

# COST AND TIME OVERRUNS IN PUBLIC SECTOR PROJECTS\*

Sebastian Morris

## Abstract

---

*Delays and cost overruns in Public Sector investments can raise the capital-output ratio in the sector and elsewhere, bringing down the efficacy of investments. Yet there are no estimates of the delays and cost overruns, and of their opportunity cost.*

*This study arrives at rough estimates of the delays and cost overruns, and the opportunity cost in terms of the extra 'capital X time' that is used up. Cost overruns (at 80%) and the extra 'capital X time' incurred (about 190%) are very large; even after removing the increase due to inflation! The reasons for the same are also identified and rated. Factors internal to the public sector system and Government largely account for the delays and cost overruns: Poor project design and implementation, inadequate funding of projects, bureaucratic indecision, and the lack of coordination between enterprises. Appraisal by the Government very often is devoid of meaning when the emphasis is only on the form of the project proposal rather than on its content- a tendency quite usual in bureaucracies.*

*Since the public enterprises particularly those in the core sector have large dealings with each other, a 'vicious circle of delays' has been built up. The politically expedient tendency to take up large numbers of projects and short fund them all, except those with the very highest priority, is perhaps the most important factor in delays. The Government's ad hoc approach in according high priority to certain sectors- oil and natural gas, and petroleum- while perhaps overcoming the problem in these sectors have compounded the problem elsewhere, particularly in the infra-structural areas- railways, coal and steel.*

---

## Introduction

The Public Sector (PS) occupies an important place in the Indian economy. As a leading sector, a substantial part of the autonomous investments arise therein. These investments pull (and push) along other investments in the private corporate and small and cottage industries sectors. Indeed the very raison d'etre of the Public Sector's central place in Planning in India is to raise the level of investment economy-wide. Economists have been keenly aware of this central aspect

---

\* Copy of paper "Cost and Time Overruns in Public Sector Projects", in Economic and Political Weekly, Nov.24, 1990, Vol. XXV, No.47, pp.M-154 to M-168.

Sebastian Morris, Institute of Public Enterprise, Hyderabad, now at the Indian Institute of Management, Ahmedabad

of the PS, as much of the discussions of the "stagnation debate", that started in the early seventies and continues till today would indicate.<sup>1</sup>

Delayed investments, have the evident effect of lowering the growth rates from planned ones. If cost overruns are pervasive and increase the cost of investment in real terms, they raise the capital - output ratio in the PS, an effect which can spread to other sectors if the PS raises the prices of its output, since much of the output of the PS constitutes input to the private sector and to itself. The transmission mechanism is through price increases of investment and intermediate goods at a higher rate than price increases of other goods. The debate on the slow growth of the economy (in the late sixties and seventies) in India saw explanations based on increases in capital - output ratios and the PS's role in contributing towards the increase in this ratio. Some economists have argued that high cost production of capital and intermediate goods have led to high incremental capital - output ratios, which has tended to reduce the efficacy of investment in bringing about growth.<sup>2</sup> A less general argument has been that poor performance of the PS in certain critical areas like power, coal and steel have led to loss of output and to higher costs elsewhere in the economy.<sup>3</sup> In contrast to these arguments, other scholars have seen the root of the problem as lying in the fact that demand (particularly of wage and basic goods) as envisaged in the Plans, was not forthcoming due to structural reasons which has the statistical effect of raising the capital - output ratios when investments are nevertheless sought to be pushed in essentially a market economy.<sup>4</sup> The debate continues. Nevertheless, there can be little dispute that there is a need for the PS to reduce the cost of production, whether or not the right policy decisions to remove the structural maladies restricting home demand are set right.

---

1. For the most recent contribution to the debate see I.J. Ahluwalia (1985).

2. C. Rangarajan (1982), P.R. Brahmananda (1982).

3. I.J. Ahluwalia (1985), Ashok Desai (1981).

4. Prabhat Patnaik (1981), N.K. Chandra (1982), A.K. Bagchi (1970).

There is widespread feeling among administrators, policy makers and senior managers, that improper project implementation, and delays in decision-making, have increased the capital costs of projects. This has put pressure on prices of final output,<sup>5</sup> or led to increasing deficits when the prices are held down by administrative measures,<sup>6</sup> and hence indirectly to general inflation. Yet even a rough measure of the degree of cost escalation is not available. Are the delays and cost escalation due primarily to bureaucratic styles of functioning? How far are the individual enterprises responsible? Are there genuine problems arising out of technical difficulties, inadequate experience, of learning by doing, additional costs of technological self-reliance, additional costs arising from price preference for domestic contractors and suppliers which cannot be set right by administrative reform alone? It is important to have the answers to these questions before the appropriate policy initiatives are made to push the Public Sector in the direction of greater efficiency.

In Section I, quantitative estimates of cost overruns, delays and the wasted 'capital x time' is provided, and it is argued that one of the important reasons for delays and cost overruns is short funding of projects. In Section II, other factors are discussed, based largely on information available in various reports of the Committee on Public Undertakings (CPU).

### **Section I: Extent of delays and cost overruns**

Delays in project implementation and the attendant cost overruns have become a regular feature of public sector projects. Delays have

---

5. As for instance in the fertiliser industry where the retention prices till recently were on a plant level cost basis!

6. As for instance in the Coal and Electricity sectors where the prices have been pegged down by Government.

been there right from the early sixties, if not earlier.<sup>7</sup> One of the motivations in setting up the Programme Implementation Ministry was to monitor and report on project implementation related to public sector investments. Though it is suspected that since the mid-sixties delays and cost-overruns have increased,<sup>8</sup> trends in delays and cost overruns in public sector projects are difficult to compile because the information is not available.<sup>9</sup> And, we could not address ourselves to this important question.

### Official estimates

As on March 31, 1987, there were 290 medium & large projects in the Public Sector under implementation. These consist of projects with a cost (original or anticipated as the latter information becomes available) of Rs. 20 crores or more. They include only projects sponsored by the central Government. Of these, 186 had cost overruns. Similarly, 162 projects had time overruns or were anticipated to have time overruns. The percentage cost overrun (i.e. the cost overrun or anticipated cost overruns / original cost) was as much as 50% and the time overrun was in excess of 43%. As we shall argue, these figures if used as indicators of cost and time overruns of projects, understate the real likely cost and time overruns both in terms of the number of projects affected and the quantum of overruns involved. Firstly, they do not pertain to completed projects but to projects still under implementation. As such, the time and cost overruns are only anticipated

---

7. Cf. J. Satyanarayana (1973).

8. Cf. I.J. Ahluwalia (1985).

9. The Bureau of Public Enterprises (BPE) Surveys report only on the projects that are as on a particular date under implementation. Without the information of the date of approval or the date of the start of construction, it is difficult to build up a valid picture of the trends in time or cost overruns. Even otherwise the data is extremely shoddy and there is little consistency from year to year. Similarly, the data generated by the Programme Implementation Ministry reports only on all projects (whether by units under construction or otherwise) that are being implemented at a point of time. Since this data goes only a few years back in time it is difficult to build up any year wise picture.

values and can very well increase as the project makes progress and gets completed. Older projects are known to go through several revisions, while newer projects show fewer revisions implying that as the implementation progresses further revisions could take place. A comparison of the data between two quarters reveals that, in very many cases, the anticipated value of final cost and the date of completion themselves change as more information becomes available and further expenditure is incurred. More importantly, the set of 290 includes 98 projects which were approved in 1984 or after: For very many of these projects, implementation would have only just begun and the reported anticipated cost and time overruns in these projects hardly reflect what the final overruns would really be. In a further 33 cases (excluding the cases above), while the approvals were made before 1984, they were originally targeted to be completed only during 1989 or later. Many of these had overruns. But the overrun values may be said to be very preliminary and hardly anywhere near what the final overruns would be. For 18 projects, most of being executed by the Railways - railway construction, doubling of tracks and electrification - there is no data on the anticipated dates of completion and the extent of anticipated cost overruns. Instead of attributing to these projects overruns equal to the average for railway projects (based on the cases for which data is available), the aggregate values which have been worked out, and which we have quoted above assume that the overruns for these projects is nil: Railway projects, in the cases where data is available, show high cost and time overruns. Nevertheless, we give in Table 1 the figures gathered from the Programme Implementation Ministry as indicative of a liberal lower limit to time and cost overruns in medium and large public sector projects. The expenditure on these projects in the year 1986-87 was Rs. 7,980 crores. This is about 24 per cent of the gross fixed capital formation in the entire public sector including general administration, of Rs. 32,992 crores. in the same year.

## Capital 'waste' in projects

We have recomputed the time overruns, cost overruns, "capital (waste) factor",<sup>10</sup> etc., going back to the data for individual projects. For the railway projects for which data was not available on the anticipated dates of completion, we have worked back the anticipated dates of completion using the average time overruns in railway projects falling in the same category, for electrification, doubling, or new track laying, for which data was available. Time overrun in these projects did not show much variation, so we could not have deviated much from the true picture in using such estimates. Moreover for only four projects out of 23 was the data not available. Instead of using the data for all projects, we have used the data for only 133 projects which were scheduled (as per the original plans) for completion during or before 1987. We have excluded the remaining 157 projects because our objective is to arrive at a reasonable estimate of the cost and time overruns. The anticipated costs and date of completion for these 157 projects are very preliminary estimates and hence likely to be revised again (and again) as the implementation proceeds. Three projects, one in Atomic Energy and two in the Aviation Ministry for acquisition of aircraft were also excluded. On the other hand, the estimates for the 133 projects are most likely to be firm (they could also undergo further revisions no doubt, but this is much less likely than for the 157 projects).

These 133 projects had a total original cost of about Rs. 19,567 crores. The anticipated cost overruns in these projects was about Rs. 16,101 crores, giving a cost overrun of 82%. Similarly, the average time overrun for these projects works out to about 70.5%. Such large time and cost overruns necessarily warrant a more detailed analysis. Projects are approved on the basis of costs that exist at the time the project is submitted, or at the time it is resubmitted if the approval had been delayed by more than six months. Therefore, typically the cost estimates are likely to be valid only at the time the project construction starts; or for a time six months before, given the delays in approval. The

---

10. We shall soon define this and other quantities.

question naturally arises about the portion of the cost overrun that is due to the fact of price increases. This portion of the cost overrun due to increase in prices (assuming that there is no delay in implementation) certainly cannot be attributed to improper project implementation, or to its formulation as such. It is an overrun that arises because project formulation is done at costs that exist, and not at what they are likely to be at the times the different expenditures are planned to be incurred. No actual data is available which can be directly used to arrive at the 'expected', as it were, cost overruns that is inherent in project formulation at given costs and its implementation in a situation of inflation. Yet, we would argue that cost overruns due to inflation need not be too high. Not all items are affected. When the Detailed Project Report (DPR)/Feasibility Report (FR)<sup>11</sup> is prepared, values from actual quotations are used, which are sometimes valid for periods of around a year and quite often for around six months. It all depends on the proportion of such expenditure covered by long-term quotations to other expenditure not so covered and hence subject to price inflation.

Lacking the relevant data, we have used certain assumptions and computations to arrive at broad estimates (valid only in the aggregate) of the contribution due to inflation alone to cost overruns, as explained below: Actual expenditures are expected to take place as outlined in the PERT chart for every project. Without this information, we may assume that they take place uniformly with respect to time. In other words, the cumulative expenditures build up linearly at a rate given by " $C_0/O$ " where " $C_0$ " is total targeted expenditure and " $O$ " is the time for project implementation. This is the simplest assumption that can be made. If we assume that prices increase at a certain rate, " $p$ "

---

11. The Public Sector has to necessarily submit the project for approval and appraisal' by the government. See Sebastian Morris (1987) for details about this process.

per cent per annum then the contribution to cost overrun due to the price increase can be worked out. Since " $C_o$ " the total targeted expenditure includes the interest on actual expenditure to be incurred (less than " $C_o$ ") adjustments have to be made for this factor. Working through the details (as outlined in the Appendix) the contribution of price increases alone or what we have called the 'price factor' ( $PF$ ) to cost overruns is given by:

$$PF = \left( \frac{C_o}{O} \right)^2 \left( \frac{e^{pO/12}}{rO + 2} - 1 \right)$$

Where  $C_o$  : is the total cost of the project including the interest amortisation

$p$  : is the annual rate of inflation

$O$  : is the period of construction in months

$r$  : is rate of interest (cost of capital used)

The  $PF$  in aggregate for the 133 projects at a 10% (assumed) level of inflation per annum works out to Rs. 4117.02 crores, which as a percentage of the total cost overrun is only 25.57%. Thus, in the aggregate, we would contend that only about 25%, say 30%, can be attributed to price increases. Thus, the remaining 70 to 75% of the cost overruns have to be explained in terms of real factors, such as delays in implementation resulting in overruns of certain items of expenditure which are time related-such as salaries of supporting staff, wages, etc., which have an overhead element, expenditure not envisaged in the DPR/FR but during implementation seem to be necessary, and to the combined effect of these factors with inflation.

Not only is the cost overrun high but the time overrun too is very high. This means that we have to examine the aspect of "capital waste": When capital is tied up for periods more than what is planned, there is a loss in terms of the alternative use for this capital. It is well Cost and Time Overruns in Public Sector Projects, *EPW*, Nov.24, 1990

known that the Government has a resources constraint. To that extent if capital was used more efficiently, then availability of capital to the Government increases, enabling it to take up more projects. One way of computing the "capital waste" is to compute the cost of the extra capital that is deployed (both by way of increased time taken for project implementation, and due to cost overruns), using a notional return to capital which is the approximate cost of capital. But given the capital constraint we are much more interested in capital as such rather than its cost alone. Here we have thought it worthwhile to work in terms of 'capital x time'.

Again, given the limitations of data, and assuming that the expenditure build up is uniform, the "extra capital x time" or the "capital (waste) factor" (**CF**) as we have chosen to call it, for a project can be worked out as (See Appendix for the details):

$$CF = (1/24) (AC_a + AC_e - OC_o - EC_a)$$

where **A**: is the now anticipated period of completion in months.

**O**: is the originally planned period of construction, sometimes revised upwards in months.

**E**: is the time elapsed since the project was taken up, as on 31.3.86, in months.

**C<sub>a</sub>** : is anticipated total cost

**C<sub>o</sub>** : is planned total cost.

**C<sub>e</sub>** : is the actual expenditure incurred till 31.3.86

**CF** in the aggregate works out to Rs. 93,246.31 crore years. While the base capital factor as originally planned works out to Rs. 47,811 crore years for the 133 projects. As a ratio of this base the capital factor works out to about 195%. In other words, as a result of cost and time overruns, the projects use up 195% more "capital x time" than what

was originally planned. Or, stated differently, if all projects had gone on as per schedule and without any cost overruns, with the same resources that the Government deploys today, it could have enhanced the quantum of projects taken up by 195%.

This figure of 195% is not based on a detailed examination of the actual time and cost overruns in each unit, but it is largely valid as an aggregate measure of the 'capital waste' over projects. One need not attach much importance to the exact value of the figure, but that it is very nearly at 200% is indicative of the enormous waste of capital resources that is there in public sector project implementation.

### Sectoral patterns

The sectoral pattern of cost and time overruns is interesting. See Table 2. Notice first that the sector which has been accorded the most priority in recent times, viz. petroleum and natural gas shows least overruns; and the CF here is only at half the average. Another important underlying reason is that several of the projects in this sector, as also in surface transport, and in communications involved only the acquisition of equipment, i.e. oil rigs, drill ships, dredgers, etc. If the DPR/FR had in such cases been prepared on the basis of quotations valid for the long-term (as it seems to have been) then the high computed price factor is quite understandable. These are projects where despite the fact of use of "current" cost estimates there ought not to be the cost overrun due to price increase. And the fact of low cost overruns emerges out of the nature of the task in these projects: acquisition, which is a relatively simple activity in comparison to construction or setting up productive units.

The infra-structural investments and steel have suffered particularly hard: railways, steel and coal; the traditional domain of the Public Sector in India. The cost overruns are far in excess of 100% and the 'capital (waste) factor' exceeds 250% in all these cases. Thus

it is in the very core set of activities of the Public Sector that large delays and overruns have taken place.

We had also worked out the time and cost overruns in terms of the size of the project, but no discernible relationship is noticed. Therefore, it is not so much the size of the projects and hence the "complexity" that is associated with size, as much as other factors: technology, resource constraints, social priorities, etc., that determine the cost and time overruns.

Yet, the pervasiveness of time and cost overruns throughout the sectors (except in the petroleum and natural gas sectors and in certain acquisition projects) calls for a general explanation not based on factors specific to particular sectors. (One may have explained the long delays and the enormous cost overruns in the coal sector in the Dhanbad area, where Eastern Coal Fields Ltd (ECL) and Bharat Coking Coal Ltd (BCCL) operate, as being due to the "Coal Mafia", or because the coal projects are known to be badly prepared by the Central Mine Planning & Development Institute (CMPDI).

#### Short funding projects

We shall argue that a more important reason is the thin spread of financial resources by the Government over a large number of projects that delays project implementation. First of all, the evidence that the Government is indeed spreading thin its resources: The Government itself is quite aware of the problem. Thus "It may be noted that very large investments are planned in Power, Steel, Petroleum & Coal sectors [See Table 3, Column "Anticipated cost percent" ]. Compared to the planned investments, distribution of outlay is high in Petroleum, Civil Aviation and Fertiliser sectors, and very low in Coal, Steel and Railway sectors [in a sense bringing out the revealed priorities of the Government]. Ratio of throw-forward [ = Anticipated Cost - Expenditure already

incurred up to end March 1987 to outlay for 1986-87 ] in most of the sectors is excessive. It should normally be no more than 3 to 4 if a project is to be completed in about 6/7 years. In other words, available meagre resources are being spread thinly over a large number of projects thereby stretching the period of completion of projects. There is an urgent need to slow down sanctioning of new investments and to speed up the implementation of ongoing projects." <sup>12</sup>

We are not particularly happy with the concept of "throw-forward" ratio as used by the Government. "Throw-forward" ratio as defined by the Government is a ratio of expenditure remaining to current year's outlays. Nevertheless, the mere fact that in the sectors, Railways, Coal and Steel, the outlays are disproportionately low in comparison to the investment requirements, relative to that for other sectors reveal the plight of these sectors. Even in the aggregate, the fact that Government has spread resources thinly is evident, since the throw-forward of 3.8 times, implies that nearly four years at the current rate of funding and without the addition of any more projects would be required to complete them at their new anticipated cost.

To the above analysis one may raise the objection, that since we have worked with anticipated costs rather than with original costs, our comment about the Government spreading its resources thin is valid only given the increases in project costs, so that at the old costs its resources may not be too inadequate. But we must realise that not only does high project cost given limited resources, lead to meagre outlays relative to needs, but meagre outlays relative to requirements also lead to delays in implementation and to cost overruns, since certain costs have to be incurred continuously being in the nature of overheads. Working with an average of original costs and the anticipated costs, the outlays at the rate of Rs. 9084 crores/year implies that the average of original and anticipated costs can be covered in six years and five months, whereas the original cost weighted time for completion (as originally approved) is five and a half years. Thus, it is still true

---

12. Quoted from an official report of the Programme Implementation Ministry.

that the Government has been short funding its projects. If we work with the anticipated costs then the comparison is between seven years eight months as per the yearly outlay, and five and a half years as the cost weighted average (originally planned) time for completion of the basket of projects!

The cost and time overruns of projects when viewed in terms of location present interesting features. See Table 4. We observe that the fast industrialising states, Gujarat, Maharashtra, Haryana show much lower cost overruns and "capital (waste) factor" values than lowly industrialised or stagnant states such as Assam, West Bengal, Bihar and Uttar Pradesh. Madhya Pradesh, Rajasthan, Orissa, Tamilnadu and Kerala show intermediate levels of costs. Yet it is not entirely clear that the location of projects does affect the cost overruns and "capital waste factor". One may suspect that the state-wise pattern evident above may merely be a reflection of the sectoral pattern, since there is much concentration of certain kinds of projects - coal, for instance in Madhya Pradesh, Bihar, West Bengal and Andhra Pradesh.<sup>13</sup> More relevant is the observation that a few states - West Bengal, Assam, Bihar, Orissa, Madhya Pradesh and Andhra Pradesh have generated (or would generate) as much as 76.4% of the total "capital waste". This is not just a reflection of the higher planned investments in these states (the investment in these states as revealed by the original cost was only 53%), but of both the investments and their wasteful use through cost and time overruns whatever the reasons.

## **Section II: Reasons for Time and Cost Overruns**

We have already suggested that one of the important reasons for time and cost overruns is the fact of the inadequate funding of

---

13. This interesting problem of multi-variate analysis could not be taken up satisfactorily because in many states there are too few projects.

projects. There may be other equally general reasons which underlie cost overruns, but which are not deducible from the kind of data already considered. The CPU has in several of its reports examined the reasons for cost and time overruns in Public Sector project implementation. Although, the content and quality of the information available in the CPU reports vary widely, these are the only source of published information available on this important aspect of the Public Sector. Scattered bits and pieces of information on the reasons for delay in implementation are also available with the Ministry of Programme Implementation, for a few of projects with an anticipated cost of less than Rs. 100 crores but above Rs. 20 crores.

From among the projects covered by the CPU since 1974, there is some information in the CPU for 99 projects to permit an analysis of the reasons for cost overruns. The reasons stated in the CPU have been aggregated under 10 broad groups. (See Table - 5). The scores for each of these classes of factors have been arrived at in several ways. For the unweighted scores, the number of occurrences (over projects) of a class of factors is summed up (and normalised) to give the score of that class of factors. Size and extent of cost overruns is ignored in this tabulation - column 1. For the weighted scores the occurrences of the various classes of factors over projects are weighted for both the cost (original or overruns) and inversely for the number of reasons mentioned for each project. Thus, if for a project with cost of Rs. 10 crs., three reasons pertaining to three different classes are mentioned then the contribution to these classes by the project under question is Rs. 3.33 crs., each. If on the other hand three reasons are mentioned two of which pertain to one class and the third to another class then the contribution to the first class is  $\frac{2}{3}$  of 10 i.e. Rs. 6.66 crs., and to the second class it is Rs. 3.33 crs. The aggregate contribution to the classes is summed up and divided by the total cost (original or overrun) to give the weighted scores. Admittedly, this procedure is crude and inter alia assumes that: projects can be aggregated; interaction between the factors that result in cost overruns at the level of a single

project can be ignored; all mentioned reasons have equal weight in terms of their contribution to cost overruns. Nevertheless, we would plead that there is little else one could have done, not only because of the lack of systematic data, but because even with comprehensive data, we would still have to overcome the problem of aggregation in a way that is not too dissimilar to our procedure. In Table - 5, the most meaningful scores indicating the relative importance of the various classes of factors listed are the cost overrun weighted scores. The scores have been worked out with and without the 14 large projects of the National Thermal Power Corporation (NTPC), and also excluding them, separately; because the NTPC projects are very large being nearly double the next largest project.

The coverage of these 99 projects as a percentage of all projects taken up by the Public Sector since the early seventies is not available: But it would not be an insignificant portion of the projects that had large cost and time overruns. From Table - 6 we notice that these projects involved a total cost of Rs. 10,894 crs. (Rs. 6976 crs. by way of the original cost and Rs. 3918 crs. by way of cost overruns). The sectoral coverage has certain inadequacies. An important one is that the Steel and Railway sectors have not been covered at all. Secondly, the coverage of the manufacturing sector is not quite satisfactory. The coverage is particularly good in terms of the coal projects, power projects (central level), mining, and metals other than iron ore. Coverage of the paper sub-sector of manufacturing is also good since we have been able to include the three paper mills of the Hindustan Paper Corporation, in the Northeast which have all had high cost and time overruns.

#### Other factors

Observe from Table-5 that whether we use the weighted or the unweighted score, the first two factors are the most important. Whereas

the first factor - inadequate project preparation, planning and implementation - reflects weaknesses of the enterprise, the second - delays on the part of contractors and equipment suppliers- reflects on other enterprises. Labour unrest at the time of construction is hardly an important factor. Similarly, natural calamities and problems with foreign technical collaborators, are not too important. Thus there is little basis to the popular perception that labour unrest underlies much of the ills of the public sector, including its sloppy project implementation. In other words environmental factors (i.e. factors outside the enterprise and the Government) are actually least important.

Factor 7 viz., technical and other incompetencies of the enterprise other than those that directly bear on project implementation also reflect upon the enterprise. This factor is quite important as is seen from the scores without NTPC. Factor 2, viz. delay in construction, supply of raw materials and equipment by contractors refers to organisations different from the enterprise in question. We shall show (a little later), that much of the delays in construction and equipment supply occur with other public sector enterprises: machinery manufacturers, contractors, construction and engineering companies, largely limiting the problem to the public enterprise system. Factors 3,4,5 and 6 reflect upon the immediate superstructure of the enterprise: the policy environment, decision making by Government, the lack of adequate funds (responsibility of the Government), failure of coordination by the Government between projects.

Thus our general observations is that the most important factors for project delays and cost overruns can be traced to the inadequacies within the public sector as such. The next important set of factors can be attributed to the immediate superstructure of the public sector particularly the policy environment and the relationship of the enterprise with the Government.

Statements amounting to inadequate project preparation, planning and implementation as a factor in cost and time overruns ere mentioned

in as many as 94 out of the 99 cases considered. Some of the actual statements include: "project monitoring is absent", "planning is non-existent / weak", "wrong FR was submitted", "projected demand was not forthcoming", "much divergence between the project report and the project as it was actually implemented", "project report not backed up by concrete ground surveys [in the case of coal and other mining projects ], "project report itself was not prepared", "estimates were based on inadequate data". Nevertheless, we must not overemphasise the importance of this factor. Any final divergence between the project and what was planned can always ex-post be attributed to inadequate project planning, and in some cases the CPU has certainly overemphasised project planning.

#### Project planning

In what follows we will discuss in somewhat greater detail the inadequacies in project preparation, covering mostly mining projects. In the case of coal and other mining projects much of the inadequate planning particularly as regards ground surveys and estimates of mineral potential are largely due to the poor services provided by the consultancy and survey companies. FR/DPRs for coal projects are prepared by the Central Mine Planning and Design Institute (CMPDI). The CMPDI in turn depends on the Mineral Exploration Corporation (MECL), for the geological reports and ground and other surveys. When the CMPDI, and the National Coal Development Corporation (NCDC) often responsible for mine development (i.e. project implementation), have been questioned about the inadequacies in their project reports, they have put the blame squarely on the MECL. The problem really is that of a vicious circle where the quality of the total work is only as good as that of the weakest link in the chain and the time taken is dependent on delays at each of the links. Thus: "According to the Audit Report, results of investigations conducted for mineral exploration and the resources established, are embodied in the geological reports prepared by the

company.... such reports are required to be submitted to the GOI[Govt. of India] in the course of promotional projects and to concerned agency [ NCDC / Coal Companies ] / State Governments in the case of contractual projects. For delay or non submission of the report, the company is liable to penalty..... During 1973-74 - 1982-83 the company completed 41 promotional projects and 133 contractual projects....there were delays in submission of reports in respect of 61.5 per cent of projects...." <sup>14</sup>

When asked the reasons for delay "MECL informed in a note that the main reasons were delays in receipt of analytical reports from the Central Fuel Research Institute [CFRI], and other laboratories..... changes/revisions of specifications".<sup>15</sup> Other internal problems were shortage of skilled manpower, weak management, lack of modern technology to speed up drafting and report writing work. Thus, "[in the projects undertaken by MECL] there was inadequate planning, inadequate management and control reflected in cost and time overruns, delays in closure of camps, low productivity per worker, .... idleness of equipment and manpower to say the least",<sup>16</sup> and further it is surprising to note "that until recently [circa 1980] the Company had no system of project coordination with the clients and association of geologists to assess the correctness or otherwise of the estimates made by it and take corrective measures. [Hence little scope for learning by doing, so vital in an area like mineral exploration & development]. That even after 12 years of its formation the company has not been able to lay down any norms for consumption of POL /bits/productivity of machines..... operating in a given strata /mineral, deployment of manpower, [etc]..."<sup>17</sup>

---

14. Page 17, CPU VIII LS No. 4 (566) 8th August, MECL.

15. Page 39, *ibid.*

16. Page 40, *ibid.*

17. Page 8, CPU VII LS, No. 18 VII LS, No. 18 (426), 24th April, 1981. Khetri Copper Complex.

That not only coal but other mining projects are plagued by inadequate surveys is illustrated by the case of Khetri Copper mining and smelting project: "The basic bungling that materially altered the economics of the project was the gross overestimation of the ore deposits at Khetri.... deposits were reassessed [after the project had started and much of the implementation had already taken place] and scaled down to 40m tonnes of 0.91% average grade of copper from a level of 106m tonnes of 1% grade. Curiously, there were no detailed geological studies before project formulation..... A more amateurish handling of the basic assessment of a project cannot be expected from any quarter",<sup>18</sup> and, "..... the planning of Khetri Copper Complex typifies the way projects should not be planned"<sup>19</sup>

It is through the delays in construction and equipment supply where the public sector firms as consultants and equipment suppliers contribute most to time and cost overruns. Thus in all, except four cases, the construction and contracting firms responsible for delays were known to be in PS. In order to illustrate this vicious circle of delays, we discuss a few cases below:

#### Construction and equipment supply

In the case of the Khetri Copper Complex, besides the problems related to poor ground surveys, "the delay in implementation of the project was also partly due to delay in construction / supply of material by other Public Undertakings such as MAMC [Mining and Allied Machinery Corporation], NPCC [National Projects Construction Corporation], and FACT [Fertilisers and Chemicals Travancore Limited]. Civil and structural construction plant was delayed by 20 months due to lack of practical experience of the NPCC. There was delay in the

---

18. Page 40, *ibid.*

19. Page 19, *ibid.*

execution of the turnkey contract by FACT for the acid-cum-fertiliser plant, whereas MAMC delayed certain supplies".<sup>20</sup>

The Bailadila Iron Ore project, had high priority since it was set up to exploit iron ore deposits for export to Japan to earn scarce foreign exchange, and more importantly the Japanese were known to be insistent upon delivery targets being strictly adhered to. Yet, despite the importance attached to this project, lapses on the part of MAMC, and HEC [Heavy Engineering Corporation] for equipment, and NPCC for construction of a tunnel, meant that the project was commissioned late. The CPU noted "with concern that even the present anticipated [ twice revised, circa 1975 ] completion [date] .... cannot to adhered be to".<sup>21</sup>

In the case of the Bohajan plant of the Cement Corporation of India, due to the Bangladesh war and strikes at the plants of ACC Vickers Babcock, its principal equipment suppliers, the project could effectively be taken up only in 1972. Earlier there were delays in award of the contract which had led to necessary increases in the cost of the project. More importantly, after 1972, "delays in the supply of large size castings by the HEC [as sub-contractors], and delays in making available mild steel to ACC by Hindustan Steel [were responsible for the delays]".<sup>22</sup> In 1974, everything else except the castings from HEC were awaited.

In the case of Hindustan Paper Corporation's Nagaland paper project not only were the cost estimates prepared by the National Industrial Development Corporation (NIDC), as technical consultants, "unrealistic [but they were] incomplete and did not take care of all

---

20. Page 19, *ibid.*

21. Page 19, *ibid.*

22. Page 185, CPU, V LS, No. 69(289), 17 July, 1975, Cement Corporation of India.

aspects of the project ...." <sup>23</sup> As turnkey contractors, they were responsible for the delays and cost overruns.

In the case of the Damodar Valley Corporation's (DVC's) early large projects, slippages in delivery schedules by Bharat Heavy Electricals Ltd.(BHEL) and Heavy Electricals India Ltd., [later merged with BHEL] were among the important reasons for the delay in commissioning of these projects. <sup>24</sup>

A factor that strengthens this vicious circle of delays, emanating largely from within the Public Sector, is the unexamined assumption that a public enterprise should patronise another. Such attitudes have stood in the way of the use of private contractors and equipment suppliers even when they were available and probably had better expertise than the public sector. Even critical bodies like the CPU have been victims of this presumption. Thus, in the award of construction contracts, in the case of Hindustan Photo Films' (HPF's) unit in Ootacamund, the CPU criticised the Government for not using public sector construction firms.<sup>25</sup> The bigger problem of course is that for many of the construction, equipment and technical services requirements of the public sector there are no competing private sector firms.

#### Costs of learning by doing

A purely managerial perspective may lead one to root this vicious circle of delays entirely in the inadequate project implementation practices in public enterprises. Yet, there may be other underlying more general factors which have their roots in Planning, and sometimes

---

23. Page 185, CPU, V LS, No. 69(289), 17 July, 1975, Cement Corporation of India.

24. Page 18 & 19, CPU VII LS, No. 16 (423), 7th August, 1981.

25. CPU V LS, No. 70 (290), Hindustan Photo Films.

reflect a cost that has to be borne when economic development is sought to be fostered through the Plans. As mentioned elsewhere, the quintessence of planning in India implies that Public Sector investments lead the development of the economy. This often means that particular enterprises which are given the task of producing equipment such as BHEL, or MAMC, or of developing a technical skill such as Engineering Projects (India) Ltd. (EPIL) or Engineers India Ltd. (EIL), would have their markets in other firms (often from the Public Sector), which are users of these equipments or services. Provision of preferential access against international firms would often mean that the costs of learning by doing which are a real cost get passed on to the user firms in the form of delays in equipment supply, improper or faulty project design, cost escalation in equipment. A developing country, particularly a large one has to incur these costs if it has to have sustained growth and build up technological self-reliance. But it would be more appropriate from the administrative point of view as well as for transparency of the accounts, if instead of letting the user firms bear these costs, the supplier firms are directly subsidised.

Throughout the sixties and the early seventies, State Electricity Boards reported teething problems with equipment supplied by BHEL. The problem was compounded by Government's decision to move quickly from 100 MW sets to 210 and then to 500 MW without allowing either BHEL or the Electricity Boards the time to master the peculiarities of operations at each of the capacities. It is debatable whether the enormous costs of learning by doing, and yet dependence upon foreign technology were justified, given the alternative of standardising on say 210 MW sets for a long enough period. But the fact remains that if 500 MW units had to be manufactured for use in a small market that is India, then the (large) costs of learning by doing had to be borne somewhere.

Let us consider the case of the Oil and Natural Gas Commission (ONGC's) procurement of equipment from indigenous suppliers mostly all in the Public Sector. Following the oil crisis of 1973, high priority was accorded to oil exploration and accelerated development. Indeed,

the priority accorded was so high that ONGC was given the mandate to go ahead and build its production facilities without waiting for indigenous equipment suppliers to develop and supply the same. It was only in the eighties that pressures emerged to accommodate indigenous suppliers. ONGC's responses and the comments of its Chairman which we shall examine below bring out clearly the contradiction between accelerated development of a particular sector, and the development of all or a majority of the sectors.

Purely bureaucratic delays could not have been an important factor in the case of ONGC's projects since it was accorded a priority high enough to rough ride the delays that a slow moving bureaucracy might have imposed. Thus: "a yearly analysis of the shortfall in Plan expenditure on ONGC during the 6th Plan [1979/80 -1984/85] had indicated the main reasons as slippage in procurement of capital equipment and delays in finalising proposals for rigs, vehicles, etc. The Ministry had made efforts to expedite deliveries from PS undertakings such as MDL, [Mazgaon Docks Ltd], BHEL, BPCL [Bharat Pumps & Compressor Ltd], HSL, [Hindustan Shipyard Ltd.] etc, not through letters [the usual response of a bureaucracy when confronted with problems of coordination] but by holding meetings with supplier organisations and ministries."<sup>26</sup> (Emphasis added). Yet there were delays which are traceable to the fact that such activities as supply of rigs and other equipment were being undertaken for the first time: Thus: "Unfortunately, sometimes the ordering of equipment is not in our [ONGC's] hands, I would give you the example of jack-up rigs. I opposed this order, because on account of my engineering background, I knew they could not deliver these rigs within the stipulated time, but it was forced down my throat [by].... The Ministry from the national angle. The Government says that you have to develop indigenous industry. There is a Committee of Secretaries for this".<sup>27</sup>

---

26. Page 24, Statement of Chairman, ONGC to CPU quoted in CPU VII LS, No 8 (573) 28th April, 1986, ONGC.

27. Ibid., (Statement of the Ministry of Petroleum).  
Sebastian Morris

And further,"a number of contracts have been signed by the ONGC and Mazgaon Docks. In this case we were not keen to place orders for more than one jack-up rig. The Government said that we should place orders for three."<sup>28</sup>

ONGC had placed orders with local firms (most of them public enterprises) under the policy of indigenisation of equipment by the oil

Name of the under-taking	Total no. of equipments ordered	No.of equipments supplied	Delay
BHEL	21	19	1-9 months
Bharat Pumps and Compressors	14	13	1-48 months
Mazgaon Docks	24	23	In most items delay over 20 mnths.
Hindustan Shipyard	7	5	& up to 36 mths. 1-7 months, 2 items yet to be delivered
HDPE*	2	2	2 months each
Goa Shipyard	3	3	2-6 months
Garden Reach Ship Builders & Engineers	3	3	2 months each
Burn Standard	2	2	8-20 months

\* This unit's full name not revealed in the original source)

industry. Nearly all the items had been delayed as the Table above shows. Special efforts were made to speed up delivery of equipment. A task force to "sit every fortnight to sort out the problems, [which] should speed up the whole process of manufacture..." was constituted. "Government's policy is to encourage the manufacture of oil field equipment indigenously both in the public and the private sectors subject to their meeting the requirements of specification, delivery schedules and being within the price preference available. In order to achieve this, a number of incentives are being given to indigenous manufacturers such as concessional customs duties, benefit of deemed export and price preference up to 35% depending upon the quantum of

28. Ibid.

domestic value added when the supplies are made against ICB [International Competitive Bidding]. ... During the 6th Plan the savings in imports were estimated to be of the order of Rs.1900 crores. During the current years [1985-86], the savings are estimated to be around Rs.600 crores." <sup>29</sup>But, delays there were. Incentives alone cannot cover the cost of learning by doing as there is a time element to learning which cannot be covered other than with time. Thus, the experience with regard to the supplies to ONGC bear this out. While Hindustan Shipyard could have manufactured all or most of the platforms, they were not entrusted with the job, but instead were given contracts to manufacture less critical (from the point of view of ONGC being able to meet its production targets) equipment such as offshore vessels: According to ONGC "[the] history of Hindustan Shipyard has not been very good. But in the recent past [since 1982], as a result of very dynamic management, they have shown tremendous improvements, But in spite of that, they are not able to meet the delivery and price requirements of ONGC. These platforms are required for oil production. A rig is delayed. I can compensate by paying extra money. But if a platform is delayed, there is no other way but to lose production, ...I cannot afford to take a chance in platform delivery. The price is some times three times more."<sup>30</sup> In 1980-81, nearly all the vessels on charter with ONGC were of foreign flags. "Today hundred per cent are of Indian flags ... But we have suffered." Regarding Mazgaon Docks orders were placed and "we have to pray for the rigs to be delivered. It is already 30 months. I have no idea when they will deliver." And in the case of BHEL, " [it] is giving us endless trouble, but of course it has improved and we have placed more orders ... for 20 rigs".<sup>31</sup>

---

29. Ibid, page 25.

30. Ibid, page 26, (Statement of the Ministry of Petroleum, quoted in).

31. Ibid.

We would, therefore, conclude that inherent in the policy of import substitution - making everything that can be made in the country with only a secondary reference to costs and the quantities required - there are real problems that arise, which cannot be handled by mere administrative change or by changes in penalty clauses in the contracts with equipment suppliers. Indeed, even when there is a foreign contracting party, penalties are hardly the answer. Firstly no party would agree to a clause which covers delays due to unforeseen circumstances, natural calamities, power failure (endemic in the Indian situation). Moreover delays in implementation unrelated to the particular equipment supplier often gives an opportunity to the supplier to invalidate performance guarantees.<sup>32</sup>

#### Environmental problems

Not all delays in equipment supply and construction by Public Sector, and certainly by the private sector units, have their origin in the costs of learning by doing. When equipment is being manufactured for the first time by the company there are extra costs, but not otherwise. Yet delays in equipment supply are quite common here. Similarly, in fairly well known service activities such as surveying, detailed engineering, technical consultancy where the technology is not being bought for the first time there are no justifiable reasons for delays although there may be justifiable reasons for price support or subsidisation and preferences.

A not insubstantial part of equipment manufacture in India is really equipment fabrication with shop floor drawings obtained from technical collaborators abroad (there are exceptions such as in the case of BHEL and HMT where the technology is embedded deeper), and as such there are few uncertainties arising out of the technology. This is particularly so where the equipment is not being fabricated for the first time. In such cases there can be little reason for delays.

---

32. As was the case for instance with the BALCO smelter, page 16, CPU, VIII LS, No. 71 (511), 27th August, 1983.

But the vicious circle of delays' runs deeper. Equipment suppliers are themselves subject to delays on account of delayed availability of materials, power failures, delays in component and other equipment supply. We have not collected systematic evidence on this aspect. But it is a well known practice among project contractors in India including equipment suppliers, to keep a careful note of the time lost due to circumstances beyond their control such as power failure, so that in the final reckoning they are quite successful in avoiding the penalties, that are usually incorporated in supply and construction contracts. Government's efforts at breaking this 'vicious circle of delays' have not been particularly effective except where great priority has been accorded to the particular project or set of projects. Injunctions of the CPU, as well as pressures from other bodies to speed up implementation has led the Government to set up a system of monitoring and control for the management of project implementation. But the system has really been a dead duck. Except for projects with high priority, or those from departments with few projects going on at any particular time, for most departments the number of projects is far too large for the Government to handle, given its style of functioning. Quarterly progress reports are envisaged, and thereafter a perusal at high level, is supposed to be made in meetings (of high officials from different ministries) to monitor and speed up implementation. First of all, the number of performance reports which an over burdened ministry like the Industries would have to handle would be far beyond its ability. When a department of the Government is weighed down with all the meetings for approvals, we can hardly expect it to have the time for the large number of review meetings every year.

Similarly, direct efforts at coordination, except in a few cases, have been failures. In very many cases, the Government is far too tied up to have any further contact with a project once it is approved except in a formal sense. In some other cases when demands were placed on the

Government to lend its might to help solve the problem of coordination between different public enterprises involved in the project implementation, Government has either not responded or its response was far too slow. This has been so for instance in the case of Khetri Copper Project.<sup>33</sup>

Besides, resources (funds) constraint and the failure of Government attempts at coordination during project implementation which we have already considered, there are other factors that relate to the immediate superstructure of the Public Enterprise. These we consider below: The foreign exchange constraint has been known to have led the Government to contract with inferior, inexperienced consultants, as part of a credit tied package resulting in delays and cost overruns. Evidence in this regard is hard to come by, but the CPU has mentioned at least two cases where one of the contributing factors was the improper choice of the foreign technical consultants.<sup>34</sup>

Changes in scope of the project much after the project is approved and implementation has begun, changes in Government policy which would warrant changes in the project, are important factors, that reflect on the poor decision-making superstructure of the Public Sector. The Rihand Stage I of NTPC was affected by delays in decision-making owing to a genuine problem that cropped up: After sanction of the project, the transmission line to Delhi was not sanctioned quickly since the Central Electricity Authority wanted to examine the question of the relative merits of a high voltage DC versus AC for long distance transmission in minimising transmission losses.<sup>35</sup> But in very many other cases, the changes in scope have arisen out of a lack of prior appreciation of the problems, and incomplete or poorly planned projects which were revealed as such during implementation. Thus in the case of the Khetri Copper

---

33. Page 11, CPU VII LS, No. 60 (495), 18th April 1983, Khetri Copper Project.

34. Khetri Copper Project & BALCO's Alumina Smelter. CPU VII LS, No. 60 (495), 18th April, 1983 and page 16, CPU VII LS, No. 71 (511), 27th April, 1983 respectively.

35. Page 8, CPU VII LS No. 92 (543), 22nd April, 1984, NTPC.

mines, and in several other coal projects, there were substantial changes in scope which had their source actually in poor ground surveys.

For BALCO's Korba Smelter, which showed a final cost overrun that exceeded 86% over the original cost, the associated Gandhimardhan bauxite deposit in Orissa had to be developed. Delay in decision-making on this mine resulted in the mine being operational only in late 1985, when it should have gone on stream in 1981! Meanwhile, to use the smelter which had been commissioned earlier, ore had to be purchased, but without their own mine, operations were below capacity. Earlier, in the first phase while one of the alumina plants was ready the smelting operations could not be commissioned. In the case of the BALCO projects, what appears as delay in approvals, are actually due to real factors such as resources crunch which had delayed the decision particularly as regards the source of technology, problems with technical collaborators, delay in tying up credit sources, etc.<sup>36</sup> The case also illustrates the fact that when serious technical questions arise, Government's ability to quickly appraise and decide is limited. The only significant exceptions are perhaps the railway and power projects. In case of power projects the Government has developed an expert body in the form of the Central Electricity Authority (CEA), which carries out the evaluation competently. In the case of Indian Petrochemicals Ltd.(IPCL's) aromatics plant, the indigenous component of plant and equipment was sought to be pushed up after the project had started. This was one of the root causes for delay which in turn led to higher costs on imported machines as the rupee depreciated with respect to foreign currencies particularly the Deutsche Mark over the period.<sup>37</sup>

Similarly, in the case of the Barauni refinery project of the Indian Oil Corporation the choice of the type of crude to be used was

---

36. Page 12 & 14, CPU, VII LS No. 71 (511), Bharat Aluminum Company Ltd.

37. CPU V LS, No. 64 (277), 22nd April, 1975.

not decided (it was changed twice - during, and after implementation), the petty details of the project were subject to in depth scrutiny which did not serve any purpose. Furthermore, at Barauni, a kerosene treatment plant (Unit II) was installed at a cost of Rs. 1.24 crores. It was idle because the associated Atmospheric Unit II was not commissioned. Even when this was commissioned, later, the unit "could not be operated as the kerosene obtained from the Middle-East crude did not require sulphur dioxide extraction. It was therefore, decided to use the kerosene treatment plant in the Bongaigon refinery which was expected to be commissioned in 1976 [two years later] .... the cost of dismantling and putting up was Rs. 25 lakhs".<sup>38</sup>

#### Revised estimates and approval

As projects get delayed during the implementation and build up cost overruns, they have to come to the Government for approval of the "revised" estimates. The process of approval of revised estimates, which takes place after implementation has begun is known to have delayed several projects. BALCO's alumina and smelter plants, the Indian Oil Corporation's Haldia, Barauni and Gujarat refineries, FACT's Cochin Phase I project, are some of those that were known to have been delayed due to the Government having taken a long time in approving the revised estimates.

But the more important malaise is that the approval of revised estimates has become a farce. In theory, the rationale for approval of revised estimates is that the Government can again critically examine the changes both in scope and due to price increases and come to the conclusion that they are necessary, and that the projects continue to be viable both financially and in an economic sense. Government has so far, shied away from automatic approval of revised estimates, that entirely arise out of inflation, or to the provision of such increases in costs in the formulation of the project itself. "This escalation is not provided for while sanctioning the estimates, as it was so decided, on

---

38. Page 8, CPU, V LS, No. 65 (279), 25th April, 1975, Indian Oil Corporation.

the consideration that provision for future escalation in estimates will only result in excessive expenditure on the project as the natural tendency for contractors and project authorities will be to spend more based on sanctioned costs"<sup>39</sup> [Emphasis added]. Here, we have an important message: the Government itself does not believe in its ability to control costs, despite the FR/DPR, and its detailed "appraisal". It really does not believe that the FR/DPR can serve as a budget or a guide. It is helpless enough to sometimes attempt cost control by the primitive method of under provision for expenditure.

Revised estimates are more often than not a post facto regularisation of what has taken place. Thus, the CPU noted that in the case of Hindustan Photo-Films (HPF's) black and white film project, the original approved cost was Rs. 6.08 crores, in 1961. This was revised by the company to Rs. 8.37 crores in 1962, to Rs. 11.6 crores in 1970 and further to Rs.11.7 crores. "It has been admitted [by the Government] during the evidence [before the CPU] that the effect of increase in the project cost on the economics of the project was not assessed, while approving the final revised estimates".<sup>40</sup> And HPF's case was certainly not an isolated one in the early seventies. "The Committee [CPU] takes a serious view that in spite of their repeated recommendations in several of their reports ....., that the economics of the project on account of revision should be examined, and new schemes, etc. introduced should be specifically brought to the notice of Parliament, Government has neither considered the economics of the Project on revision of estimates nor brought such additions specifically to the notice of Parliament."<sup>41</sup> We are not so much concerned with the fact that revisions, schemes etc.,

---

39. Reply of the Government, page 13 CPU VII LS, No. 37 (458), 5th April, 1982, Damodar Valley Corporation.

40. Page 38, CPU, V LS No. 70 (290), Hindustan Photo Films.

41. Ibid.

are not brought to the notice of Parliament as much as the fact that the impact of the revisions on the original economics was not considered. This makes a mockery of the detailed appraisal process, rendering decision criteria such as a cut off internal rate of return (IRR) of 12% for instance, to which so much importance is given in the appraisal process, quite meaningless.

Consider the case of the Indian Oil Corporation's Haldia refinery project: "The Committee [CPU] were informed that the revised estimates as approved by the Government are not final and the project cost would go up due to delay in commissioning of the Refinery, and the extent of revision would be worked out only after the completion of the project [!]. The Committee stressed that revised estimates of the project should not be treated as a mere completion report, but should be seen as an instrument of financial control".<sup>42</sup> For the Cochin Phase I project of FACT, the original estimate approved was Rs. 39.72 crores. They were 'revised' thrice upwards to reach a figure of Rs. 63 crores in January, 1973. "The Committee [CPU] regret that none of the estimates was approved by Government so far. It is surprising [not to us] that FACT instead of getting the revised estimates approved, informed the Government that it would approach Government for approval of the revised estimates after commissioning of the plant. ....The Ministry also allowed FACT to proceed with incurring expenditure without sanction of the estimates..... The Committee are distressed to note that Government in spite of increase on several accounts did not go into the economics of the revision, but only stated that they took into consideration, the revised estimates for their budget proposals"<sup>43</sup>

Estimates for the Hindustan Paper Corporation's Nagaland Paper Project, where the DPR was prepared by the NIDC, were "unrealistic,

---

42. Page 7, CPU, V LS No. 65 (279), 25th April, 1975, Indian Oil Corporation Ltd.

43. Page 38 & 39, CPU, V LS, No. 81 (305), 10th March 1976, FACT.

incomplete and did not take full care of all aspects of the project".<sup>44</sup> The fact that the estimates were revised several times and yet the Government could not critically or carefully examine the project speaks much about the ineffectiveness of appraisal by Government. Similarly, the case of the National Mineral Development Corporation's (NMDC's) newer projects, besides bringing out the incompetence of the company, also brings out the mere formality that approval of revised cost estimates has become. A few of the other cases where expenditures were known to have been incurred before appraisal or much before the approval of revised estimates, are, HMT's tractor project, the Khetri Copper Project, DVC's Chandrapura projects, and Hindustan Teleprinters electronic typewriter project.

#### Formality of IRR

Given the purely formal role of approval of revised estimates, it is hardly surprising that a minimum IRR of 12% as a decision criterion has become quite meaningless. Thus, in the case of the Bailadilla Iron Ore project, cost escalations meant that the Government knowing fully well that it would make losses on every tonne of ore exported, had to continue with it. In the case of NMDC's phosphate mining project later incorporated as Pyrites, Phosphates & Chemicals Ltd., the project was implemented without any feasibility study. In the case of Khetri Copper the fact that investments had already been made meant that a project with a negative rate of return had to be continued. When IRR's are not affected due to cost overruns, such as for fertiliser projects where the pricing is on a cost plus basis, the IRR is a priori meaningless. For the Nangal Expansion, Bhatinda and Panipat Projects of the National Fertilisers Ltd.(NFL), "heavy cost overruns ranging from 58% to 75% over the original estimates has also resulted in the increase of cost of production of urea ranging from Rs.129 to 296 per tonne".<sup>45</sup> Yet the

---

44. Page 93, CPU, V LS, No. 85 (310), 6th April, 1976, Hindustan Paper Corporation.

45. CPU VII LS, No. 65 (502), National Fertilisers Ltd., 26th April, 1983.  
Sebastian Morris

IRR's (percent at 90% capacity utilisation) for the projects were as under:

Therefore the cost plus pricing formula provides only a disincentive to control project costs. In the case of the Scooters India Project, the project cost went up from 10.90 crores to Rs. 21.87 crores, i.e., it more than doubled, bringing down the return on investment from a fantastic 44% to a negative value. Here, the problem was that IRR was looked upon as a mere formality. The cost overrun which arose was not due to delays as such but to the fact of a badly planned project, wherein the Government simply did not have the expertise to critically examine the technical feasibility.

The problem, that in very many cases the criteria of a minimum or cut off rate of

	Nangal expansion	Bhatinda	Panipat
Original estimate	10.93	19.90	20.7
Actual	10.63	22.40	22.6

return does in actual practice get shunted to the background, has its roots in the basic contradiction of

simultaneously appraising projects and deriving them from the Plans. The investment targets that emerge out of planning of the consistency type mean that one has to invest, whatever the IRR. Appraisal and also IRR has a role but only to select between different alternatives. The project with the highest IRR from any of the alternatives would have to be selected. Instead Government has "decided that only those projects with a financial rate of return and an economic internal rate of return, both exceeding 12%, should be put to the PIB [Public Investment Board] for their consideration in future. The economic internal rate of return be computed....excluding taxes and duties, adopting a premium of 25% on foreign exchange and shadow pricing for energy costs, transport charges, etc., where necessary.... Under no circumstances shall projects with

both the financial and economic internal rate of return falling below 12% be considered by the PIB."<sup>46</sup>

On paper there was little scope of projects with one of the IRR's falling below the cut off rate being taken up. Thus, the same Office Memorandum continued : "In those cases where either the financial rate of return or the economic IRR is over 12% but the other one falls short of the norm and the administrative ministry still considers it essential that the project should be taken up for implementation, the reasons therefor (sic) should be gone into in detail at the pre-PIB meeting and also set out in the memorandum for the PIB. The PIB shall consider such cases, only in exceptional circumstances and that too only if the projects are in the core sector".<sup>47</sup> In actual practice, the contradiction between Plan based investment and return to capital (IRR) based investment decisions is "resolved" in a way that pretends that there is no contradiction ; i.e., by assuming that the area of overlap between the set of suitable projects derived from these two criteria is very large, when in actual practice it may not be. The fact that very many projects which start out with high IRRs only to finally show low or negative IRRs is a reflection of this wishing away of the contradiction. This leads us to a further insight confirmed by several senior officials in the Government intimately connected with project appraisal: Projects are purposefully presented with a high IRR, and once the approval is obtained and the project implementation has actually begun, or after substantial investments have already been made, does the "truth" of its economic return come out when the revised estimates are presented. The real picture may only emerge in stages. The obvious corollary is that Government's appraisal process is quite incapable (except in areas like

---

46. Pages 1 & 2 of Office Memorandum from the Ministry of Finance, Government of India (Plan Finance - II Division), widely circulated among concerned Government departments, dated 23rd August, 1984, signed K.P. Geethakrishnan, Jt. Secretary to the Government of India.

47. Ibid.

power) to detect this systematic over-estimation of return. It is not merely the pressure from the enterprises to get several projects going that leads them to inflate the figures related to returns, but there can be pressures from the Government departments themselves to push through uneconomic projects. Here the usual pressure of a bureaucracy to expand may not be particularly important. Political pressure to take up particular projects, locations, and technology and equipment would be the more important ones. The lack of systematic evidence in this regard should not let us underrate this factor in its contribution to time and cost overruns. Well known cases of uneconomic projects taken up due to political pressure are the Visakhapatnam Steel Plant, as also the particular choice or site for Hindustan Paper Corporation's project in the North East.

Like the "revised estimates", the Completion Report which has to be submitted by the project authorities is largely a formal requirement. In the case of two of DVC's projects, as brought out by the CPU, the completion Report had not even been submitted.<sup>48</sup> Little or no use is made of these reports. Ostensibly, besides serving as a record, they have the potential to sub-serve expert analysis and studies of project implementation which could have led to improvements. Government departments simply do not have the time nor the inclination to subject these Reports to analysis. More importantly, the very nature of bureaucracy could make it difficult for it to learn by doing, even granting that some sections of the Government is interested in learning from its past mistakes. Time and again, departments of the Government and enterprises have pleaded that the delays and cost overruns are due to their lack of experience - the activity being taken up for the first time. Yet there is no evidence of improvement. Thus, to give just one example, in BALCO's case, Government admitted to its shortcomings and pleaded that the National Aluminium Company (NALCO) to be taken later would not suffer from the same ills. But the NALCO project implementation was also poor.

---

48. Page 74, CPU No. 37 (458), Damodar Valley Corporation, 5th April, 1982.

The structures within a bureaucracy are hierarchical, and decision processes are rule and criteria oriented. When a bureaucracy takes up tasks that are judgement and analysis oriented (as for example appraisal), the quality of its output necessarily suffers. Organisations (such as enterprises) can on the other hand be task oriented, and so can accumulate experience related to complex activities. In other words, in contrast to bureaucracies, organisations have or should have structures and processes that in an essential sense have the ability to learn by doing, and of accumulating skills and experience. The only "improvement" that can come with time in a bureaucracy is that due to the embedding of procedures and guidelines. But this small merit of bureaucracies becomes a curse when the procedures need to change, and the issues for consideration change, as the environment and the content of decisions change. In the Indian case, whatever little learning of complex tasks, such as appraisal, that could have taken place around individuals or small groups within bureaucracies is entirely vitiated by the frequent transfers of its officers.

Appraisal should have been the primary responsibility of the firms allowing therefore for the possibility of learning by doing, and accumulation of skills. Furthermore, such an arrangement would have brought project implementation and appraisal together making the firms directly responsible for implementation. But this means that Government divests of much arbitrary power making its intervention more fruitful which would certainly not be in the interest of powerful groups: the bureaucracy, the politicians, and also much of the top managers of the enterprises who under the present arrangement can easily displace and diffuse their responsibilities.

## Conclusions

Delays in project implementation and the attendant cost overruns have become a regular feature of public sector projects. Official statistics suitably adjusted reveal that the projects under implementation which were scheduled for completion during or before 1987 had an average cost overrun of 82% and time overrun of 70.5%.

Escalation in costs is attributable partly to the fact that the original estimates were prepared at the then current prices, and partly to delays which enhance the effect of inflation and to direct escalation in costs arising out of change in scope, errors etc. Based on certain assumptions with regard to the pace of expenditure on projects we have roughly computed that for the 133 projects which were studied only about 25 to 30% of the cost increase can be attributed to inflation. The remaining 70 to 75% has to be explained in terms of delays, inefficiencies, scope changes, changes in statutory levies, variations in exchange rates and to the combined effect of these factors with inflation.

There are general factors, quite apart from factors specific to sectors, that underlie cost overruns. Inadequate project preparation leading to scope changes during implementation is perhaps the most important reason for cost and time overruns. The inadequacies cover deficiencies in demand forecasts, ground surveys, technology choice, etc. Inadequate funding delays project implementation which in turn results in cost overruns warranting higher outlays. Short-term political expediency among other things makes the Government spread thin its resources over many more projects than it should have. In the short run, this practice allows the Government to take up more projects than it can given its resources, but the resources are tied up for longer periods. The 'capital (waste) factor' i.e., the 'capital X time' that is lost on account of time and cost overruns is at a colossal level of more than 190% even on a liberal estimate. In other words, Government could have taken up and completed at about twice as many projects (in cost terms)

more than what it does today in a given period if it could have broken out of this vicious circle of time and cost overruns.

Broadly, the purely environmental factors such as natural calamities, political disturbance, labour strife are of least importance in explaining cost and time overruns. Factors related to public enterprises as a whole - poor project planning and management skills, inadequate technical skills, or poorly done ground surveys in the case of mining projects, delays in construction and equipment supply by other public enterprises are the most important set of factors. Delays in construction and equipment supply (largely by other public enterprises) is the most important among this class of factors. Here too, the problem has the characteristics of a vicious circle. The large linkages between public investments implies that delays in a few enterprises get transmitted to other enterprises either as delays in supplies, or in the way of the expected market demand being pushed into the future.

Some of the delays and cost overruns necessarily arise out of the learning by doing that is inherent when new activities are taken up (as import substitutes) and as such are perhaps unavoidable. The question of who should bear these costs has not been systematically addressed by the Government.

Closely following the first set of factors are those related to the immediate superstructure of the Public Sector-particularly the policy environment and the interface between Government and public enterprises with specific reference to investment decisions. Changes in scope of the project, lack of coordination between projects intended to be closely interdependent, improper choice of technology, changes in Government policy-all reflect upon the immediate boundary of the enterprise with Government. In taking upon itself the task of detailed appraisal, the Government has contributed to the displacement of responsibility for improper project choice away from the enterprise

where it should largely lie. Post-appraisal monitoring which seeks to rectify problems as soon they arise exists largely only on paper.

In actual practice, there is little adherence to a minimum cut off rate of return, despite the existence of a norm of a minimum internal rate of return (IRR) of 12%. Frequent revisions and time and cost overruns make the initially approved (usually very high, and perhaps unrealistic) IRR quite meaningless. The divergence between the high initially projected IRR and the low or negative IRRs actually obtained may at least in part be on account of the perverse behaviour of enterprises and administrative departments pushing their projects by inflating the profitability to present a rosy picture of the projects, because once a project has started it can hardly be stopped.

There is an a priori contradiction in deriving the projects from the Plans and simultaneously insisting upon a minimum cutoff IRR in economic/financial terms. IRR as a decision making criterion can be validly used in a planning regime of the consistency type, only to make the selection from a basket of projects which vary in terms of their technology, site, capital-labour proportions, etc. One would obviously select that project with the highest IRR. The decision on whether or not to invest in a particular sector is largely derivable from the Plans.

### Appendix

#### **Some Notes for the Computations of "Price" and "Capital Waste", factors**

Let

**O** : Original estimated period for commissioning (in years)

**A** : Now anticipated period for commissioning (in years)

**E** : time from approval to date(new) (in years)

**C<sub>O</sub>** : Original estimated cost of project (Rs. crores)

**C<sub>a</sub>** : New anticipated cost of project (Rs. crores)

$C_e$  : Expenditure to date (now) (Rs. crores)

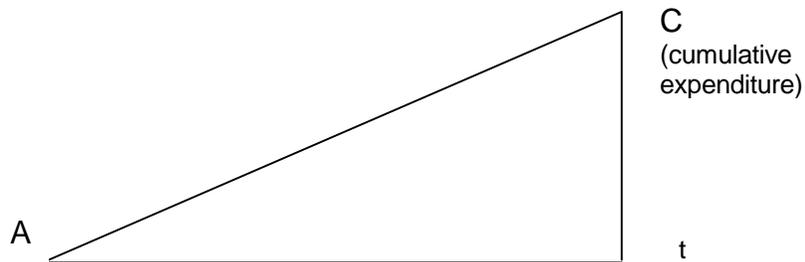
$r$  : be the assumed opportunity cost of capital

$$\text{cost overrun} = C_a - C_o$$

Opportunity cost of delay = opportunity cost of the extra capital tied up in the projects.

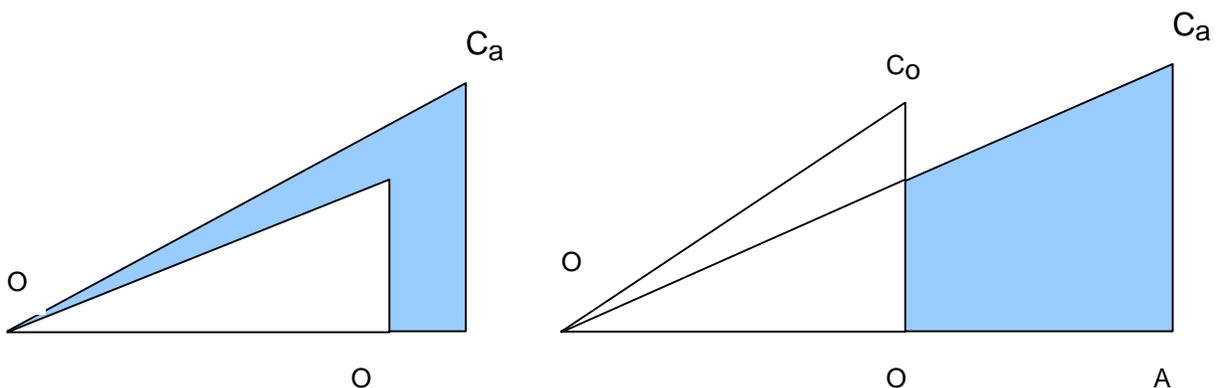
We have to get a measure of the extra Capital X time tied up on account of the delay.

Assume further that expenditure throughout the course of a project takes place uniformly. Then the cumulative expenditure increases linearly with the time.



Then Capital X time cost for this is  $(tC)/2$  rupees- years. If the "assumed" opportunity cost of capital is  $r$  per year than the opportunity cost of capital of this project is  $(rtC)/2$  rupees.

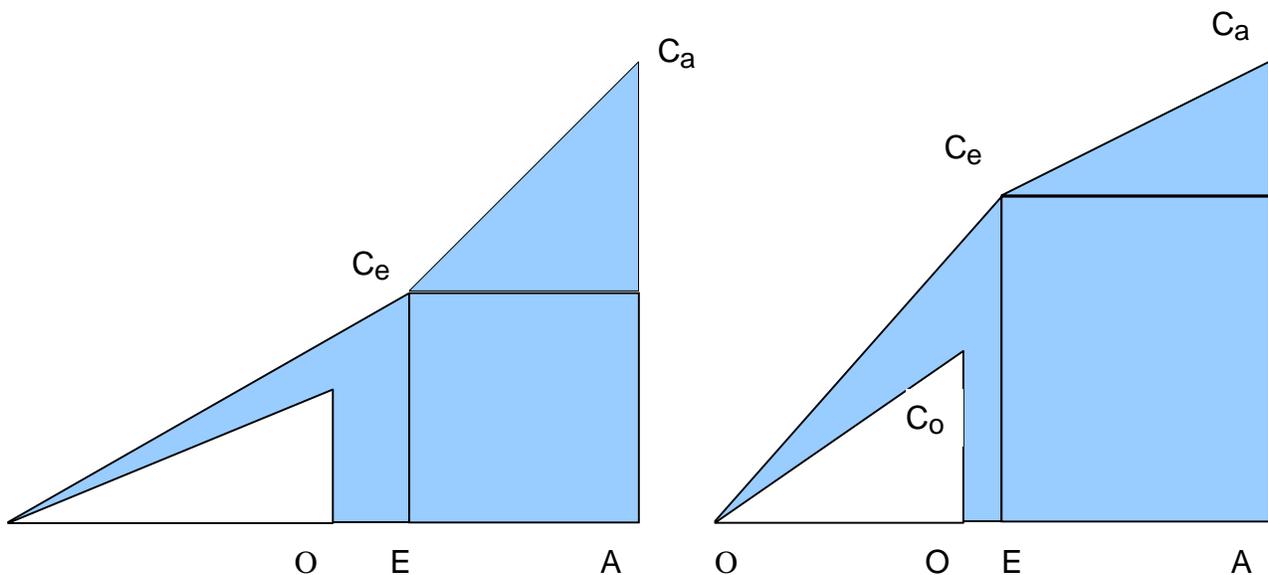
If there is delay then the increased capital X time for the project is indicated by the shaded area.



or indicated as the difference between the shaded and the dotted areas,

$$\text{which in general} = \frac{1}{2} (AC_a - OC_o)$$

The fact that there is one more point of data, at **E**, of **C<sub>e</sub>** leads us to the use of this data to modify the build up of expenditure as anticipated. We now assume that up to this point in time (now) the costs were incurred at an uniform rate that cumulates at **E** to **C<sub>e</sub>** and after **E**, the costs could be incurred at another uniform rate such that over the time **A-E**, the costs could cumulate to **C<sub>a</sub>-C<sub>e</sub>**. In other words the relevant capital X time for the delay is the shaded area.



$$\text{this area} = \frac{1}{2} (AC_a - OC_o) + \frac{1}{2} (C_e - \{C_a/A\} * E) * A$$

$$= \frac{1}{2} (AC_a + AC_e - OC_o - EC_a)$$

i.e., the increased capital tie-up which we have defined as

$$\text{the capital factor (CF)} = \frac{1}{2} (AC_a + AC_e - OC_o - EC_a)$$

When **A**, **O**, **E** are in months it becomes

$$\frac{1}{24} (AC_a + AC_e - OC_o - EC_a)$$

therefore the opportunity cost of delays =  $r*CF$

and the 'capital (waste) factor' =  $CF/ \text{Base}$

where Base =  $(OC_0) / 24$ .

### Price Increase factor

Assume that project cost estimates do not take into account, the fact of inflation. In that case there would necessarily be an overrun from the original estimates, on account of price increases alone. Let us also assume the original cost estimates include an element which arises due to "capitalisation" of interest costs, i.e., the opportunity cost of the borrowed funds is included in the estimate. Also assume that all the funds are borrowed at a rate = the opportunity cost of capital.

Then let  $C_w$  be the expenditure excluding the interest costs. then

$$C_0 - C_w = 1/2 C_0 Or$$

$$C_w(Or/2 + 1) = C_0$$

$$C_w = C_0(2/\{Or + 2\})$$

Let there be a uniform inflation rate  $p$  per annum on the typical basket of items that constitute the project expenditure  $C_w$ .

then the contribution due to increase in prices

$$\begin{aligned} PF &= \int_0^1 (C_w/O) (\exp(px) - 1) dx \\ &= [C_0/O][2/(rO+2)][(\exp(pO)-1)/p - O] \end{aligned}$$

In short to the cost overrun, the contribution by the price factor is given by the above, and the rest  $C_a - C_0 - PF$  is that due to delays, and mixed effects.

Hence we may express  $PF/\text{Cost overrun}$  as the percentage price factor.

## Acknowledgements

I am grateful to the World Bank who sponsored a study titled "The Process of Investment Decision in the Public Sector - A study delays and cost overruns". This paper is based on the same study. The views expressed herein are entirely mine own. I am indebted to Mr. T.L. Sankar who initiated this study and guided me throughout its course. My thanks are also due to G.V.G. Raman & V.V. Ramana who helped me with the data.

## REFERENCES

AHARONI, YAIR (1986), *"The Evolution and Management of State Owned Enterprises"*, Ballinger, Massachusetts.

AHLUWALIA, I. J. (1985), *"Industrial Growth in India: Stagnation Since the Mid-sixties"*, New Delhi, Oxford.

BAGCHI, A.K. (1970), "Long-term Stagnation of India's Industrial Growth", in *E.A.G. Robinson and M. Kidron (eds.) (1970)*.

BAGCHI A.K. BANERJI, N. (eds.) (1984), *"Change and Choice in Indian Industry"*, Calcutta, K.P. Bagchi.

BRAHMANANDA (1982), *"Productivity in the Indian Economy: Rising Inputs for Falling Outputs"*, Bombay Himalaya.

CHANDRA N.K.(1982), "Long-term Stagnation in the Indian Economy", *Economic and Political Weekly (EPW)*, Annual No. Vol.17. No.14 Page 785.

CENTRE FOR SCIENCE AND ENVIRONMENT, (1985), *"The State of India's Environment, 1984-85"*, 2nd New Delhi.

DESAI, ASHOK (1981), "Factors Underlying the Slow Growth of Indian Industry", *EPW*, Annual No., March, No. 10,11,& 12, pp.381-392.

GUHA, RAMACHANDRA (1984), "Forestry in British and Post\_British India", *EPW*, No. 44, pp.1882-1896, and No.45 & 46, pp.1940-47.

PATNAIK, PRABHAT (1981), "An Explanatory Hypothesis of the Indian Industrial Stagnation", in *A.K. Bagchi and N.B. Banerjee (eds.) (1984)*.

MORRIS, SEBASTIAN (1987), "The Process of Investment Decisions in the Public Sector: A study of delays and cost-overruns", Consultancy report sponsored by the World Bank, Institute of Public Enterprise, mimeo

RANGARAJAN, C.(1982), "Industrial Growth : Another Look", *EPW*, Annual No. Vol XVII, Nos. 14, 15 and 16

Cost and Time Overruns in Public Sector Projects, *EPW*, Nov.24, 1990

ROBINSON E.A.G. and Kidron M.(eds.) (1970) *Economic Development in South Asia: Proceedings*. Ceylon, London, Macmillan.

SATYANARAYANA, J (1973), "Accumulated Deficits of the Public Enterprises", I.P.E. Hyderabad.

VAITSOS, C.V. (1978), *Inter-Country Income Distribution and Transnational Corporations*, Oxford, Clarendon

**TABLE 1: SOME DATA ON PROJECTS UNDER IMPLEMENTATION  
WITH COST EXCEEDING Rs. 20 CRORES.  
(As on 31.3.1987)**

1.	No of projects with original approved cost of over Rs. 20 crores	290
2.	Total original cost of these projects (Rs. crores)	46,444.03
3.	Anticipated cost (Rs. crores)	69,649.05
4.	No. of projects having cost overrun	186
5.	Range of cost overrun	0-961%
6.	No. of projects having time overrun	162
7.	Range of time overrun	0-204%
8.	Total expenditure up to 3/86 (Rs. crs)	26,064.05
9.	Expenditure during the year 3/86 to 3/87	7,980.20
10.	Cost weighted original time for construction (without railways)1/	68.31 months
11.	Cost weighted anticipated time for construction (without railways)2/	97.86 months
12.	Cost weighted time overrun (11-10)	29.55 months
13.	Weighted time overrun (12/10)	43.3%

Notes:

1. Original time for completion project-wise averaged with the original approved costs as weights over all projects excluding the railways, since for very many railway projects the date or anticipated date of completion are not available.
2. Anticipated time for completion of projects averaged, with the anticipated cost as weighted over all projects excluding railways.
3. See text for other comments on the limited validity of this table.

**TABLE 2: SECTOR-WISE DISTRIBUTION OF CERTAIN MEASURES OF COST AND WASTE IN PUBLIC SECTOR PROJECT IMPLEMENTATION 1/**

Sector (Ministry)	No. of proje- cts	Orig- nal cost (Rs. crs.)	Time overrun (per cent) ----- Aggre- gate avera- ge		Cost over- run (per cent)	Price factor <u>2/</u> (per cent)	Capital (Waste) factor <u>3/</u> (per cent)
1. Railways (Transport)	23	946.06	69.85	76.03	164.21	12.38	385.63
2. Steel (Steel & Mines)	13	4636.32	80.92	84.00	149.56	18.51	265.30
3. Coal (Energy)	31	1288.60	80.26	85.50	131.39	18.01	303.07
4. Power (Energy)	16	2701.14	42.79	45.53	98.67	27.85	162.88
5. Fertilizer (Agriculture)	7	1201.25	63.72	56.61	90.60	20.03	201.38
6. Mines (Steel & Mines)	3	1558.62	38.73	42.23	88.52	23.93	127.67
7. (Industry) <sup>4/</sup>	9	799.74	46.24	45.54	61.20	32.35	112.22
8. Petroleum & Nat- ural Gas (Petro- leum)	19	5257.65	53.51	58.28	4.80	261.955/	99.09
9. Surface Trans- port (Transport)	10	1107.06	87.67	109.33	3.96	495.255/	86.74
10. Communications (Telecommuni- cations)	2	70.94	10.97	11.75	2.58	518.685/	-51.99
Total	133	19566.88	66.23	70.50	82.29	25.57	195.03

(1)Medium and large projects i.e., projects having either their original cost or anticipated cost (as and when this figure is known) of Rs. 20 crores or more; 133 out of total 290 projects under implementation end march 1987, as reported by the Programme Implementation Ministry have been selected, because the estimates of anticipated time and final costs are more likely to reflect the actual time and cost overruns. See text for further details. Time and cost overruns are anticipated values.

(2)For definition see text. The figures give an approximate idea of the contribution of inflation, at an assumed rate of 10% to the cost overrun.

(3)For definition see text. The figures give an approximate estimate of the extra capital X time, i.e. capital factor that arises (as a percentage of the originally planned capital X time) due to time and cost overruns.

(4)Includes one cement project, two paper projects one automobile project, one acrylic fibre plant, phenol and acetone plant, a polypropylene plant and a teflon plant.

(5) Not particularly meaningful, since these projects had low cost overruns, less than that indicated notionally by a 10% per annum inflation. Many of these included purely acquisition projects for large sums, such as rigs, supply vessels in the petroleum and natural gas sectors, ships and telephone exchanges for the other two sectors.

TABLE 3 : SECTOR-WISE DISTRIBUTION OF OUTLAYS, EXPENDITURE AND  
 'THROW-FORWARD'<sup>1</sup>/ IN PUBLIC SECTOR PROJECTS UNDER IMPLEMENTATION

Sector	No. of Projects	Anticipated cost (Rs.crs)	(%)	Outlay for 1986-87 (Rs.crs)	(%)	Expend- iture incurred till 3/'86 (%)	Throw forward (Rs.crs)	Ratio of throw for ward to outlay (%)
Atomic Energy	6	2319	3.3	296	3.3	1058	966	3.3
Civil Aviation	5	2110	3.0	577	6.4	135	1398	2.4
Coal	72	8483	12.2	779	8.6	2587	5117	6.6
Fertilizer	10	3275	4.7	640	7.0	1164	1471	2.3
Mines	3	2938	4.2	519	5.7	1918	501	1.0
Steel	13	12728	18.3	1070	11.8	6383	5275	4.9
Petrochemicals and Chemicals	8	1669	2.4	189	2.1	216	1264	6.7
Petroleum & Natural gas	32	10331	14.8	1971	21.7	4549	3810	1.9
Power	35	16036	23.0	1997	22.0	5553	8486	4.2
Paper, cement, automobiles, etc.	6	1173	1.7	183	2.0	554	437	2.4
Railways	73	6349	9.1	600	6.6	1437	4311	7.2
Surface Transport	21	1835	2.6	165	1.8	352	1318	8.0
Telecommunications	6	404	0.6	98	1.1	159	147	1.5
<b>Total</b>	<b>290</b>	<b>69649</b>	<b>100.0</b>	<b>9084</b>	<b>100.0</b>	<b>26065</b>	<b>34501</b>	<b>3.8</b>

1. Throw-forward as on 31st March 1987 is defined as (anticipated cost-expenditure incurred up to 3/86) / Outlay for the year 1986/87.

Figures may not be consistent to the last significant digit due to rounding off.

**TABLE 4 : STATE-WISE DISTRIBUTION OF CERTAIN MEASURES OF COSTS  
IN PUBLIC SECTOR PROJECTS UNDER IMPLEMENTATION 1/**

=====							
	No. of proj- ects	Original cost (Rs.crs.)	Cost overrun (per cent)		"Capital (waste) factor" <u>3/</u> (per cent)	"Capital factor" <u>2/</u> Rs.cr. years	"Capital (waste) factor" <u>2/</u> Percent to total for India
			Aggre- gate average	Simple average			
-----							
1. Jammu & Kashmir	1	55.15	961.4	961.4	1590.0	4055.67	4.3
2. Tripura	1	9.67	265.1	265.1	436.9	121.45	0.1
3. West Bengal	15	917.06	218.4	209.0	431.3	11990.00	12.9
4. Uttar Pradesh	6	718.73	84.7	161.2	91.1	1986.54	2.1
5. Assam	6	449.14	142.9	149.4	299.6	3783.05	4.1
6. Bihar	17	1819.01	105.1	123.7	433.0	17324.65	18.6
7. Madhya Pradesh	20	2762.48	90.6	123.0	210.1	15134.27	16.2
8. Rajasthan	2	77.09	117.8	116.3	170.0	301.32	0.3
9. Orissa	9	1890.72	102.8	95.3	158.6	7592.47	8.1
10. Tamilnadu	4	359.29	103.2	83.2	340.7	2757.61	3.0
11. Kerala	5	218.15	47.9	65.7	110.8	451.23	0.5
12. Andhra Pradesh	9	2995.07	155.0	65.7	164.9	19224.76	20.6
13. Punjab	1	69.32	58.7	58.7	39.6	35.45	Neg.
14. Haryana	3	353.25	21.7	47.1	19.2	141.61	0.2
15. Maharashtra	4	723.30	- 4.1	30.5	-33.84/	-639.05	0.7
16. Gujarat	5	490.90	6.4	19.3	3.84/	-26.64	Neg.
17. Delhi	1	21.13	8.6	8.6	-56.34/	-19.32	Neg.
18. Several States (ONGC)	5	980.09	- 2.2	6.2	4.2	51.39	0.1
19. Several States (Railways)	11	3643.04	14.1	95.5	131.9	7912.03	8.5
20. Offshore (ONGC)	8	1024.29	11.1	- 4.1	67.7	1067.82	1.1
-----							
Total	133	19566.88	82.3	109.8	195.0	93246.31	100.0
=====							

1. Medium and large projects i.e., those having their original approved or anticipated cost (as and when this figure is known) of Rs.20 crores or more; from internal reports of the Ministry of Programme Implementation.

2. For definition see text. The figures give an approximate estimate of the "capital X time" that arises due to cost and time overruns.

3. Above as a percentage of the "originally planned capital cost X originally planned period of completion".

4. Negative values arise due to the definition which also uses the information of cost build up implicit in the expenditure already incurred.

In the last column figures may not add up to 100.0 due to rounding off.

**TABLE 5 : RELATIVE IMPORTANCE OF FACTORS 1/ UNDERLYING COST  
OVERRUNS IN PROJECT IMPLEMENTATION IN THE PUBLIC SECTOR**

Factors/ Reasons	Unweig- hted sc- ore(per cent)	Cost weigh- ted score (percent)		Cost overrun weighted score (percent)	
		with NTPC	without NTPC	with NTPC	without NTPC
1. Inadequate project preparation, planning and implementation	33.9	28.2	26.2	32.5	36.0
2. Delay in construction, supply of raw materials & equipment by contractors	21.9	16.9	27.4	20.5	26.1
3. Change in the scope of the project, in Government policies	8.8	24.5	8.0	14.4	1.7
4. Resources constraint: funds, foreign exchange, power; associated auxiliaries not ready	7.2	13.6	10.9	8.9	4.1
5. Delays in decisions making by Government, failure of specific coordinating bodies	5.0	12.5	5.2	8.4	3.2
6. Wrong / inappropriate choice of site	0.5	0.6	3.0	6.5	12.4
7. Technical incompetence, poor organisational structure, and failures of the enterprise other than (1) above	8.8	1.7	9.4	4.8	9.1
8. Labour unrest	5.7	0.8	4.2	1.7	2.3
9. Natural calamities, Indo-Pakistan War	3.8	0.5	2.6	1.1	2.1
10. Lack of experience of technical consultants, inadequacy of foreign collaboration agreements, monopoly of technology	4.3	0.6	3.3	1.1	2.1
<b>All Factors</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

1. Actual reasons mentioned in the various reports of the Committee on Public Undertakings, have been grouped together under ten factors.

**TABLE 6: INDUSTRY WISE GROUPING OF THE PROJECTS TAKEN UP  
FOR STUDY OF THE REASONS FOR COST AND TIME OVERRUNS**

Industry	No. of Projects	Original cost		Cost overrun	
		(Rs. crs)	(percent of total)	(Rs.crs)	(percent of original cost)
Manufacturing (not elsewhere grouped)	10	191.46	2.74	55.77	29.13
Petrochemicals	10	157.50	2.26	174.43	110.75
Oil refining and distribution	5	51.06	0.73	18.51	36.25
Fertilisers	4	160.04	2.29	120.64	75.38
Paper	3	81.72	1.17	512.90	627.63
Mining(other than coal & iron ore and refining of non-ferrous metals	9	259.86	3.72	260.95	100.42
Hotels	2	23.81	0.34	24.62	103.40
Coal	36	157.30	2.25	473.85	301.24
Power	20	5893.84	84.48	2196.03	37.26
<b>Total</b>	<b>99</b>	<b>6976.59</b>	<b>100.00</b>	<b>3917.70</b>	<b>56.15</b>