients are not significant at 5 percent level in both the cases. In the new projects the study reveals that there is significant relationship between time and cost overruns. But the relationship shows negative in the EMD projects and it is not significant at 5 percent level. The relationship is very high and it is significant at 5 percent level in the new promoters' projects. Whereas the relationship shows negative and it is not significant at 5 percent level in the case of existing promoters' projects. In industry wise study it is seen that in the capital and intermediate projects the correlation shows positive. But in both these categories of projects, the correlation is not significant at 5 percent level. In the consumer goods projects, the relationship is negative and is not significant at 5 percent.

5.6 Causes of Time Overrun

In order to identify the causes of project time overrun, it is imperative to see how delays occur in the course of implementation of a project. Delays may occur at different stages of project implementation, namely, pre-feasibility study phase, evaluation phase, contracting and

procurement phase, construction phase and starting phase. The general causes of delay in each phase are discussed below:

(1) Pre-feasibility Phase.

At pre- feasibility phase, the delays occur due to reasons such as delay inland acquisition, delay in environmental clearances, delay in clearances from financial or regulatory bodies of the government, lack of infrastructural facilities, failure in planning for important resources, facilities etc., selection of incompetent consultant, etc.

(2) Evaluation Phase.

Delays occur in project evaluation phase of the projects due to incomplete project study of the project, calling for subsequent changes in the scope of the project, political influence in site selection, inadequacies of consultants and project authorities etc.

(3) Technology Selection and Engineering Phase.

At this phase, time overrun may occur due to a number of reasons such as poor or outdated technology acquisition, delay in completing details of engineering, lack of design data, delay in the freezing of design and specification, absence of an engineering schedule, inefficient procedure for scrutiny, approval and transmittance of drawings and specifications, etc.

(4) Contracting and Procurement Phase.

Delays are often occurred during this phase, due to the following reasons, such as delays in preparation of bid documents, poor selection of vendors/manufacturers/contractors and preferential treatment to public sector enterprises on the basis of government's guidelines, delay in placing orders, delay in the issuance of import licences, permits and various clearances, delay in the opening of letter of credit and issuance of various guarantees to foreign suppliers, lack of integrated action plan closely involving suppliers and contractors, delay in the supply of critical equipment , etc.

(5) Construction Phase.

The main reasons for delay during construction phase are delay and/or inadequacy in contractors' mobilisation, inefficiency of contractors, hold-up resulting from delay in interconnected activities because of the absence of integrated management, delay in payment and provision of infrastructural facilities, delay in settlements of extras, changes and claims, etc.

(6) Start-up Phase.

The reasons for delay during start-up phase are delay in inputs, absence of commissioning specialists, design changes, failure of equipment or parts, defects in erection and installations, teething troubles resulting from bad quality control during erection and improper testing of equipment, etc.

There are various other factors on account of which delays occur in the implementation of the projects. These causes could be due to external, managerial, technical and financial factors.

External factors are normally beyond the control of the promoters like natural calamities, strikes or lock-outs in the factories of equipment suppliers, etc. Some managerial problems always prevail but in fact, it is unavoidable. Whatever is the management pattern, factors like inexperienced promoters, lack of knowledge and poor exposure to procedures, inefficiency in co-ordination and implementation are the impediments in project implementation.

Technical problems relate to lack of proper collaboration arrangements, failure to get detailed engineering data in time, fast changing of technology or project concept etc., all contribute to the delay in project completion. Financial problems include delay in tying up of financial arrangements, mobility of the promoter to pump in additional funds required for financing overrun in project cost, etc.

5.6.1 Causes of Time Overrun in Central Public Sector Projects

The Annual Report of the Ministry of Programme Implementation provides an insight into the causes of time overrun in the Central Public Sector Projects. The table 6.27 presents the causes of time overrun in the central sector steel, fertiliser, and chemical and Petrochemical projects.

Table 5.27

Causes of Time Overrun in Central Public Sector Projects

Sl No	Steel	Fertiliser	Chemical & Petrochemical
1	Delay in supply of-Equipment	Delay in finalisation of Collaboration	Delay in engineering activity
2	Delay in creation of - infrastructural facilities	Delay in equipment Delivery	Substantial modification for plants
3	Delay by turn key suppliers	Faulty design & mismatch of equipment	Delay by contractor
4	Changes in scope & design	Delay in mechanical erection	Delay in technology transfer
5	Delay in ordering various Packages	Adverse labour conditions	Delay in award of Contract
6	Delay by contractor	Delay in commissioning of plant	Delay in agreement with contractor
7	Funds constraints	Funds constraints	
8	Delay in absorption of technology	Delay in awarding Contract	-------
9	Delay in advance planning for replacing out dated technology		

Source: Ahindra Chakraborty, Public Sector Projects: Dimension of Time and Cost overrun; Indian Journal of Public Enterprises. pp 117-119

5.6.2 Causes of Time Overrun in Sample Projects

In order to ascertain the causes of time overrun and their relative importance in the sample projects, the various causes have been classified in to ten different heads. The project

managers belonging to the public and private sectors covered under the study were asked to rank the causes, in the order of their importance. The sector wise causes of time overrun and their respective ranks are given in table 5.28 and 5.29.

(i) Public Sector Projects

Table 5.28 reflects the causes of time overrun in the public sector projects and their respective ranks. These causes of time overrun on the basis of their ranks are discussed briefly here under:

Table 5.28

Ranking of the Causes of Time Overrun in Public Sector Projects

Causes	Rank
Delay in Delivery and Receipt of Machinery	I
Delay in Civil and Construction Work	II
Delay in Getting Clearance	III
Delay in Tying up of Financial Arrangements	IV
Delay by Consultants and Contractors	V
Change in Scope of Work	VI
Delay in Land acquisition and Site Development	VII
Delay in Providing of Infrastructural Facilities	VIII
Change in Location of Projects	IX
Labour Problems	X

(1) Delay in Delivery and Receipt of Machinery

It is revealed from the table that the project managers ranked delay in delivery and receipt of machinery as the first cause among the various causes of time overrun in public sector. The

reasons for delay in delivery of machinery were delay in preparation of bid documents, poor selection of vendors, delays in placing orders, delay in issue of import licences, permits and various clearances, delay in opening of letters of credit and giving guarantees to foreign suppliers, lack of integrated action plan closely involving suppliers and contractors etc. There are a number of instances where delays in delivery and receipt of machinery were occurred in public sector projects.

For instance, in the case of the Integrated Casting Unit of Autokast Ltd., the delay in the supply of high pressure moulding line (which was imported) from the West Germany, prolonged the commissioning of the second phase of the project considerably (CAG Report, 1990, p.48).

In the Malabar Cements Ltd. it is noted that there was delay in supply of electric motors by the BHEL and the period of delay ranged up to 15 months. Causes of delay due to the supply of defective machinery was also noted (CAG Report 1986-87,pp. 112,113).

Delay in issuing orders and receiving bid documentations from consultants, for procurement of equipment was noticed in the case of the Kerala State Salicylates and Chemical Ltd. Delay in supply and execution of machinery was also noted in the Keltron Control Projecs (CAG Report 1989, p.140 and CAG Report 1992, p.56).

The delay in supply of digestor and delay in structural erection, spray roaster, etc., affected the time schedule of the Titanium Dioxide Pigment Project of KMM Ltd. (CAG Report 1983-84, p.100).

(2) Delay in Civil and Construction Works.

Another important cause for time overrun in the public sector projects was delay is civil and construction works. It was ranked second by the project managers. The reasons for such delay were the delay by contractors, delay on account of increase in area, delay in civil and structural works, delay in piping and instrumentation works, etc.

The case of Kerala State Salicylates and Chemicals Ltd., can be sited as the best example of delay in civil and construction works in projects. It was reported to have a delay up to 39 months in completion of civil works, 23 months in piping and other instrumentation works and consequent delay in installation and commissioning of the project (CAG Report 1992, p.56).

Similarly in the KMM Ltd., the second and fourth revision of the project costs was necessitated, due to the delay in civil and structural work. Delay in the completion of civil work also cased time overrun in the Keltron Control Project. Delay in the construction of aerial rope way for the transport of lime stone, also caused time overrun in Malabar Cements Ltd., (CAG Reports 1983-84, p.100, 1989, p.140 &1986-87, p.87).

3. Delay in Getting Clearance

This was ranked third among the various causes of project time overrun by the public sector project managers. The public sector projects are experienced with a considerable time overrun due to the delay in various government clearances, such as industrial licence/letter of intent, import of capital goods, foreign exchange clearance, approval of foreign collaboration, etc.

The Ammonium Sulphate Caprolactam Project of FACT Ltd. was experienced with the undue delay due to lag in government clearances. The company submitted its Techno-Economic Feasibility Report in August 1980. The company's proposal was approved by the Government of India on 24th April 1982 and the letter of intent was issued by the Ministry of Industry on 22nd August 1982. Then the company invited bids for know-how, basic engineering services, etc., on 18th September 1982 and the same was approved by the Board on 6ht July 1983. The application for foreign collaboration was filed on 15th July 1983, but the foreign currency approval was issued only on by on 8th February 1984. The foreign collaboration agreement with the Chiyoda Chemical Engineering & Construction Company Ltd., was agreed by the authorities of the Overseas Economic Co-operation Fund (OECF) on 11th May 1984 and the same was approved by the Government of India on 18th September 1984. Due to uncertainties associated with the approval of contract, the company was not able to submit the Detailed Cost Estimates in time. Later the Detailed Cost Estimate was submitted on March 1985 and was approved by the Government of India on June 1986. From this, it is clear that unnecessary control and red-tapism were the main causes of delay. (Project Completion Report)

In the Kerala State Salicylates and Chemicals Ltd., it was reported to have delay on the part of the state government in giving approval to the revision of project cost from time to time. (CAG Report 1992, p.57).

(4) Delay in Tying up of Financial Arrangements.

Factors such as delay in applying for funds, delay on the part of companies in complying with various formalities, delay in sanction of loans by financial institution, interruptions in the flow of funds etc., contributed to the time overrun in public sector projects.

For example, in the case of Kerala State Textile Corporation Ltd., it was reported that the company had obtained approval from the government in 1982 to set-up 3 new spinning mills and took up their implementation in 1982-83. The company went ahead with implementing the projects, although it did not receive the financial assistance envisaged in the proposals, from the IDBI, IFCI in view of the embargo placed by the IDBI, as a matter of policy, on the financial assistance for additional spinning capacities (CAG Report 1986-87, p.116).

The delay in project implementation in the Kerala State Salicylates and Chemicals Ltd. was mainly due to the delay in getting funds from financial institutions. Delay ranging up to 16 months was observed in getting funds from financial institutions due to the delay in applying for funds and complying with the various formalities (CAG Report 1992, p. 56).

It was reported that interruptions in the flow of funds caused time overrun in Integrated Casting Unit of Autokast Ltd. The delay in getting funds from financial institution and banks due to non-compliance of cumbersome formalities lagged the timely availability of funds.(CAG Report, 1990, p.42)

5. Delay By Consultants and Contractors

The delay in supply of know-how due to large scale changes in design, delay in furnishing details such as drawings etc., delay in collection of basic engineering documentation and data etc., on the part of consultants affected the time schedule for completion of projects. The CAG Reports provide number of evidences in this connection.

The delay in supply of know-how due to large-scale changes in design was noticed in the Keltron Controls Project. Further, it was revealed that the foreign collaboration was selected with out inviting tenders and evaluating the technical aspects of the different offers. Hence it could not be ensured whether the company had obtained the latest technology at the most economical terms or not. There were concrete evidences in the CAG Report (1989) about the transfer of obsolete technology by the Brown Boveri, Kent (U.K) to the Keltron Control Projects (CAG Report 1989, p.141).

In the Kerala State Salicylates and Chemicals Ltd., a delay of 18 months was observed on the part of consultants in furnishing details, such as drawings to the vendors for design and fabrication of equipment, etc. A technical committee consisting of officials of the company and its holding company (KSIE) had assessed that the service rendered by the Kinetic Technology India Ltd. (KTI), the consultants, was totally insufficient and ineffective in the various areas of implementation of the project (CAG Report 1992, p.52).

Delay in the collection of basic engineering documents and data by the consultants (MECON), frequent changes made by the collaborating firm (collaborator) in the basic engineering documents also caused considerable delay in the Titanium Dioxide Pigment Project of KMM Ltd. (CAG Report 1983-84, p. 95).

The delay on the part of contractors was also noticed in many public sector projects. The CAG Report (1991,p.120) identified a delay of 31 months in the construction work of factory building, by the contractors in the Kerala Premo Pipe Factory Ltd. But the company could not recover any penalty from the contractors for the delay in completion of work. It is also noted

that in many cases contractors were selected not on the basis of their ability and capacity to perform the work, but on the basis of some other consideration.

6. Change in Scope

This reason was ranked sixth by the project managers. In many public sector projects, it was experienced that the scope of work originally defined had changed during execution and thereby caused time overrun and up ward revision of cost.

In the Ammonium Sulphate Caprolactam Project, considerable time and cost overrun were occurred due to the change in scope of work. The significant items of changes in scope were installation of captive power system, microprocessor system, fire protection system and piling for foundations (Project Completion Report).

In the Keltron Control Project, upward revision of cost and time was mainly on account of change in the original concept of a mere assembly plant to that of a full-fledged manufacturing division, with facilities for fabrication shop and tool maintenance (CAG Report 1989, p.144).

7. Delay in Land Acquisition and Site Development

This was the seventh cause for time overrun ranked by the public sector project managers. In several public sector projects, time overrun had occurred due to this reason. Delay in sanctioning approval for land acquisition was reported during the implementation of the Kerala State Salicylates and Chemicals Ltd. In the Kerala Wood Industries Ltd., it was noticed that on

account of delay in finalising the lease deed with government for land, the company was unable to offer the final security in time.

8. Delay in providing Infrastructural Facilities

This was ranked eighth among the causes of time overrun, in project completion under study. Delay in providing infrastructural facilities such as communication, transport, power etc., caused time overrun in the public sector projects. In Kerala, power shortage has been a main cause of worry to industrial units. The working of industrial units are interrupted frequently by power cuts. In the KMM Ltd., the delay in power supply to the plant had caused time overrun during the project implementation. The same had caused considerable delay in the completion of the integrated casting unit of Autokast Ltd.

9. Change in Location of Project

The project managers ranked changes in location of project as ninth. For instance, in ASCP project change in plant location and subsequent modification in plant layout, for maintaining better safety standards, increased the projects completion period.

10. Labour Problems.

Labour problems were given only the last rank by the project managers in the public sector projects. Adverse labour relations had contributed to the delay in implementation of the projects. In the Integrated Casting Unit of Autokast Ltd., there were about 112 days lost during the construction period due to labour strikes, demanding revision of wages and fringe benefits.

(CAG Report, 1990, p.55) Similarly, labour problems during the construction stage were also noticed in the case of Vitamin A project of KSDP Ltd., and Titanium Dioxide Pigment Project of KMM Ltd.

(ii) Causes of Time Overrun in Private Sector Project

Table 5.29 presents the ranking of the causes of time overrun by the project managers in the private sector projects.

Table 5.29

Ranking of the Causes of Time Overrun in Private Sector Projects

Causes	Rank
Delay in Delivery and Receipt of Machinery	I
Delay in Civil and Construction Work	II
Delay in Providing of Infrastructural Facilities	III
Delay in Tying up of Financial Arrangements	IV
Delay in Getting Clearance	V
Change in Scope of Work	VI
Delay by Consultants and Contractors	VII
Change in Location of Projects	VIII
Delay in Land acquisition and Site Development	IX
Labour Problems	X

It is revealed from the table that, like public sector, delay in delivery and receipt of machinery was the first important cause of time overrun in the private sector projects. But it is observed that, the delay time was much less in the private sector than the public sector projects. The ranking of the delay in civil and construction works in the private sector projects was the same

as that of the public sector projects. Though the delay on account of this factor was less than the public sector, it caused time overrun in the private sector.

Delay in providing infrastructural facilities, especially, power was the third important reason for time overrun in the private sector projects. Delay in tying up of financial arrangements was ranked fourth in the private sector projects. This had resulted in problems of funds constraints in the private sector projects. Delay in getting clearances such as licence, environmental clearances, etc., was ranked as fifth.

Like the public sector, the change in scope of work led to time overrun in the private sector and it was ranked as sixth cause of time overrun. Delay by consultants and contractors ranked seventh, change in location of projects ranked eighth and delay in land and site development ninth, among the causes of time overrun. Labour problems were ranked the last. They caused less time overrun in the private sector projects than the public sector projects under study.

Conclusion

From the ranking of the causes of time overrun by the project managers in the public and private sectors, it is inferred that the delay in delivery and receipt of machinery and delay in civil and construction works are the most important reasons for the project time overrun under study. The delay caused by labour is the least important reason for the time overrun of the projects. It is also observed that there exists consensus of opinion among the project managers with regard to 50 percent of the causes of time overrun in the public and private sector projects.

Like the public sector, the change in scope of work led to time overrun in the private sector and it was ranked as the sixth cause of time overrun. Delay by consultants and contractors was ranked seventh, change in location of project ranked eight and delay in land and site development ranked ninth among the causes of time overrun. Labour problems were ranked the last. They caused less time overrun in the private sector projects than public sector projects.

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CHAPTER 6

IMPACT OF TIME AND COST OVERRUNS

An attempt to describe the magnitude of overruns and their causes was made in the previous chapter. The study reveals that all the projects, whether in public or private sector, are affected by time and cost overruns. However, the public sector projects are more prone to overruns than private sector projects. The incidence of heavy overruns in the sample project is invariably due to the improper project planning, execution and monitoring system. Unless effective control was exercised over the project cost and time schedule, the cost of production as well as the prices of the end products would be multiplied. Consequently, due to the forces of competition, the profitability of the industrial projects gets dwindled. This, in turn, will have serious repercussions on the industrial growth of a nation. In a country where much significance is attached to industrial growth, it is of paramount importance that adequate returns ought to be generated from the investments in projects. This chapter focuses attention on the impact of time and cost overruns on the industrial projects covered under the study.

6.1 General Overrun Problems

6.1.1 Time Overrun

Time overrun can be traced to improper time scheduling or poor project administration. It has several implications on the performance of a project.

(i) The longer the completion time, the larger will be the accumulated recurring costs or period costs of the non-productive category.

(ii) Delay in training and placement of technical and operating personnel at appropriate time will result in idling of heavy investments already committed, and project costs are bound to rise even as revenue generation gets deferred.

(iii) On a larger perspective, many projects have inter-linkages and even a small delay in a project will lead to corresponding delay in other projects which in turn; will adversely affect the economic progress.

(iv) Delays might also create opportunities to other enterprises to enter the industry and reap the benefits of the latest technologies. The market conditions might change which dampen the prospects of the projects.

(v) Another problem encountered by industrial units due to time overrun, has been the opportunity cost, which is measured in terms of the foregone revenue, which the company could have earned during the period of delay, if the project was commissioned in time. At the government level, it could have another kind of opportunity cost in terms of foregone tax benefits.

6.1.2 Cost Overrun

(i) The major objectives behind promoting projects, such as import substitution, export promotion, etc., remain unfulfilled and which result in the inevitable high cost of operations and high product costs, and low volumes of outputs due to low capacity utilisation, leading the state in to a state of predicament where it has to import more and export less.

(ii) The cost overrun upsets the planning and resource allocation process of the state, as the public sector units continuously demand government financial support for meeting cost overrun and the loss in the various operating phases. They cut into the developmental

outlays and other essential new investments, and thus slow down the pace of economic development.

(iii) The massive cost overrun is a direct drain on the state exchequer.

(iv) Public enterprises are committed to discharge a wide range of social obligations including welfare of employees, promotion of ancillary units, and other initiatives for the benefit of society, but they are unable to take up these measures with a degree of consistency and success, in view of their non-profitable operations.

(v) Huge cost overrun push up project capital costs, combined with delay in starting commercial operations, slow down the pace of attainment of production capacities, high production costs and absence of competition, inevitably result in pushing up prices of products and fuelling inflation.

(vi) At the enterprise level, there are problems in securing finance to meet the cost overrun. With the government forced to ration its scarce financial resources among competing claims of high priority, resources get spread out widely and there are substantial procedural delays in obtaining funds. The projects suffer further reverses because of these delays and inadequacies of funds.

(vii) With a bad start marked by huge cost overrun and bad performance, many projects find revival of profitable operation beyond their reach.

(viii) With more funds to be borrowed to finance the cost overrun, there is also the need to meet the increased commitment towards interest payments. In the face of unprofitable functioning, many projects fail to meet their debt obligation in respect of principal and interest.

(ix) High costs and high prices of products affect the sales prospects of enterprises and in situations where they have to face competition, the demand for their products shrinks and the profit is affected rigorously.

(x) When the project cost overrun is excessively high, the enterprise becomes sick right from the start and the sickness grows, assuming alarming proportion over the years.

(xi) Devoid of surplus and reserves, such enterprises cannot think in terms of growth and diversification, which are rightly expected of them.

The above discussions provide an insight into about the general problems of project overruns. The impact of overruns can also be viewed from the macro level of the economy as well as at the micro level (i.e., at the sample projects level).

6.2 Macro Level Problems

The following are the important macro level problems arising out of overruns.

6.2.1 Stunted Economic Growth.

Time and cost overruns of industrial projects distort the structure of Government's overall economic planning policies and allocation of funds. They create havoc and seriously affect the government investment in projects, since preference has to be given to the ongoing projects in which investments have already been made. In the Fourteenth Report of the Ministry of Planning and Programme Implementation, the Parliamentary Standing Committee on Finance recommended a moratorium on approval of new projects in order to ensure funds for the ongoing projects.

During the Seventh Plan, the cost overrun of public sector projects touched the dizzy height of Rs. 29,278.80 crores. But in private sector projects, the cost overrun reached the level of Rs. 17160 crores. (S. Kannan, 1990)

In the study, the total cost overrun of sample projects came to Rs. 32661.62 lakhs. Out of this total cost overrun, public and private sector sample projects shared Rs. 31820.99 lakhs and Rs. 840.63 lakhs respectively.

Table 6.1

Cost Overrun of Sample Projects (Total)

(Rs in lakhs)

Category	Projected Cost	Actual Cost	Cost Overrun
Public Sector	31999.48	63820.47	31820.99
Private Sector	3756.48	4597.11	840.63
Total	**35755.96**	**68417.58**	**32661.62**

It can be inferred from the above discussion that the overall economic growth was badly affected by the unbridled cost overrun.

6.2.2 Non-Achievement of Objectives

The impact of overruns on industrial projects invariably creates a hiatus between the expected and actual results. Due to heavy cost and time overruns, it would be difficult to achieve the main objects for which investment has been made in projects. In fact, the increased capital cost of the project due to overruns increases the cost of production, which in turn, triggers up the

prices of products. Thus, the very objectives for which the projects were approved get defeated.

6.2.3 Drain on Public Exchequer

Cost overrun in public sector projects increases the financial burden of the government. Instead of contributing to the public exchequer by means of increased revenue and foreign exchange, the public and joint sector projects may be forced to depend more on the government finance for covering the cost overrun and even for their existence.

During the Seventh Plan, the loss in production due to overruns in public sector projects was Rs. 28,537 crores and loss in revenue was Rs. 2748 crores. During the same period, in private sector projects, the loss in production was Rs. 7460 crores and loss in revenue to government was Rs. 1567 crores. (S. Kannan, 1990)

Table 6.2

Total Loss on Account of Overruns in Sample Projects

Particulars	**Production loss (tonnes)**	**Revenue loss (crores)**	**Profit loss (crores)**
Public Sector	3697480	1682.32	259.33
Private Sector	92786	54.17	3.45
Total	**3790266**	**1736.49**	**262.78**

Table 6.2 highlights the losses to the economy due to overrun in the sample industrial projects. The total production loss on account of overruns was 37,90,266 tonnes, revenue loss came to Rs. 1736.49 crores and loss of profit was Rs. 262.78 crores.

6.2.4 Difficulty in Discharging Social Obligations

The overrun projects struggled with cash flow problems and deteriorated profitability, may not be in a position to adequately discharge their social obligations towards their employees and society at large. The study of the impact of overruns on sample projects reveals that the time overrun created an employment loss of 49,83,870 man-days. Out of it, the share of public sector was 4,89,3,780 man-days and that of the private sector came to 90090.

6.2.5 Inflationary Effects

Increased cost of production due to overruns ultimately leads to inflationary reactions in the market. During the Seventh Plan period, the product prices of central public sector and private sector projects were boosted up by 10.5 percent and 7.8 percent respectively. (S. Kannan, 1990)

6.3 Micro level Problems

The implication of overruns in industrial project not only affects the economy at the macro level but also the individual projects at the micro level. The micro level problems include both operating and financial problems. They are:

6.3.1 Increased Cost of Production

Overrun increases the cost of production and compels the industrial projects to jack up the price of their products, which may render them non-competitive and unviable from the profit angle.

6.3. 2 High Leverage.

Due to the difficulty in raising own capital, the promoters of overrun projects would avail the opportunity of borrowed capital to cover up the cost overrun. This will distort the balance of debt-equity mix as mentioned in the project report. High interest burden due to increased use of borrowed funds and delayed cash inflows due to time lag in the commencement of commercial production will create a dead lock in the financial position of overrun projects.

Table 6.3 presents the financing of cost overrun through borrowed capital in sample projects.

Table 6.3

Cost Overrun Financing through Borrowed Capital

(Rs. in crores)

Projects	**Debt capital (Expected)**	**DEBT CAPITAL (Actual)**
Public Sector Projects	176.19	343.71 (95.88)
Private Sector Projects	23.44	30.93 (31.95)
All Projects	199.63	374.64 (87.67)

Figures in brackets indicate percentage increase

The table reveals that, in all projects, the actual debt capital (especially term loans from financial institutions) increased by 87.67 percent of the estimated debt capital. In public sector projects, due to cost overrun, debt capital increased by 95.88 percent. But in private sector, the hike in debt capital was only 31.95 percent.

6.3.3. Increased Financing Cost and Repayment Problems

The over-dependence on debt capital increases the cost of capital, and as a result, creates the problem of heavy interest burden. In a capital scarce state like Kerala, the cost of raising debt capital is high when compared to equity capital. The situation is further aggravated when the projects are facing cash flow problems in the initial years due to the time overrun. Thus the overruns would result in financial crunch and the concomitant hindrances.

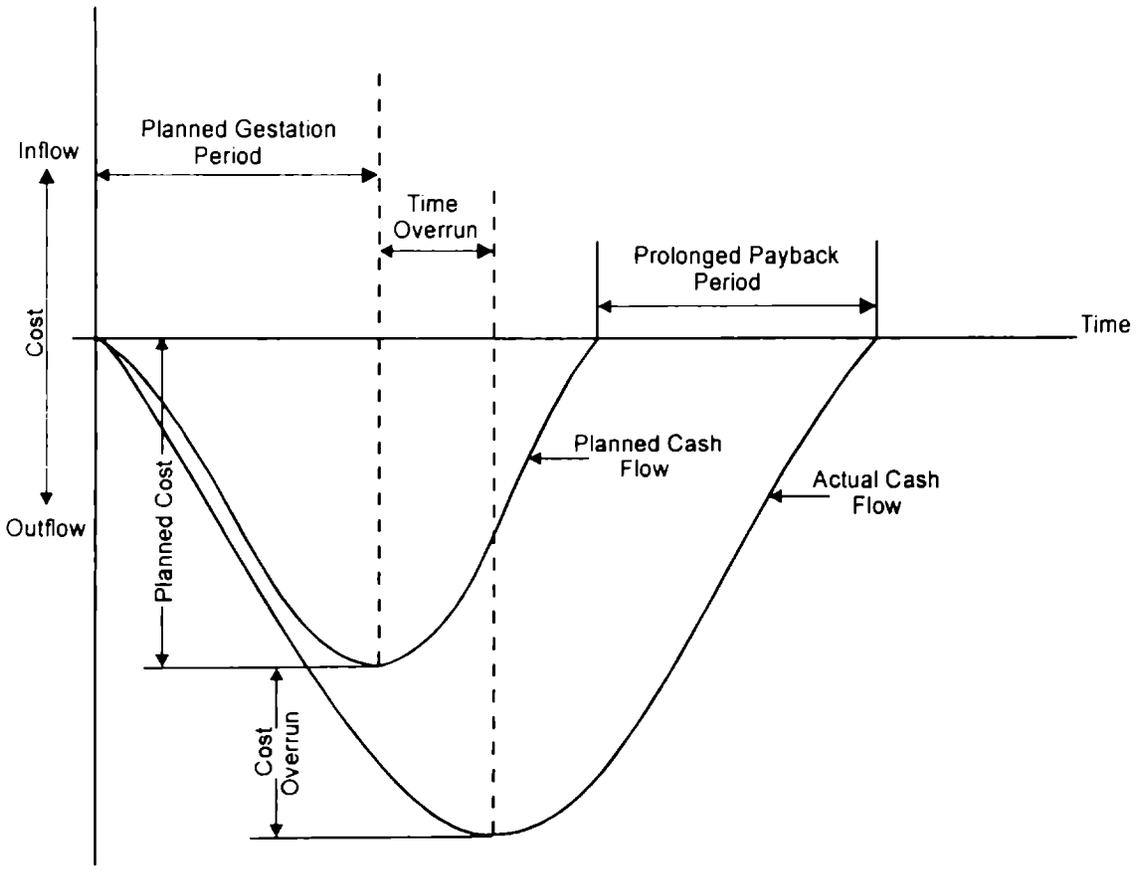
6.3.4 Sickness of Industrial Units

The incidence of overruns at the very beginning of the projects, affect adversely the working of projects in later years. Time and cost overrun in projects implementation, attributed to delay in earnings, deterioration in the earning capacity and cash flow problems in the initial years of operations. Consequently over a period of time it may lead to the industrial sickness. The graph 6.1 depicts the effect of overruns on the cash flows of projects.

From the above discussions, it is observed that the overruns affect the performance of projects in different ways. Therefore, an attempt has been made to study the impact of overruns on the sample industrial projects. The impact of time overrun has been studied in terms of production

Graph 6.1

Effect of Overruns on Cashflow



loss, revenue loss and profit loss. The impact of cost overrun has been studied with the help of various pre-overrun and post-overrun ratios.

6.4 Impact of Time Overrun

The time overrun of projects creates operational problems, which in turn, results in various losses to the projects. Here the operational problems on the sample projects have been examined through loss of employment, loss of production, loss of revenue and loss of profit. The loss of production has been computed with the help of production capacity of the sample projects. Loss of revenue and loss of profit have been measured in terms of sale revenue loss and profit loss during the period of time overrun and loss of employment is measured in terms of man-days lost.

6.4.1 Employment Loss

Table 6.4 presents the employment loss (total and per day) in the sample projects. Average loss of employment in all the projects taken together was 226,540 man-days and average employment loss per day was 210 man-days.

The sector wise analysis of cost of delay reveals that the employment loss on account of time overrun was very high in the public sector sample projects than the private sector. The average loss of employment in the public sector was 407,815 man-days where as it was 9009 man-days in the private sector projects. The employment loss per day on account of time overrun was 344 and 50 man-days respectively for the public and private sectors projects.

In purpose wise study, the average employment loss in expansion, modernisation and diversification (EMD) projects came to 2,94,771 man-days but it was 16,9,680 man-days in new projects. The average employment loss per day was 244 and 182 man-days respectively for EMD projects and new projects. It indicates that EMD projects have higher loss of employment than new projects.

Table 6.4

Employment Loss due to Time Overruns

(Man-days)

PROJECTS	Employment Loss		Employment Loss /Day	
	Total	Average	Total	Average
All Projects	49,83,870	226,540	4625	210
Sector Wise:				
Public sector	48,93,780	4,07,815	4126	344
Private sector	90090	9009	499	50
Purpose Wise:				
New	20,36,160	1,69,680	2184	182
Expansion, Modernisation & Diversification (EMD)	29,47,710	2,94,771	2441	244
Promoter Wise:				
New promoters	12,72,360	127236	1504	150
Existing promoters	37,11,510	22,97,121	3121	260
Industry Wise:				
Capital goods	770,040	154008	738	148
Intermediate goods	32,14,680	459240	2593	370
Consumer goods	999150	99915	1294	129

In the existing promoters' projects, loss of employment per day was 260 man-days but it is 150 man-days in new promoters' projects. It reveals higher loss of employment in the existing

promoters' projects than new promoters' projects. The industry group study points out that the employment loss in intermediate goods projects was the highest among the different industry wise projects. The loss of employment per day in intermediate projects was 370 man-days when compared to capital goods (148 man-days) and consumer goods (129 man-days) projects.

6.4.2 Production loss

Table 6.5 highlights the total production loss and per day loss in the sample projects. All the projects combined together recorded a massive production loss (average) of 2,36,892 tonnes and 186 tonnes per day.

Regarding the sector wise production loss, the public sector projects attributed to 333 tonnes of production loss per day. But it was 38 tonnes per day in the case of private sector projects. It is evident from the analysis that the production loss on account of time overrun was very high in the public sector projects than the private sector projects.

The table reveals that the production loss per day was higher in EMD projects (199 tonnes) than new projects (173 tonnes). In the existing promoters' projects the production loss per day came to 224 tonnes. But the loss was 147 tonnes per day in the new promoters' projects. It indicates that in the existing promoters' projects, the production loss was higher than that of new promoters' projects.

Table 6.5

Production Loss in Sample Projects (Tonnes)

PROJECTS	Production Loss		Production Loss /Day	
	Total	Average	Total	Average
All Projects	37,90,266	236892	2970	186
Sector Wise:				
Public sector	36,97,480	462185	2665	333
Private sector	92,786	11598	305	38
Purpose Wise:				
New	15,81,823	158182	1239	173
Expansion, Modernisation & Diversification (EMD)	14,93,145	3,68,074	1731	199
Promoter Wise:				
New promoters	14,93,145	213307	1176	147
Existing promoters	2,29,7,121	28,7140	1794	224
Industry Wise:				
Capital goods	89,728	17946	131	26
Intermediate goods	32,3,1345	807836	2102	526
Consumer goods	4,69,193	67028	737	105

The industry group study shows that the intermediate goods projects had the highest production loss on account of time overrun (526 tonnes per day) and capital goods projects recorded the lowest production loss (26 tonnes per day) among the projects under study.

6.4.3 Revenue Loss

Table 6.6 reflects the revenue loss of the sample projects due to time overrun. It is revealed from the table that the delay in project implementation caused a total revenue loss of 1,73,649

lakhs and an average of Rs. 7,893 lakhs in all projects. The revenue loss per day, on an average, per project was worked out at Rs. 6.11 lakhs.

Table 6.6

Revenue Loss in Sample Projects

(Rs in lakhs)

PROJECTS	Loss of Revenue (Total)		Loss of Revenue /Day	
	Total	Average	Total	Average
All Projects	1,73,649	7,893	134.5	6.11
Sector Wise:				
Public sector	1,68,232	14,019	108.0	9.0
Private sector	5,417	541.73	26.5	2.7
Purpose Wise:				
New	56,669	4,722.4	70.09	5.84
Expansion, Modernisation & Diversification (EMD)	1,16,980	11,698	64.41	6.44
Promoter Wise:				
New promoters	46,659	3,333	60.02	6.00
Existing promoters	1,26,990	12,699	74.48	6.21
Industry Wise:				
Capital goods	11,253	2,250.52	16.74	3.35
Intermediate goods	1,46,150	20,879	85.03	12.15
Consumer goods	16,246	1,625	32.73	3.27

Regarding sector wise comparison, the revenue loss per day, in the public sector was Rs. 9 lakhs, where as Rs. 2.7 lakhs was in the private sector projects. It indicates that the public sector projects suffered very high revenue loss when compared with the private sector projects.

The revenue loss per day in the EMD projects amounted to Rs. 6.44 lakhs and Rs. 5.84 lakhs in the new projects. It reflects a slightly higher revenue loss in EMD projects than new projects. The promoter wise analysis reveals that a single days delay had caused a revenue loss of Rs. 6.21 lakhs and Rs. 6.00 lakhs respectively for existing and new promoters' projects.

In industry group study it is found that the cost of delay in terms of revenue loss per day was the highest in the intermediate goods projects among the industry wise projects. The revenue loss per day in the intermediate goods projects was 12.15 lakhs, Rs. 3.35 lakhs in capital goods projects and Rs. 3.27 lakhs in consumer goods projects.

6.4.4 Profit Loss

Table 6.7 indicates the impact of time overrun on profits of the sample projects. It is found that the average profit loss in all the projects combined together was Rs. 1195. The loss of profit per day, on an average, was worked out at Rs. 0.73 lakhs in all projects. This is an indication of the fact that the profits were considerably eroded due to time overrun in the sample projects. Regarding the public sector projects a single day's profit loss due to time overrun was Rs.1.18 lakhs, but it was only Rs. 0.18 lakhs in the private sector projects. It clearly indicates the very high incidence of profit loss due to time overrun in the public sector projects as compared to the private sector projects. The purpose wise analysis reveals that the profit erosion on account of time overrun was Rs. 0.95 lakhs (per day) in EMD projects and Rs. 0.54 lakhs (per day) in new projects. The profit loss was higher in the EMD project than the new project.

Table 6.7

Loss of Profit in Sample Projects

(Rs. In lakhs)

PROJECTS	Loss of Profit (Total)		Loss of Profit /Day	
	Total	Average	Total	Average
All Projects	26,278	1,195	15.95	0.73
Sector Wise:				
Public sector	25,933	2,161	14.17	1.18
Private sector	345	34.49	1.78	0.18
Purpose Wise:				
New	5,990	499	6.43	0.54
Expansion, Modernisation & Diversification (EMD)	20,288	2,029	9.52	0.95
Promoter Wise:				
New promoters	4,318	432	4.75	0.48
Existing promoters	21,960	1,830	11.20	0.93
Industry Wise:				
Capital goods	1,694	339	2.0	0.40
Intermediate goods	23,136	3,305	11.44	1.63
Consumer goods	1,448	145	2.51	0.25

In promoter wise comparison, it is found that a single day time overrun wasted a profit of Rs. 0.93 lakhs and Rs. 0.48 lakhs respectively in the existing and new promoters' projects. Here the profit loss in the existing promoters' projects was higher than that of new promoters' projects.

The table further reveals that the profit loss (per day) in the intermediate goods projects was to the tune of Rs. 1.63 lakhs per day, where as it was Rs. 0.40 lakhs and Rs. 0.25 lakhs respectively in the capital goods and consumer goods projects. It clearly reveals that the

intermediate goods projects recorded the highest amount of profit loss and the consumer goods projects suffered only the lowest amount of profit loss on account of time overrun.

The conclusion derived from the sample study as to the impact of time overrun on projects is substantiated by the study conducted by FICCI on public and private sector industrial projects and their impact on the Indian Economy during the Seventh Plan period. The major findings of the study has been summarised below:

6.5 Economic Losses in Central Public Sector Projects:

FICCI made an estimate of the economic losses on account of time delay in project implementation in the Central Public Sector with the help of data on 39 completed projects in 1987-88 and 174 on-going projects. Table 6.8 shows data relating to estimates of direct losses to the economy due to time overrun in central public sector projects.

Table 6.8

Estimated Economic Losses in Central Public Sector Projects

(Amount in Crores per annum)

Economic Losses	39 Completed Projects	174 Ongoing Projects
Loss in Production	4763	22521
Loss in Revenue to Government	977	4617
Loss in Exports	294	1389

Source: Cost of Time, FICCI Report, 1989 pp. 3, 4.

It is revealed from the table that the estimated economic losses (production, revenue and exports) per project are higher in the ongoing projects than the completed projects.

6.5.1 Cost of Delay per day

The FICCI study also highlighted the magnitude of losses to the economy when the projects were delayed by one day. Table 6.9 briefly presents the details.

Table 6.9

Estimated Economic Losses Per Day in Central Public Sector Projects

(Amount in Lakhs)

Cost of Delay	39 Completed Projects	174 Ongoing Projects
Increase in the cost of all projects	300	6400
Increase in the cost of each project	7.6	37
Loss in Production	1310	6200
Recurring production loss	210	26
Loss of exports		933
Loss of employment (man-days)	65	1416

Source: Cost of Time, FICCI Report, 1989 pp. 3, 4

It is revealed from the above table that the increase in cost of project and loss in production were higher in the on going projects than completed projects.

6.6 Economic Losses in Private Sector Projects

The economic losses in the private sector projects due to time overrun are depicted in table 6.10. The table illustrates that the time overrun caused considerable economic losses in private sector projects also.

Table 6.10

Estimated Economic Losses in Private Sector Projects

Cost of Delay	Rs. in Crores/Annum
Loss in Production	7460
Loss in Revenue to Government	1567
Loss in Employment (Numbers)	3,95,000
Loss in Exports	448

Source: Cost of Time, FICCI Report, 1989, p. 9

6.6.1 Cost of Delay per day

The results of FICCI study on the cost of delay per day in the private sector projects are presented in table 6.11

Table 6.11

Estimated Economic Losses per day in Private Sector Projects

Cost of Delay	Rs. In Crores/Day
Loss in Production	20
Loss in Revenue to Government	4.3
Loss in Exports	1082
Loss in Employment (Numbers)	1.2

Source: Cost of Time, FICCI Report, 1989, p. 9.

The impact of time overrun on the Central Public Sector projects and private sector projects (during the Seventh Plan period) clearly indicate that the time overrun not only affected the

industrial projects at the micro level, but it hampered the economic growth at the macro level as well. It is also seen from the above analysis that if the time dimension of capital expenditure programmes is under control, there can be rather salubrious effects on the economic performance of the enterprise in general and project performance in particular and vice versa.

Conclusion

The analysis of the impact of time overrun highlights that in all the projects covered under the study, the loss in employment was 210 man-days, loss in production 186 tonnes, loss in revenue 6.11 lakhs and loss of profit was 0.73 lakhs, on an average, per day.

The sector wise comparison reveals that the cost of delay, per day, on an average, in terms of loss of employment, production, revenue and profit was very high in the public sector projects. The cost of delay in the public sector projects were more than that of all the projects taken together. Therefore, it could be inferred that the public sector projects were the worst hit by time overrun as against private sector projects.

Regarding purpose wise comparison, the study discloses that the EMD projects had higher cost of delay than the new projects in respect of loss in employment, production, revenue and profit. Similar in the case when compared with all the projects taken together.

The cost of delay per day, on an average, in all the variables studied was higher in the existing promoters' projects than the new promoters' projects. The picture is not different when compared with all the projects taken together.

The industry wise analysis of the cost of delay depicts that the intermediate goods projects had the highest cost of delay in terms of loss in employment, production, revenue and profit among

the industry group. The cost of delay in all the sample projects was less than that of the intermediate goods projects. Hence, it could be concluded that the impact of time overrun was the worst in the projects belonging to intermediate goods group. Moreover, the conclusion derived from the sample study as to the impact of time overrun on projects is also substantiated by the FICCI study.

6.7 Impact of Cost Overrun

Cost overrun has considerable influence on the profitability and financial position of industrial projects. Cost overrun results in financial problems such as higher cost of production, escalation in product price, reduction of profitability, short term and long-term liquidity position etc.

Performance of a product during gestation period is very much linked with the price line. This linkage, though normally behind the screen, remains hidden but predominant. A project when delayed results in shooting up of its estimated capital cost. The initial appraisal of project, on the basis of which it gets approval and after its implementation, it becomes realised that its estimated cost, benefits, break even point etc are completely thrown out. As seen from Graph 6.1, that the overrun results in prolongation of cash flows and pay back period. At times, because of over-capitalisation, the break-even point becomes out of sight and consequently, projects will be faced with financial losses. In order to make them financially viable and cover-up the losses due to over capitalisation, there has been a tendency to increase the prices of products. This adversely affects both the producers and consumers.

Another problem faced by industrial units due to cost overrun, is the deterioration of their earnings and profitability. Increase in capital cost of projects hike the borrowed capital, which in turn, increases the annual additional debt serving charges. This has direct impact on the profitability and solvency position of industrial units.

The impact of cost overrun on the sample industrial projects is discussed in the following section. The impact has been analysed, with the help of percentage variation between the pre-overrun and post-overrun ratios of the sample projects.

6.7.1 Impact on Solvency Ratios

In order to study the impact of cost overrun on the solvency position of projects, two important ratios are used i.e., Debt-Equity Ratio and Debt-Service Coverage Ratio.

(a) Debt-Equity Ratio

Table 6.12 depicts the impact of cost overrun on the debt-equity ratio. It is revealed from the table that the debt-equity ratio of all projects (combined together) was decreased by only 3.97percent on account of the cost overrun. This means that the cost overrun was financed through debt and equity capital in more or less equal proportion. But we cannot underscore the fact that the amount of debt capital in absolute terms increased considerably in the capital structure of the sample projects (Table 6.3). This has a serious repercussion on the post commissioned profitability of the projects.

The impact of cost overrun on the debt-equity ratio in the sector wise projects reveals that there was 4.88 percent decrease in the public sector projects, but the ratio was increased by 24.10 percent in the private sector projects. It means in the public sector, the amount of debt capital used for financing cost overrun was slightly less than equity capital. But in the private sector projects, debt capital was increasingly used for meeting the cost overrun.

The purpose wise analysis shows that in the new projects, the debt-equity ratio was increased by 17.24 percent, but the ratio decreased by 7.81 percent in EMD projects. This is an indication that the new projects adopted more debt capital than equity capital in financing cost overrun and viceversa in the case of EMD projects.

Table 6.12

Impact of Cost Overrun on Debt Equity Ratio of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations
All Projects	1.26	1.21	-3.97
Sector Wise:			
Public sector	1.23	1.17	-4.88
Private sector	1.66	2.06	24.10
Purpose Wise:			
New	1.45	1.70	17.24
Expansion, Modernisation & Diversification (EMD)	1.28	1.18	-7.81
Promoter Wise:			
New promoters	1.65	1.92	16.36
Existing promoters	1.22	1.15	-5.73
Industry Wise:			
Capital goods	1.32	1.25	-5.30
Intermediate goods	1.25	1.18	-5.60
Consumer goods	1.50	1.68	12.0

Promoter wise analysis reveals that the new promoters' projects depended more on debt capital to cover-up their cost overrun. The ratio was increased by 16.36 percent in the new promoters' projects. But in the existing promoters' projects, the ratio was decreased by 5.73 percent. It means an increased dependence on equity capital for financing cost overrun in existing promoters' projects.

In industry group projects, debt-equity ratio in the capital and intermediate goods projects was decreased by 5.30 percent and 5.6 percent respectively. But in the consumer goods projects, the ratio increased by 12 percent. It indicate that only consumer goods projects used more debt capital to finance their cost overrun.

(b) Debt Service Coverage Ratio (DSCR)

Table 6.13 indicates the impact of cost overrun on the debt-service coverage ratio of the projects under study. The debt-service coverage ratio signals the ability of the company to pay interest and principal. It is clear from the table that the debt-service coverage ratio of all the projects taken together decreased by 15.19 percent. This was mainly because of the increased commitment of interest and principal on the part of the company.

In the public sector projects, the DSCR was considerably affected by cost overrun. The DSCR was diminished by 37.23 percent in public sector, but it was 5.28 percent in private sector. This was mainly because of the use of more amount of debt capital in public sector.

The purpose wise analysis reveals that DSCR was fallen by 27.72 percent in the EMD projects and 5.39 percent in the new projects. Therefore, it is observed that the adverse impact of cost overrun was high in EMD as against the new projects.

Table 6.13

Impact of Cost Overrun on Debt Service Coverage Ratio of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations*
All Projects	2.70	2.29	15.19
Sector Wise:			
Public sector	2.82	1.77	37.23
Private sector	2.65	2.51	5.28
Purpose Wise:			
New	2.60	2.46	5.39
Expansion, Modernisation & Diversification (EMD)	2.85	2.06	27.72
Promoter Wise:			
New promoters	2.60	2.46	5.39
Existing promoters	2.88	2.01	30.21
Industry Wise:			
Capital goods	2.65	2.46	5.39
Intermediate goods	3.34	1.82	45.51
Consumer goods	2.60	2.41	7.31

* All percentage variations are negative.

In the existing promoters' projects, the DSCR was fallen 30.21 percent and in new promoters' projects the rate of decrease was only 5.39 percent. It clearly indicates that the fall in DSCR due to cost overrun was very high in the existing promoters' projects than new promoters' projects.

The industry group study reveals that the DSCR was decreased by 45.51 percent in the intermediate projects, 7.31 percent in consumer good and by 5.39 percent in capital goods projects. Among the industry wise projects, the rate of decrease in DSCR on account of cost overrun was the highest in the intermediate goods projects. It also reveals that the debt-service ability of these projects was the worst affected by cost overrun among the industry wise projects.

6.7.2 Impact on Profitability

The impact of cost overrun on profitability is studied with the help of variation in Return On Investment (ROI), Net Profit Ratio (NPR), Internal Rate of Return (IRR), Break Even Point (BEP) and Pay Back Period (PBP), during the pre-overrun and post-overrun period.

(a) Impact on Return on Investment (ROI)

The table 6.14 shows the variations in return on investment due to cost overrun. The percentage of variation on an average, of all the projects (combined together) was 11.20 percent. This clearly illustrates to the extent to which cost overrun eroded the return on investment of the projects.

It is also revealed from the table that the ROI was fallen by 33.94 percent in the public sector projects. But in the private sector projects the impact of cost overrun was only 5.27 percent fall in ROI. This is a clear indication that how badly the cost overrun influenced the ROI of the public sector projects.

Table 6.14

Impact of Cost Overrun on ROI of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations*
All Projects	23.30	20.69	11.20
Sector Wise:			
Public sector	16.41	10.84	33.94
Private sector	26.17	24.79	5.27
Purpose Wise:			
New	26.14	24.17	7.54
Expansion, Modernisation & Diversification (EMD)	19.25	15.14	21.35
Promoter Wise:			
New promoters	25.69	24.25	5.61.
Existing promoters	18.92	14.16	25.16
Industry Wise:			
Capital goods	25.14	21.03	16.35
Intermediate goods	14.57	9.65	33.77
Consumer goods	24.22	22.57	6.81

* All percentage variations are negative.

The table 6.14 also reflects that the expansion, modernisation and diversification projects were hardly affected by cost overrun. The ROI was reduced by 21.35 percent. But in the new projects the erosion in ROI was only 7.54 percent. The adverse impact of cost overrun on ROI was very high in the projects promoted by existing promoters (i.e., 25.16 percent) as against the projects of new promoters (i.e., 5.61 percent).

The intermediate goods projects stood first in the industry group analysis of the impact of cost overrun on RIO, with a fall of 33.77 percent. It was followed by the capital goods projects

(16.35 percent) and the consumer goods projects (6.81 percent). The cost overrun had the worst effect on ROI of the projects belong to the intermediate goods category.

(b) Impact on Net Profit Ratio (NPR)

Table 6.15 illustrates that the net profit ratio of all the projects taken together diminished by 11.80 percent. This was mainly due to the incidence of high interest charges on account of the increased use of debt capital to finance the cost overrun.

Table 6.15

Impact of Cost Overrun on Net Profit Ratio of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations*
All Projects	13.64	12.03	11.80
Sector Wise:			
Public sector	15.47	11.12	28.12
Private sector	12.88	12.30	4.50
Purpose Wise:			
New	12.98	11.90	8.32
Expansion, Modernisation & Diversification (EMD)	14.58	11.51	21.06
Promoter Wise:			
New promoters	12.89	12.30	4.58
Existing promoters	15.02	11.52	23.30
Industry Wise:			
Capital goods	15.16	13.68	9.76
Intermediate goods	16.51	10.54	36.16
Consumer goods	12.57	11.70	6.92

* All percentage variations are negative.

In sector wise analysis of net profit ratio, the public sector projects were the worst hit by cost overrun. Net profit ratio of the public sector projects was decreased by 28.12 percent, but in the private sector projects, the decrease was only 4.5 percent.

It is seen from the table that the impact of cost overrun on N/P ratio was the highest in the intermediate goods projects among the industry wise projects (i.e., 36.16 percent), whereas it was the lowest in the consumer goods projects (i.e., 6.92 percent). The adverse variance in net profit ratio was 21.06 percent in expansion, modernisation and diversification projects and it was only 8.32 percent in the new projects.

The fall in NPR ratio came to 23.30 percent in the existing promoters' projects and in new promoters', it was 4.58 percent. It shows undoubtedly that the adverse impact of cost overrun on NPR ratio was very high in the existing promoters' projects as against projects of new entrepreneurs.

(c) Impact on Internal Rate of Return (IRR)

The impact of cost overrun on internal rate of return is depicted by table 6.16. It is revealed that the overall fall in the IRR on account of cost overrun in the sample projects was 11.10 percent.

Table 6.16

Impact of Cost Overrun on IRR of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations*
All Projects	26.66	23.70	11.10
Sector Wise:			
Public sector	14.58	11.32	22.36
Private sector	31.69	29.68	6.34
Purpose Wise:			
New	31.22	28.95	7.27
Expansion, Modernisation & Diversification (EMD)	20.14	17.61	12.56
Promoter Wise:			
New promoters	30.28	28.14	7.07
Existing promoters	20.01	17.21	13.99
Industry Wise:			
Capital goods projects	33.72	28.63	15.09
Intermediate goods	17.89	12.73	28.84
Consumer goods	25.69	24.80	3.46

* All percentage variations are negative

In the public sector projects, the IRR got diminished by 22.36 percent as against 6.34 percent fall in the private sector projects. It is interesting to note that the fall in IRR was very high the in public sector projects than the private sector projects.

The purpose wise analysis reveals that the IRR was fallen by 12.56 percent in the expansion, modernisation and diversification projects, and it was only 7.27 percent in new projects. The fall in IRR was higher in the EMD projects than the new projects.

The table also depicts that the impact of cost overrun on IRR in the new promoters' projects registered a fall of 7.07 percent as against 13.99 percent in the existing promoters' projects. It also points out the fact that the adverse effect of cost overrun on IRR of the existing promoters' projects was higher than that of new promoters' projects.

The industry wise analysis of the impact of cost overrun on IRR reveals that in the intermediate goods projects IRR was fallen by 28.84 percent, while it was 15.09 percent in the capital goods projects and 3.46 percent in consumer goods projects. It shows that the IRR of the intermediate goods projects was the worst hit by cost overrun among the industry groups.

(d) Impact on Break-Even Point (BEP)

Cost overrun has also its effect on the break-even point of project. Table 6.17 points out that the break-even point in all the projects (combined together) was increased by 6.2 percent. Any increase in BEP would have adverse impact on the profitability of the projects.

In sector wise analysis, it is seen that the BEP was hiked by 19.10 percent in the public sector but in the private sector, it was only marginal i.e., 3 percent. It reveals that in the public sector projects, the increase in the BEP level was very high as compared with the private sector projects.

In the expansion, modernisation and diversification projects the BEP level was increased by 12.86 percent as against 4.64 percent increase in the new projects. The increase in BEP level was higher in the EMD projects than the new projects. The BEP increase was 13.77 percent in the existing promoters' projects, but in the new promoters' projects the increase was only 4.48

percent. The projects under existing promoters' category recorded higher percentage of increase in the BEP level than the projects under the new promoters' group.

Table 6.17

Impact of Cost Overrun on BEP of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations
All Projects	45.99	48.84	6.20
Sector Wise:			
Public sector	50.42	60.05	19.10
Private sector	44.15	45.43	3.0
Purpose Wise:			
New	44.82	46.90	4.64
Expansion, Modernisation & Diversification (EMD)	47.66	53.79	12.86
Promoter Wise:			
New promoters	43.07	45.00	4.48
Existing promoters	51.35	58.42	13.77
Industry Wise:			
Capital goods	55.55	58.83	5.91
Intermediate goods	40.20	53.26	32.49
Consumer goods	43.57	45.78	5.07

In the intermediate goods projects, the impact of cost overrun on BEP was 32.49 percent but 5.91 percent in capital goods projects and 5.07 percent in consumer goods projects. It reveals that among the industry wise projects the intermediate goods projects were the most adversely affected by cost overrun.

(e) Impact on Pay Back Period (PBP)

The table 6.18 substantiates the fact that pay back period of projects get stretched due to cost overrun. The table reveals that the time required to recoup the original investment is increased by 20.96 percent in all the sample projects. This variation is very acute in the public sector projects (41.6 percent) than the private sector projects (7.22 percent). The table also pinpoints the very high pay back period (i.e., 8.85 years) in the public sector projects as against the in private sector projects (i.e., 4.16 years).

Table 6.18

Impact of Cost Overrun on Pay back Period of the Sample Projects (Average)

Projects	Pre-overrun	Post-overrun	% of variations
All Projects	4.58	5.54	20.96
Sector Wise:			
Public sector	6.25	8.85	41.6
Private sector	3.88	4.16	7.22
Purpose Wise:			
New	4.0	4.50	12.5
Expansion, Modernisation & Diversification (EMD)	5.40	7.07	30.93
Promoter Wise:			
New promoters	4.1	4.6	12.20
Existing promoters	5.46	7.33	34.25
Industry Wise:			
Capital goods	3.47	4.15	19.60
Intermediate goods	7.15	9.13	27.69
Consumer goods	4.51	5.39	19.51

The impact of cost overrun on the pay back period of the expansion, modernisation and diversification projects was 30.93 percent increase and in the new projects the increase was 12.5 percent. In promoter wise classification, the variation in the overrun ratios was high in the existing promoters (34.25 percent) as against the new promoters' projects (12.20 percent).

In the intermediate goods projects, the pay back period was prolonged by 27.69 percent. The variations were 19.60 and 19.51 percentage respectively, in the capital goods and consumer goods projects.

Conclusion

The study of the impact of cost overrun on the sample projects indicates that the overall D/E ratio was decreased marginally by 3.97 percent. On the other hand, the DSCR of all the projects was fallen by 15.19 percent. With regard to profitability ratios of all the projects, the study reveals that the ROI and N/P ratios were decreased by 11.20 percent and 11.80 percent respectively. The adverse impact of cost overrun on IRR was 11.10 percent, BEP 6.2 percent and on Pay Back Period was 20.96 percent in all the projects taken together.

The sector wise study of the impact of cost overrun shows that in the public sector projects, the DSCR was considerably affected by cost overrun than the private sector projects. The D/E ratio increased due to cost overrun in the private sector projects but it was slightly decreased in the public sector projects. The adverse impact of cost overrun on the profitability ratios was more in the public sector projects than private sector projects. In all the above ratios, the percentage of decrease was higher in the public sector projects when compared to all the

projects taken together. Therefore it could be inferred that the public sector projects were the worst hit by cost overrun than the private sector projects.

The purpose wise analysis of the impact of cost overrun reveals that the expansion, modernisation and diversification projects were more adversely affected than the new projects in respect of debt-service coverage ratio and various profitability ratios. The percentage variation of the above ratios was also higher in the EMD projects than all the projects average.

In promoter wise projects, the adverse impact of cost overrun on the debt-service coverage ratio and profitability ratios was higher in the existing promoters' projects as compared to the new promoters' projects. While comparing the percentage variation of the above ratios with that of all the projects taken together, the study reflects that the variation was higher in the existing promoters' projects.

Among the industry wise projects impact depicts that in intermediate goods projects the debt-service coverage ratio and various profitability ratios were the most adversely affected by cost overrun than the consumer and capital goods projects. The adverse impact was also higher in the intermediate goods projects than all the projects combined together. Hence it could be concluded that the impact of cost overrun was the most adverse in the among the industry wise projects.

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CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

The development of a country, largely depends on how programmes and projects are being implemented. Programmes and projects when rightly managed will give momentum to the process of development. Therefore, sound planning and efficient execution of projects are vital for socio-economic development. The empirical evidences indicate that many of the industrial projects, especially, in the public sector in India are affected by time and cost overruns, which in turn, result in project failures. These time and cost overruns are mainly the result of poor project planning, implementation and control and other defective project management practices. In an economy like Kerala, which is characterised by low level of economic development and poor supply of investible funds; the adverse impact on its growth on account of overruns is high. Unless there is effective control over the project capital costs and time schedules, the costs of production as well as the prices of end products would be higher. Owing to the forces of competition, profitability of projects gets dwindled, which ultimately, affects their return on investment.

Though several peripheral studies were conducted at the National level, to examine the overruns in industrial projects and their causes, no serious attempt has been made to probe in-depth, the time and cost overruns of industrial projects in Kerala.

Therefore, the present study focussed attention on project planning, implementation and control; magnitude of time and cost overruns, the causes of time and cost overruns and their impact on selected industrial projects in Kerala.

In order to accomplish the aforesaid objectives, a sample of 24 overrun industrial projects in Kerala is selected for the study. Out of which 12 projects belong to the public sector and 12 projects are from the private sector. The data collected were properly analysed with the help of appropriate statistical tools. On the basis of such analysis conclusions are arrived at and recommendations are made wherever possible.

7.1 Major Conclusions

The sector wise study of project management practices reveal that in project identification, both public and private sector projects depended more on their own sources rather than external sources for identification of projects. (Table 4.1)

The study on the project cost estimation indicates that the cost of plant and machinery constituted a major share of the project cost, whereas the land and site development cost formed the lowest share of the project cost, both in the public and private sector projects (Table 4.3).

The analysis of estimates of project cost pinpoints the fact that the sample industrial projects, both public and private sectors, had maintained a low level of provision for contingency. (Table 4.3)

With respect to project time estimates, it is observed that the estimated time for completing the public sector projects was very high as compared to the private sector. The estimated time for completing the public sector projects ranged from 12 months to 54 months. But in the private sector projects, the estimated time ranged from 6 month to 20 months.

The study also highlights numerous flaws and deficiencies in the preparation of Detailed Project Reports (DPR) in the public sector projects. Regarding cash flow estimation, conceptual confusion has been observed in the treatment of depreciation, interest, tax etc. Many of the sample projects have chosen an arbitrary period of 5 to 10 years, for forecasting cashflows without considering the economic life of the projects.

For the computation of cost of capital, the arbitrary judgement of the management and the fallacious tendency of equating the borrowing rate with the minimum rate of return has been noted in the sample projects. The concept of weighted average cost of capital was not used by many of the public sector projects.

From the analysis of project appraisal and selection techniques, it is seen that the public sector projects relied heavily on the traditional project appraisal techniques such as Pay Back period, Break-even Point and Return on Investment. On the contrary, the private sector projects used both traditional and modern project appraisal techniques. It is also to be noted that there has been a trend of growing awareness about risk and sensitivity analysis in public sector projects (Table 4.4).

From the above, it could be concluded that the project planning practices in the private sector projects are better than that of the public sector projects.

The study indicates that the public sector sample projects had undue delay in obtaining the approval for the project proposals from the various governmental and non-governmental agencies. The project managers opined that the legal clearances by governmental agencies and

cumbersome documentation formalities on the part of the financial institutions were the major hindrances faced by the private sector regarding approval of projects.

Majority of the project managers in the public sector projects were non-techonocrats, whereas in private sector projects, most of them were techonocrats. The private sector projects managers were posted at project sites and were provided adequate financial and decision making powers, so as to have a close association and co-ordination with the project teams. But in public sector, the project managers were posted at their administrative offices. It is also revealed that the frequency of project visits by the project managers was very low in the public sector projects in comparison with the private sector projects.

The private sector projects depended more on their own project organisations than consultants (external) for implementation of the projects. But in public sector, consultants were preferred to own organisations for project implementation. (Table 4.5). Inordinate delay in performing services on the part of consultants has been noticed in many of the public sector projects under study.

Regarding projects scheduling, the private sector projects have been utilising the project execution and planning techniques to a considerable extent, but in the public sector projects these were applied to the minimum (Table 4.6).

With respect to project scheduling and co-ordinating techniques, the popular methods used in private sector projects are: bar charts, milestone charts and net work analysis. But it is interesting to note that the scientific project scheduling technique such as Net Work Analysis was rarely used in the public sector projects. (Table 4.7)

The number of various project meetings being conducted by public sector was less compared to private sector. Moreover, these meetings were convened in the public sector projects, usually,

The number of various project meetings being conducted by public sector was less compared to private sector. Moreover, these meetings were convened in the public sector projects, usually, on a quarterly basis. But in private sector, the project implementation meetings were held more frequently (i.e., weekly, fortnightly, monthly and quarterly basis). It clearly reveals the fact that in public sector there has been lack of interaction among the project managerial personnel regarding the project progress. While in private sector, there has been proper and timely interaction among the project managerial personnel. (Table. 4.8)

The frequency of the revision of project cost estimates in the public sector projects ranges from one to four times. On the other hand, no such revision was observed in the private sector projects due to the least cost and time overruns. (Table 4.9)

Regarding project monitoring techniques, the study reveals that in the public sector projects, those techniques were used in the bare minimum level. Whereas in private sector projects managers have the habit of developing an inbuilt monitoring machinery by employing the project monitoring techniques to the maximum possible extent. This is a clear indication of the poor project monitoring mechanism prevailing in public sector projects and vice versa in private sector projects under study (Table 4.13).

The study reveals that the public sector projects depended on debt and equity capital in more or less equal proportion for financing project cost. Whereas the private sector projects depended heavily on debt capital than equity capital for project financing. (Tables 4.14 & 4.15)

It is observed from the analysis of project overrun financing that term loans constituted the highest share of overrun finance in private sector projects. But the public sector projects used

both own funds and borrowed funds in more or less equal proportions for financing cost overrun (Table 4.16).

The project evaluation study of the sample projects reveals that the public sector projects rarely applied the project cost control and project communication and clean up techniques and this has resulted in the maximum time and cost overruns. Whereas these control techniques are mostly applied in the private sector projects under study (Tables 4.17 &4.18).

As a summary of the above findings, it could be stated that the public sector projects under study have not made use of proper and adequate project planning, implementation and control techniques. In contrast to the above, the private sector projects properly followed the project planning, implementation and control techniques.

Analysis of the magnitude of overruns of all projects (combined together) under study has shown that the cost and time overruns were 91.35 percent and 109.52 percent respectively. This is a clear indication of the fact that the industrial projects in Kerala were suffered heavily from the problems of cost and time overruns (Table.5.2)

The sector wise analysis of time and cost overruns reflects that the public sector sample projects were more vulnerable to time and cost overruns as compared to the private sector projects. The time and cost overruns of the public sector projects were 142.86 percent and 99.44 percent respectively. Whereas in private sector, they were 46.15 percent and 22.38 percent respectively. In the public sector projects, both cost and time overruns were above the all projects' percentage figures. (Table 5.3)

The hypothesis test result indicates that there exists significant difference in the percentage overruns between the public and private sector projects at 5 percent level (Tables 5.4 & 5.5).

The purpose wise analysis of the magnitude of overruns highlights that the incidence of time and cost overruns was high in the expansion, modernisation and diversification (EMD) projects than the new projects. The time overrun was 122.73 percent and cost overrun was 113.18 percent in the expansion. modernisation and diversification projects whereas in the new projects, the corresponding time and cost overruns were 105.26 percent and 49.16 percent respectively. The time and cost overruns in the expansion, modernisation and diversification projects were higher than the all project's percentage. (Table 5.6)

The hypothesis test provides the inference that there is no significant difference in the percentage overruns between the new and EMD projects (Tables 5.7 & 5.8).

Promoter wise study depicts that the projects promoted by the existing promoters had recorded higher time and cost overruns when compared to the new promoters' projects. The percentage of cost and time overruns in the existing promoters' project is 107.97 percent and 115.39 percent respectively. Both these percentages are higher than the all projects' percentages. (Table 5.9)

The hypothesis test results show that there exists no significant difference in the time and cost overrun percentages between the new promoters' projects and existing promoters' projects. (Tables 5.10 & 5.11)

The industry wise study pinpoints the fact that the project in the intermediate goods category are more prone to cost and time overruns as against the projects in capital and consumer goods groups. In the intermediate goods projects, the time and cost overruns were 143.48 percent and 104. 99 percent respectively. The overruns of intermediate goods projects were higher than the corresponding all projects' figures. (Table 5.12). The hypothesis test results prove that there exists no significant difference in the percentage cost and time overruns among industry wise projects. (Table 5.13 & 5.14)

The study of the component wise cost overrun of the projects reveals that the public sector projects have higher percentage cost overrun in all the components as against the private sector projects. A comparison of the public and private sector projects with all the projects combined together indicates that the component wise percentage cost overrun in the public sector is much higher than that of all the projects and vice versa, in the case of the private sector projects. (Tables 5.16 & 5.17)

In the public sector projects, preliminary and pre-operative expenses, buildings and civil works and plant and machinery are having the highest percentage of cost overrun. Whereas in the private sector, preliminary and pre-operative expenses, margin money for working capital and buildings and civil works are the components showing the highest percentage of cost overrun. In the public sector projects, technical know-how and engineering fees and miscellaneous fixed assets recorded the least percentage of cost overrun among the components studied. But, the corresponding components are land and site development and plant and machinery in the private sector projects. (Tables 5.16 & 5.17).

The study of the share of component cost overrun to the total cost overrun highlights that plant and machinery is the most prominent contributor of cost overrun, both in the public and private sector projects. On the other hand, land and site development is the least contributor of cost overrun, in the public as well as private sector projects. It is further observed that the share of plant and machinery in the total cost overrun (which is a dominant item) is slightly higher in the public sector projects than that of all the projects combined together. But in the private sector, the share of plant and machinery is much less when compared to all the projects taken together. (Tables 5.16 & 5.17)

The purpose wise analysis of the components of cost overrun indicates that preliminary and pre-operatives, and buildings and civil works are having the highest rate of cost overrun, both in the new projects and the EMD projects. Technical know-how and engineering fees registered the lowest percentage of cost overrun in both categories of the projects. The percentage of cost overrun in all the components of the EMD projects is higher than the new projects. A comparison with all the projects combined together shows that the EMD projects are having higher percentage of cost overrun in all the components. (Tables 5.18 & 5.19).

The analysis of the contribution of each component to the total cost overrun depicts that plant and machinery, and preliminary and pre-operatives are the most dominant contributors of cost overrun in both new and EMD projects. Whereas the least contributing factor is technical know-how and engineering fees in the new projects and land and site development in the EMD projects. It is also noticed that the share of plant and machinery which is a dominant component in the total cost overrun is higher in the EMD projects than all the projects taken together. (Tables 5.18 & 5.19)

The promoter wise study indicates that both in new and existing promoters' projects, preliminary and pre-operative, and buildings and civil works are having the highest percentage of cost overrun. Technical know-how and engineering fees recorded the least percentage of cost overrun in the new and existing promoters' projects. The existing promoters' projects have higher percentage cost overrun in all the components than the new promoters' projects. A comparison with all the projects taken together shows that the existing promoters' projects are having higher percentage of cost overrun in all the components. (Tables 5.20 & 5.21).

The share of component cost overrun to the total cost overrun highlights that the preliminary and pre-operatives is the most dominant contributor of the cost overrun in the new promoters' projects. But plant and machinery is the major contributor in the existing promoters' projects. The least contributing factor is technical know-how and engineering fees in the case of the new promoters' projects and land and site development in the case of the existing promoters' projects. (Tables 5.20 & 5.21).

The industry wise analysis of the components of cost overrun shows that preliminary and pre-operatives is having the highest rate of cost overrun in the capital, intermediate and consumer goods projects. Technical know-how and engineering fees recorded the least percentage of cost overrun in the intermediate and consumer goods projects. But in the capital goods projects, miscellaneous fixed assets is having the least percentage of cost overrun. (Tables 5.22, 5.23 & 5.24).

The study also depicts that the intermediate goods projects have the highest percentage cost overrun in all the components except one (i.e., preliminary and pre-operatives of capital goods projects) among the industry groups' projects. Moreover, the component wise percentage cost

overrun in the intermediate goods projects is much higher than that of all the projects taken together. (Tables 5.22, 5.23 & 5.24).

Plant and machinery is the most dominant contributor to the total cost overrun in capital intermediate and consumer goods projects. Whereas the least contributing factor is miscellaneous fixed assets in the capital goods projects, land and site development in intermediate goods projects and technical know-how, and engineering fees in the consumer goods projects. It is also seen that the share of plant and machinery in the total cost overrun is higher in intermediate projects than all the projects taken together. (Tables 5.22, 5.23 & 5.24).

The study of the incidence of time overrun on the sample projects indicates that the average percentage time overrun of all the projects taken together was 109.52. This is a clear indication of the high incidence of time overrun in these industrial projects.(Table 5.25).

Sector wise study of time overrun shows that the public sector projects were more prone to time overrun than the private sector projects. It is found that the EMD projects were more affected by time overrun as compared to the new projects. The study also depicts that the existing promoters' projects and intermediate goods projects were having the highest percentage of time overrun as against their counterparts. (Table 5.25).

The study of the relationship between time and cost overruns reflects that the coefficient of correlation between time and cost overruns of all the projects combined together is 0.3903. It indicates the existence of low positive correlation between them. Test results shows no significant correlation at 5 percent level. (Table 5.26).

In the public sector projects there exists a low level positive correlation between time and cost overruns and it is not significant at 5 percent level. Whereas in the private sector projects, the relationship shows negative and is not significant at 5 percent level. (Table 5.26)

In the new projects, the study reveals that there is significant relationship between time and cost overruns. But the relationship shows negative in the EMD projects and it is not significant at 5 percent level. The relationship between time and cost overrun in the new promoters' projects is very high and it is significant at 5 percent level. On the other hand, in the existing promoters' projects the relationship shows negative and it is not significant at 5 percent level. (Table 5.26)

In industry wise study it is observed that in the capital and intermediate projects the correlation shows positive. But in both these categories of projects, the correlation is not significant at 5 percent level. In the consumer goods projects, the relationship is negative and is not significant at 5 percent. (Table 5.26)

Study of the ranking of the causes of time overrun by the project managers, in the public and private sector projects, highlights that the delay in delivery and receipt of machinery, and delay in civil and construction works are the most important reasons for time overrun in the projects under study. The delay caused by labour is the least important reason for the time overrun in the public and private sector projects. It is also found that there exists consensus of opinion among project managers with regard to half of the causes of time overrun in the public and private sector projects under study. (Table 5.28 & 5.29)

The analysis of the impact of time overrun highlights that in all the projects covered under the study, the average loss per day was 210 man-days in employment, 186 tonnes in production, Rs. 6.11 lakhs in revenue, and Rs. 0.73 lakhs in profit. (Tables 6.4, 6.5, 6.6 & 6.7)

The sector wise comparison reveals that the cost of delay per day, on an average, in terms of loss of employment, loss of production, loss of revenue and profit was very high in the public sector projects. These costs of delay in the public sector projects was more than that of all the projects taken together. Therefore, it could be inferred that the public sector projects were the worst hit by time overrun than the private sector projects. (Tables 6.4, 6.5, 6.6 & 6.7)

Regarding purpose wise comparison, the study discloses that the EMD projects have higher costs of delay than the new projects, in terms of loss in employment, production, revenue and profit. Similar is the picture when compared with all the projects taken together. (Tables 6.4, 6.5, 6.6 & 6.7)

The cost of delay per day, in all the variables studied was higher in the existing promoters' projects than the new promoters' projects. The picture is not different when compared with all projects taken together. (Tables 6.4, 6.5, 6.6 & 6.7)

The industry wise analysis of cost of delay depicts that the projects in the intermediate goods category have the highest cost of delay in respect of loss in employment, production, revenue and profit as against the capital and consumer goods projects. The cost of delay in the intermediate goods projects was also higher than that of all the projects taken together. Hence it could be concluded that the impact of time overrun was the worst in the projects belonging to intermediate goods. (Tables 6.4, 6.5, 6.6 & 6.7)

The study of the impact of cost overrun indicates that in all the projects taken together, the debt-equity ratio was decreased marginally by 3.97 percent. On the other hand, the DSCR of all the projects has fallen by 15.19 percent. Regarding profitability ratios, the study reveals that the ROI and NPR ratio decreased by 11.20 percent and 11.80 percent respectively in all the projects. The negative impact of cost overrun on IRR was 11.10 percent, BEP 6.2 percent and on PBP was 20.96 percent in all the projects combined together. (Tables 6.12 to 6.18)

The sector wise study of the impact of cost overrun shows that in the private sector projects, the D-E ratio was increased by 24.10 percent, whereas in the public sector projects the ratio decreased marginally by 4.88 percent. The adverse influence of cost overrun on the debt servicing capacity was more in the public sector projects than the private sector projects. The cost overrun had affected much badly in all the profitability ratios of the public sector projects than the private sector projects. Moreover, in all the above ratios, the percentage decrease was higher in the public sector when compared to that of all the projects' (taken together). Therefore, the inference is that the public sector projects were the most affected by the malady of cost overrun in comparison with the private sector projects. (Tables 6.12 to 6.18)

The purpose wise analysis of the impact of cost overrun reveals that the EMD projects were much badly affected as against the new projects in respect of all the indicators, except D-E ratio. In all the indicators except D-E ratio the percentage of variation was much higher in the EMD projects than that of all the projects combined together. (Tables 6.12 to 6.18)

The promoter wise study reflects that, the negative impact of cost overrun on the existing promoters' projects was very high when compared to the new promoters' projects. The study

further reveals that the harmful effect of cost overrun was the highest in the intermediate goods projects among the industry wise projects. (Tables 6.12 to 6.18)

This study has been a serious attempt to enquire into the problems of time and cost overruns and their impact on the industrial projects in Kerala. The study has revealed the incidence of high magnitude of overruns. Defective project planning, implementation and control; and the related causes are mainly responsible for this overrun malady. This has emanated a lot of serious repercussions on the viability of industrial projects. The problems on account of overruns were more acute in the public sector projects than the private sector projects. Because of these overruns, the public sector projects, which were established to attain their well-cherished objectives, find themselves tumbling from the very birth.

7.2 Major Recommendations

On the basis of the study, the following major recommendations are made:

The industrial project reports should be comprehensive and realistic in its preparation. A detailed feasibility study and market survey must be conducted before the selection of a project. The estimates of cash inflows and out flows, over the expected life of projects must be in accordance with the principles of financial management.

The preparation of projects cost estimate should be on the basis of scientific techniques, by considering the nature and complexities of projects. Care should be taken to ensure that there is neither under-estimation nor omission of the requisite project costs. Adequate contingency

provision should be made in the project cost estimate towards the likely cost escalations, after considering the possible effects of inflation.

In order to minimise cost overrun due to foreign exchange rate fluctuations, the current and future trends of the exchange rates of major foreign currencies must be considered while estimating the project cost.

The time schedule of the project must be framed realistically by using appropriate net work techniques to minimise project time overrun.

The likely time duration for approval of the credit agreements by the foreign credit agencies should be considered while preparing the time schedule, if the project involves tie-up for foreign credit. This may minimise time lag in the implementation of industrial projects.

The availability of concessional rate of customs and excise duty for projects should be clearly ascertained in the initial stage itself and provided accordingly in the project cost estimate. Similarly, the likely rates of customs duty applicable to the various equipment to be imported, are kept in mind while framing the project cost estimate. This will restrict the project cost overrun to a certain extent.

Suitable contingency provision must be made in the absence of consistent long range fiscal policies and taxation laws of the government. This will minimise the cost escalation on account of increase in customs and excise duties.

Where the projects are to be located in backward areas, the cost of developing the requisite infrastructural facilities such as approach roads, railway sidings, utilities, storage tanks, effluent disposal, etc., should also be included in the project cost estimates. This will minimise the cost overrun in implementing the industrial projects.

An in-depth techno-economic and financial analysis of the various alternative investment opportunities is to be made before the final selection of a project. The strength and weakness of the project proposal should be carefully evaluated for confirming its suitability to the existing unit.

The project should be selected only if it is proved to be financially viable. Modern capital budgeting techniques including risk and uncertainty analysis must be used to assess the financial viability of projects. Techniques such as sensitivity analysis, simulation, decision-tree, etc., are of worth mentioning in this context.

There should be unambiguous definition of the full scope of the project. This will minimise the change and deviation of the scope of the project during its implementation.

Unnecessary delay in approval of public sector projects, on the part of the government is to be avoided. The government should do away with the existing bureaucratic approach for sanctioning import license, letter of credit, foreign exchange release etc., in order to minimise the time delay in various clearances to enable the implementation of projects in time.

The government must give approval for the foreign collaboration agreements of the industrial projects expeditiously, once the government policies and procedures in this regard were duly

complied with. This would enable the industrial enterprises to obtain the basic engineering designs and proceed with project execution with out any delay.

The formalities and procedures of the financial institutions are quite lengthy and cumbersome. More flexibility in granting loans and advances on the basis of minimum documentation will help in reducing the considerable delays in implementing projects.

A comprehensive project implementation plan covering the various aspects of implementation is to be framed, highlighting the planning to be undertaken for various project works involved, time schedule, input resources, funds, organisational structure, information systems etc., required for the successful execution of project.

A proper and appropriate organisation structure should be designed for the implementation of projects. There is the need for proper delegation of both administrative and financial powers down the organisation levels. Bureaucratic control, red-tapism and outmoded procedures leading to procrastination, ought to be scrapped. Dynamic and business oriented systems have to be introduced for the effective organisational functioning, right from the inception of projects.

A very competent and dynamic professional must be selected as the project manager, since the choice determines the success or failure of projects. It is essential that he should be stationed at project site and delegated with adequate powers for taking timely decisions so that the progress of the project is not hampered at any stage.

In addition to the Project Management Committee, there should be project implementation committee, which would speed up the pace of project implementation. The personnel responsible for project execution should not be frequently transferred. This ensures continuity in work and the successful completion of projects.

Selection of competent consultants possessing adequate technical skills and expertise are vital for the effective implementation of a project. Necessary penal clauses should be incorporated in the service agreement, to avoid non-fulfilment of the contractual obligation by the consultants. The project authorities should evolve alternative strategies to deal with such situations.

The organisation responsible for project design must be made more sensitive to the factors that are generally responsible for time and cost overruns, through dissemination of the findings of ex-post project evaluation, so that adequate attention is paid at the planning stage itself to prevent their recurrence.

Effective planning for materials procurement is needed, especially, for essential construction materials like cements, steel, etc. In this connection, necessary advance actions have to be taken for early completion of all the formalities by the statutory bodies for obtaining requisite approvals/clearances. Systematic resources planning and mobilisation are essential for the smooth, un-interrupted and timely completion of projects.

The project management must be made fully responsible for the inadequacies in tender documents which often lead to delays, avoidable litigation and cost escalations. Stringent penal

clauses to deal with non-compliance must form part of the tender documents and proper laws must be framed for early settlement of legal disputes.

An in-depth evaluation of suitability of the contractors/vendors should be made before awarding contracts. The contractors must be selected purely on the basis of their ability and capacity in performing contracts rather than on any other considerations. This helps in minimising time and cost overruns.

Project personnel are to be made more time and cost conscious and practice proper financial discipline so that no extra expenditure is incurred due to improper planning at any stage.
Computer based net work analysis (CPM/PERT) needs to be used for project scheduling and monitoring. More application should be made of Line of Balance (LOB), S-Curves and other techniques for monitoring and reviews.

Progress review meetings (weekly/fortnightly/monthly) are to be conducted for assessing the actual progress of every activity with reference to the master logic net work. By employing appropriate PERT/CPM net work techniques, project time overrun can be effectively controlled. Monitoring would be more meaningful, if in addition to the master logic net work, sub-net works for major component activity like engineering, procurement, construction etc., are framed.

Comprehensive fortnightly/monthly progress reports are to be prepared outlining the details of both physical and financial progress of the project during implementation.

Prudent financial management practices should be adopted for ensuring the availability and utilisation of optimum amount of funds for the smooth and un-interrupted flow of project implementation work, which yield better results of early completion of projects.

There is the need for a full-fledged cost control cell, consisting of skilled and competent personnel for proper control of project costs. The periodic revision of cost estimates is to be made based on updated net-works and detailed engineering, with a view to predicting the areas where costs are likely to exceed the estimates, so as to take necessary effective measures in advance.

Introduction and strict enforcement of the concept of 'Responsibility Accounting' at various levels would ensure that the project personnel discharge their duties efficiently towards the successful completion of projects.

Projects that run in to rough weather find their debt burden growing in to virtual traps, with the interest obligations mounting as the projects get delayed. They pose as major threats to the solvency of enterprises. Tendency of high debt equity ratios in the delayed projects is to be discouraged, as it overlooks the attendant risk of heavy debt composition in the capital structure. It would be wiser to have a larger equity component in the capital structure and restrict debt burden to a minimum extent during the project implementation stage.

The financial institutions should make it compulsory that there would be an in-depth half-yearly project audit, by an expert team of technical and financial specialists, with independent status for evaluation of the physical and financial performance of projects with special focus on the lapses on the various stages.

Financial institution have to set up a separate cell to monitor and regulate overrun projects with a close watch on them, in order to ensure minimisation of overruns in the industrial projects assisted by them.

Management Information System (MIS) should be designed in such a way as to highlight the achievements as well as the problem areas, pertaining to the physical and financial progress of projects so that the management can take right decision at the right time.

7.3 Suggestions for Future Research

Future research may be useful in the following directions:

(1) It will be useful to conduct a comparative study of overrun and underrun projects.

(2) It will also be beneficial to conduct separate overrun studies on co-operative and joint sector projects.

(3) It is worthwhile to make specific industry wise studies regarding overruns.

(4) It will be helpful to undertake case studies of overrun projects.

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Appendix I

List of Industrial Projects Selected

Public Sector Projects

1. Ammonium Sulphate Caprolactam Project – Fertilizers and Chemicals Tranvancore Ltd. (FACT Ltd., Ernakulam).
2. Titanium Dioxide Pigment Project – Kerala Minerals and Metals Ltd. (KMM Ltd., Kollam).
3. Integrated Casting Unit – Autokast Ltd. Alappuzha.
4. Vitamin 'A' Project – Kerala State Drugs and Pharmaceuticals Ltd., (KSDP Ltd.) Alappuzha.
5. Malabar Cements Ltd., Palakkad.
6. Kerala Feeds Ltd., Thrissur.
7. Kerala State Wood Industries Ltd., Malappuram.
8. Keltron Control Project, Kerala State Electronic Development Corporation Alappuzha.
9. Kerala Salicylates and Chemicals Ltd., Thiruvananthapuram.
10. Steel and Industrial Forgings Ltd., Thrissur.
11. Oil Palm India Ltd., Kollam.
12. Edarikode Textile Mills, Kerala State Textile Corporation Ltd., Malappuram.

Private Sector Projects

1. Malayalam Solvent Extractions Ltd., Kottayam.
2. Carbon and Chemicals Ltd., Ernakulam.
3. Masoneilan India Ltd., Thrissur.
4. Green Land Paper Mills Ltd., Kollam.
5. Kanoil Foods Ltd., Alappuzha.
6. Srinivas Wheat Industries Pvt. Ltd., Kottayam.
7. Surabi Steels Pvt. Ltd., Palakkad.
8. Saxon Castings Pvt. Ltd., Palakkad.
9. Mangly Timbers & Furniture Works Pvt. Ltd., Palakkad.
10. A.P. Steel Rerolling Mills Pvt. Ltd., Palakkad.
11. Global Spices Pvt. Ltd., Palakkad.
12. Mangly Industries Pvt. Ltd., Palakkad.

Appendix II

INTERVIEW SCHEDULE

PROJECT MANAGEMENT PRACTICES

(Research Purpose)

1. Name & Designation of Employer
2. Name of the project with which associated:
3. Sector : Joint/Private/Public
4. Location of the project Backward Area/Industrially Developed Area.
5. Category of the project

   New

   Diversification

   Expansion

   Modernisation

6. Industry Group of the project

   Consumer

   Intermediate

   Capital

   Any other – Specify.

7. Background of the promoters of your Project New/Existing

8. Production capacity of the project Estimated: Units/Tonnes

   Achieved: Units/Tonnes

9. Employment Potential of Project

10. Background of the Project Manager Technocrat/Non-Technocrat

11. Is there any Project management committee in your Organisation. Yes/No
12. How is the Project identified. :Own/R&D/Foreign Collaboration/ Technical Consultancy Org/SIDC/Others

13. Project implementation : Own/Consultants

14. Project Selection and Appraisal Techniques used in your Project.

: Payback	Yes/No
ARR,	Yes/No
IRR,	Yes/No
NPV,	Yes/No
ROI,	Yes/No
BEP,	Yes/No
Sensitivity,	Yes/No
Decision Tree,	Yes/No
Simulation,	Yes/No
Probability Analysis	Yes/No

15. Mention the hurdle rate (cut off rate) used in IRR/NPV:

16. Project execution, planning techniques used.

: Project Execution Plan	Yes/No
Work Breakdown Structure	Yes/No
Project Responsibility Matrix	Yes/No
Project Management Mannual	Yes/No

17. Project scheduling & co-ordinating techniques applied

: Bar Chart	Yes/No
Milestone Chart	Yes/No
Life Cycle Chart	Yes/No
Net Work Analysis	Yes/No

18. What type of meetings (Project team) were conducted during Project implementation.

: Routine	Yes/No
Review with progress	Yes/No
Fault Finding	Yes/No
Making Decision	Yes/No

19. Project Monitoring Techniques used in your Project.

Progress Measurement Technique	Yes/No
Performance Monitoring	Yes/No
Financial Status Report	Yes/No
Project Status Report	Yes/No
Project Schedule Chart	Yes/No

20. Project Cost Control Techniques applied.

:Budgetary Control	Yes/No
Value Analysis	Yes/No
Performance Budgeting	Yes/No
Others	Specify

21. Project Communication and Clean-up Techniques employed.

: Project Control Room	Yes/No
Computerised Information System	Yes/No

22. Did you experience any Project cost overrun Yes/No
(Excess of actual over estimated project cost)

23. If yes, what is the amount and percentage of cost overrun:

24. How the Project cost overrun was financed : Own funds (Amount %)
Borrowed funds (Amount %)

25. Reasons for overrun in the Project component cost: Please rank based on your experience.

a) Land and Site Development
b) Building and Civil Works
c) Plant & Machinery (Imported)
d) Plant & Machinery (Indigenous)
e) Technical Know-how and Engineering Fees
f) Miscellaneous Fixed Assets
g) Foreign Exchange Variation
h) Margin Money for Working Capital
i) Preliminary and Pre-operative Expenses
j) Other items.

26. Did you experience any time overrun Yes/No
(Excess of Actual time over estimated time)

27. If yes, Mention the time overrun in months and %:

28. Causes for delay in implementing this Project (please rank)

a) Delay in /Delivery on Receipt of Machinery
b) Delay in providing of Infrastructural Facilities
c) Delay in Getting Clearance
d) Change in Scope
e) Delay by Consultants and Contractors
f) Delay in Civil and Construction Work
g) Change in Location of Project
h) Delay in Land acquisition and Site Development
i) Labour Problems
j) Delay in Tying up of financial arrangements
k) Any other, specify.

Comments, if any

SURESH V.N

Appendix III - A

Component Wise Cost Details of Sample Projects

Public Sector

Components	ASCP- FACT Ltd.			TDP-KMM Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	5	96	91	104	159	55
Building and Civil Works	649	2327	1678	479	945	466
Plant and Machinery	9733	25349	15616	2683	3614	931
Technical Know-how & Engineering Fees	1807	3655	1848	804	949	145
Miscellaneous Fixed Assets	283	644	361	1124	1816	692
Preliminary and Pre-operative Expenses	797	2956	2159	692	1907	1215
Provision for Contingencies	692		-692	515		-515
Margin money for Working Capital	828	1810	982	99	175	76
Total	14794	36837	22043	6500	9565	3065

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
ASCP = Ammonium Sulphate Caprolactam Project
TDP = Titanium Dioxide Pigment Project

Components	IC Unit-Autokast Ltd.			Vitamin 'A' KSDP Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	15	17.65	2.65	7.51	20.16	12.65
Building and Civil Works	240	365.14	125.14	74.73	147.70	72.97
Plant and Machinery	980	1615.93	635.93	151.40	252.78	101.38
Technical Know-how & Engineering Fees				31.00	53.89	22.89
Miscellaneous Fixed Assets	25	16.03	-8.97	113.58	195.56	81.98
Preliminary and Pre-operative Expenses	40	544.25	504.25	50.03	232.53	182.50
Provision for Contingencies	60		-60.00	42.83		-42.83
Margin money for Working Capital	15		-15.00	21.55	41.0	19.45
Total	1375	2559	1184	492.63	943.62	450.99

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
IC = Integrated Casting Project.
Vitamin 'A' project

Components	Kerala Feeds Ltd.			MCL. Ltd		
	EC	AC	COR	EC	AC	COR
Land & Site Development	101.0	131.31	30.31	8.88	11.72	2.84
Building and Civil Works	601.0	787.31	186.31	448.13	981.22	533.09
Plant and Machinery	1336.64	1990.35	653.71	1656.81	2084.10	427.29
Technical Know-how & Engineering Fees	77.36	80.50	3.14	36.21	49.18	12.97
Miscellaneous Fixed Assets	87.0	113.1	26.1	430.03	655.54	225.51
Preliminary and Pre-operative Expenses	115.0	155.25	40.25	584.28	1523.38	939.10
Provision for Contingencies	155.10		-155.1	138.38		-138.38
Margin money for Working Capital	193.74	242.18	48.44	47.28	94.86	47.58
Total	2666.84	3500	833.16	3350.0	5400.0	2050.0

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
MCL = Malabar Cements Ltd.

Components	KSWI Ltd.			Keltron Control Project		
	EC	AC	COR	EC	AC	COR
Land & Site Development	2.61	13.47	10.86	25.30	27.27	1.97
Building and Civil Works	81.58	161.29	79.71	32.96	170.81	137.85
Plant and Machinery	200.04	175.67	-24.37	89.73	217.27	127.54
Technical Know-how & Engineering Fees	0.50	2.02	1.52	75.74	38.09	-37.65
Miscellaneous Fixed Assets	46.75	63.53	16.78	80.23	261.23	181.00
Preliminary and Pre-operative Expenses	19.73	44.62	24.89	68.44	250.40	181.96
Provision for Contingencies	34.99		-34.99	30.20		-30.20
Margin money for Working Capital	40.24	81.02	40.78	45.05	121.91	76.86
Total	426.44	541.62	115.18	447.65	1086.98	339.33

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
KSWI Ltd. = Kerala Wood Industries Limited.

Components	KSSCL Ltd.			SIF Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	24.94	79.05	54.11	28.5	33.65	5.15
Building and Civil Works	37.42	184.46	147.04	40.2	55.21	15.01
Plant and Machinery	303.92	516.86	212.94	252.3	292.8	40.50
Technical Know-how & Engineering Fees	62.42	117.46	55.04		----	
Miscellaneous Fixed Assets	75.98	172.28	96.30	84.18	98.4	14.22
Preliminary and Pre-operative Expenses	150.32	610.33	460.01	68.31	124.42	56.11
Provision for Contingencies				36.2		-36.2
Margin money for Working Capital				55.31	68.42	13.11
Total	655.0	1680.44	1025.44	565.0	672.9	107.9

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
KSSCL Ltd. = Kerala State Salicylates & Chemicals Limited.
SIF Ltd = Steel and Industrial Forgings Limited.

Components	Oil Palm India Ltd.			ESM-KSTC Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	112.0	229.69	117.69	4.41	5.29	0.88
Building and Civil Works	96.57	99.65	3.08	71.55	83.50	11.95
Plant and Machinery	32.40	99.48	67.08	264.2	312.84	48.64
Technical Know-how & Engineering Fees	3.00	3.00		3.9	4.80	0.90
Miscellaneous Fixed Assets	11.95	16.23	4.28	30.8	47.79	16.99
Preliminary and Pre-operative Expenses	31.00	54.56	23.56	35.2	69.03	33.83
Provision for Contingencies				26.4		-26.4
Margin money for Working Capital				3.54	8.05	4.51
Total	286.92	502.61	215.69	440.0	531.30	91.30

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
ESM-KSTC Ltd. = Edarikodu Spinning Mills - Kerala State Textiles Corporations Ltd.

(Private Sector)

Components	MIL Ltd.			CCIL Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	21.80	28.74	6.94	18.62	25.34	6.72
Building and Civil Works	43.21	83.01	39.80	37.41	91.02	53.61
Plant and Machinery	150.03	209.23	59.20	489.06	686.25	197.19
Technical Know-how & Engineering Fees	129.94	86.56	-43.38	109.28	128.36	19.08
Miscellaneous Fixed Assets	45.02	49.13	4.11	213.73	302.17	88.44
Preliminary and Pre-operative Expenses	35.00	8.13	-26.87	194.73	418.24	223.51
Provision for Contingencies				154.13		-154.13
Margin money for Working Capital	50.0	55.20	5.20	33.09	122.67	89.58
Total	475.0	520.0	45.00	1250.05	1774.05	524.0

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
MIL Ltd. = Masoneilan India Limited.
CCIL Ltd. = Carbon & Chemicals India Limited

Components	MI (P) Ltd.			GLPM Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development				28.0	25.81	-2.19
Building and Civil Works				52.50	52.40	-0.10
Plant and Machinery	140.34	137.75	-2.59	200.56	192.72	-7.84
Technical Know-how & Engineering Fees				3.0	5.99	2.99
Miscellaneous Fixed Assets	20.16	28.79	8.63	125.87	161.46	35.59
Preliminary and Pre-operative Expenses	7.89	8.41	0.52	27.26	31.62	4.36
Provision for Contingencies	2.00		-2.00	20.0		-20.0
Margin money for Working Capital	4.61	5.69	1.08	29.81	23.48	-6.33
Total	175.00	180.64	5.64	487.0	493.48	6.48

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
MI Ltd. = Mangli Industries Pvt. Limited
GLPM Ltd. = Green Land Paper Mills Limited.

Components	MSE Ltd.			SWI (P) Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	15.0	18.25	3.25	14.0	14.0	
Building and Civil Works	30.0	54.01	24.01	15.0	28.40	13.40
Plant and Machinery	97.8	96.99	-0.81	30.50	70.70	40.20
Technical Know-how & Engineering Fees	10.25	10.25				
Miscellaneous Fixed Assets	26.5	31.04	4.54	19.50	64.20	44.7
Preliminary and Pre-operative Expenses	20.25	16.28	-3.97		12.54	12.54
Provision for Contingencies	16.65		-16.65			
Margin money for Working Capital	35.75	35.75			26.57	26.57
Total	252.2	262.57	10.37	79.0	216.41	137.41

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
MSE Ltd. = Malayalam Solvent Extractions Limited
SWI Ltd. = Srinivas Wheat Industries Pvt. Limited

Components	SS (P) Ltd.			SC (P) Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	2.13	1.91	-0.22	8.85	11.92	3.07
Building and Civil Works	35.29	34.76	-0.53	32.55	40.32	7.77
Plant and Machinery	69.11	83.92	14.81	102.56	113.18	10.62
Technical Know-how & Engineering Fees		0.90	0.90			
Miscellaneous Fixed Assets	52.37	46.11	-6.26	28.95	37.35	8.4
Preliminary and Pre-operative Expenses	14.06	12.1	-1.96	15.55	16.99	1.44
Provision for Contingencies				9.50		-9.50
Margin money for Working Capital		14.74	14.74	22.34	22.34	
Total	172.96	194.44	21.48	220.3	242.1	21.8

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
SS Ltd. = Surabi Steels Pvt. Limited
SC Ltd.= Saxon Castings Pvt. Limited

Components	KOF Ltd.			MT & FW (P) Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	21.35	21.75	0.40	5.39	5.39	
Building and Civil Works	14.75	21.43	6.68	10.31	10.31	
Plant and Machinery	41.35	44.84	3.49	159.5	171.45	11.95
Technical Know-how & Engineering Fees						----
Miscellaneous Fixed Assets	26.4	32.85	6.45	19.76	23.37	3.61
Preliminary and Pre-operative Expenses	9.2	9.79	0.59	6.73	8.53	1.8
Provision for Contingencies	4.25		-4.25	5.32		-5.32
Margin money for Working Capital	22.16	22.16		4.99	5.0	0.01
Total	139.46	152.82	13.36	212.0	224.05	12.05

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
KOF Ltd. = Kanoil Food Limited
MT & FW Ltd. = Mangly Timbers & Furniture Works Pvt. Limited

Components	A P S R M (P) Ltd.			G.S. (P) Ltd.		
	EC	AC	COR	EC	AC	COR
Land & Site Development	0.50	3.65	3.15	4.34	5.48	1.14
Building and Civil Works	42.12	61.31	19.19	26.0	34.5	8.50
Plant and Machinery	86.50	100.46	13.96	24.66	24.08	-0.58
Technical Know-how & Engineering Fees	1.0		-1.00			
Miscellaneous Fixed Assets	48.4	48.08	-0.32	15.90	18.14	2.24
Preliminary and Pre-operative Expenses	9.98	21.30	11.32	8.05	8.29	0.24
Provision for Contingencies	11.50		-11.50	3.30		-3.30
Margin money for Working Capital				11.26	11.26	
Total	200.0	234.80	34.80	93.51	101.75	8.24

EC = Estimated Cost, AC = Actual Cost, COR = Cost Overrun
A P S R M Ltd.= A P Steel Rerolling Mills Pvt. Limited
G.S. Ltd. = Global Spices Pvt. Limited

Appendix III - B

Details of Time Overrun in Sample Projects

Projects	Months		
	Estimated Time	Actual Time	Time Overrun
Public Sector Projects			
1. Ammonium Sulphate Caprolactam Project. FACT Ltd.	42	128	86
2. Titanium Dioxide Pigment Project – KMM Ltd.	36	81	45
3. Integrated Casting Unit – Autokast Ltd.	54	94	40
4. Vitamin 'A' Project – KSDP Ltd.	24	64	40
5. Malabar Cements Ltd.	24	54	30
6. Kerala Feeds Ltd.	22	48	26
7. Kerala State Wood Industries Ltd.	12	35	23
8. Keltron Control Project.	28	44	16
9. Kerala State Salicylates and Chemicals Ltd.	22	104	82
10. Steel and Industrial Forgings Ltd.	27	70	43
11. Oil Palm India Ltd.	24	47	23
12. Edarikode Spinning Mills, KSTC Ltd.	17	45	28
Private Sector Projects			
1. Malayalam Solvent Extractions Ltd.	16	41	25
2. Carbon and Chemicals Ltd.	20	35	15
3. Masoneilan India Ltd.	12	10	-2
4. Green Land Paper Mills Ltd.	16	22	6
5. Kanoil Foods Ltd.	9	12	3
6. Srinivas Wheat Industries Pvt. Ltd.	16	17	1
7. Surabi Steels Pvt. Ltd.	13	22	9
8. Saxon Castings Pvt. Ltd.	10	11	1

9. Mangly Timbers & Furniture Works Pvt. Ltd.	8	12	4
10. A.P. Steel Rerolling Mills Pvt. Ltd.	13	19	6
11. Global Spices Pvt. Ltd.	15	20	5
12. Mangly Industries Pvt. Ltd.	6	7	1