TOWARDS COST COMPETITIVENESS

FICCI COMMITTEE REPORT

FEDERATION OF INDIAN CHAMBERS OF COMMERCE AND INDUSTRY
Federation House, Tansen Marg, New Delhi – 110 001

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FOREWORD

It is now well acknowledged that Indian economy has turned high cost and become in competitive. This is reflected, at the macro level, in high capital output ratios. High costs/prices have restricted domestic consumption and have been a deterrent to exports. To examine the different issues FICCI constituted a Committee, of which I was the Chairman.

Three Sub-Committees chaired by Mr D N Patodia, Mr Raunaq Singh and Mr Sudhir Jalan provided valuable inputs on different aspects of the problem such as high cost situation as an impediment to growth, devaluation, subsidies, interest rate and possibility of raising engineering exports.

Besides, the Studies initiated by Dr Charat Ram have brought to focus further opportunities in agriculture and agro processing and examined the possibilities of raising the export of agricultural commodities.

The Draft Report was discussed at a Workshop on 7th August, 1987. Dr. Vijay Kelkar, Chairman of the Bureau of Industrial Costs and Prices initiated the discussion. The Report was finalised taking the deliberations at the Workshop into account.

The Report starts with a comparison of the prices of select items in India and abroad, traces the reasons for India's high cost situation and low productivity and assesses its impact on domestic consumption and exports and finally, suggests certain remedial measures.

I sincerely hope the Report will be widely read and discussed and contribute to thinking on important policy issues. I would like to thank my colleagues on the Committee as also Shri R.P. Goenka, the then President of FICCI, for entrusting me with this exciting task.

November 2, 1987

(D. C. KOTHARI)

Members of the Committee constituted in October 1986, on Cost Competitiveness

1. Dr. D.C. Kothari — *...Chairman*
   Madras
2. Dr. Charat Ram
   Delhi
3. Shri D.N. Patodia
   New Delhi
4. Shri Sudhir Jalan
   Calcutta
5. Shri Raunaq Singh
   New Delhi
6. Shri R.P. Goenka
   President
   Member Ex-officio
7. Shri K.S.G. Haja Shareeff
   Vice-President
   Member Ex-officio

I

How High Cost Are We?

1.1. Indian economy is increasingly becoming high cost. This has pushed us out of the international market and equally, narrowed the domestic market. Demand has become the most important limitation to growth.

1.2. Some examples of high costs are given to illustrate the point. Take for instance, steel. Indian prices (without excise duty, freight equalisation levy, steel development fund levy, engineering export levy and a small cess, which together form 30 per cent of the Joint Plant Committee's price for the individual items) were 85 (tin bars, sheet bars and seamless bars) to 153 per cent (unequal angles and sections) higher than international prices (F.O.B.), prevailing on the European markets.

Table 1.1.

Differential between International and Indian Prices of certain Steel Products

Item	International Prices (fob) (Feb. 20, 1986) Rs./ tonne	Indian Prices (Feb. 1985) Rs./ tonne	Differential between International and Indian Prices (Col. 3 over Col. 2) %
Steel : —Tin bars —Sheet bars —Seamless bars	2745	5080	85
—Unequal angles and Sections	2730	6900	153
—Joist	2730	6140	125
—H R Coils	2790	6150	120
—Plates 5—10 mm. and above	3270	6570	101
—Chequered plates	3420	6670	95
—C R Coils	3600	8040	123
—G P Coils	3960	9113	130

It is not known if there are any levies on the inputs used in the production of steel abroad. If cess on coal and iron ore and duty on furnace oil are netted out from the cost of inputs used in the manufacture of steel in India, the difference in price would be still higher. The position was different some years back. The Mehtab Committeee (1966), the Marathe Committee (1974), besides a Committee on Public Undertakings have brought out that ex-works prices of select categories of steel were lower in India compared to prices in U.S.A., Japan, etc.

1.3. In aluminium, where again, India should have a natural advantage, our price (without the final excise duty) was 140 per cent higher than the U.K. price. Taxes/duties on inputs are not taken into account.

1.4. We consider, next, certain items used in the manufacture of tyres and tubes. Indian prices, as compared to international prices (C.I.F.), are higher by 45 per cent (Polybutadiene) to 152 per cent (Nylon fabrics).

Table 1.2.

Differential between International and Indian Prices of certain raw materials/ products used in the manufacture of Tyres

Item	International price (Rs./Kg.) (CIF)	Indian Price (Rs /Kg.)	Differential between International and Indian Prices Col. 3 over Col. 2 %
Natural Rubber	10.00	17.00	70
Synthetic Rubber SBR	10.50	25.50	143
Polybutadiene	14.28	20.72	45
Carbon Black	8.70	19.01	118
Nylon Fabrics	36.00	91.00	152

These prices are exclusive of final duties. Once again, taxes/duties on inputs have not been netted from Indian prices.

1.5. In polyester, Indian selling price was higher than U. S. price by 84 per cent in a 6000 tonnes per year plant; 46 per cent in a 15,000 tonnes plant; and 24 per cent in a 30,000 tonnes plant (the U.S. plants' yearly production is taken as 30,000 tonnes in all cases).

Table 1.3

Differential between International and Indian Selling Prices of Polyester (DMT route)

	International (U.S.A.)		India	
Capacity (Thousand TPY)	30	30	15	6
Total Investment (US $ million)	73	106	70	40
Raw materials (US $ per kg.)	1.17	1.36	1.36	1.36
Operating Costs (US $ per kg.)	0.35	0.35	0.43	0.56
Manufacturing costs (US $ per kg.: inclusive of depreciation, taxes and insurance)	1.76	2.03	2.24	2.59
Selling price (US $ per kg. including 30 per cent pre-tax return on investment)	2.49	3.09	3.64	4.59
Price Differential in Selling Price	6000 tpy plant over 30 000 tpy plant abroad, 84 3 per cent; 15,000 tpy plant over 30,000 tpy plant abroad, 46.2 per cent; 30,000 tpy plant over 30,000 tpy plant abroad, 24.1 per cent.			

Source : Information gathered from industry.

The importance of size and the economies that flow from it are emphasised by the above examples. To these we will revert. It is important to note that capital and raw material costs are significantly higher in India, whereas operating costs are only marginally so. These costs are exclusive of duties at the final stage, whether it is investment or raw materials that are under consideration. However, they do not exclude such duties as are there on inputs which go into the production of equipment or raw materials.

1.6. Manufacturing costs are 42 per cent higher at the spinning stage and 17 per cent higher at the fabric production stage for a new plant in India compared to U.K. Raw materials are 128 and 47 per cent more costly per kg. in India at the spinning and fabrication stages.

Table 1.4

Differential between International and Indian Selling Prices arising out of spinning and fabric production

	International (U.K.)	India	Differential between International and Indian Prices
	Spinning (Polyester/Cotton)		
1. Total Investment (US $ million)	6.80	8.70	28
2. Raw materials ($ per kg.)	2.17	4.94	128
3. Manufacturing cost ($ per kg.)	2.83	2.16	
4. Manufacturing costs ($ per kg.: exclusive of profit on investment)	5.00	7.10	42
5. Selling Prices ($ per kg.: inclusive of profit)	7.30	10.00	37
Fabric Production			
1. Total investment (US $ million)	11.60	13.80	19
2. Raw materials ($ per kg.)	6.30	9.29	47
3. Manufacturing costs ($ per kg.)	4.51	3.36	
4. Manufacturing cost (exclusive of profit on investment)	10.81	12.65	17
5. Dyeing and finishing	4.60	4.60	
6. Selling price	15.41	17.25	12

Spinning : Price Differential: Indian over International: 42 per cent

Fabrication : Price Differential : Indian over International : 12 per cent

Source : Information gathered from industry.

Investment costs are also higher by 28 and 19 per cent, but the rest of the manufacturing costs are to India's advantage.

1.7. The cost differences referred to are illustrative of the general situation prevailing. Many more of such instances can be cited. It is some times argued that international prices are not reflective of the correct cost situation and that actual cost differences between different items in USA, UK, Japan, South Korea and those in India are not as much as they are made out. It is further contended that international prices are related to the marginal cost of producing the item and are not rooted in its average cost, meaning that a part of the actual cost is hidden and is not reflected in the international price. What has to be borne in mind is that subsidies or hidden costs have to be absorbed by the economy by cutting corners elsewhere, and this would be well-nigh impossible if exports are sizeable and in diverse areas. In the ultimate analysis, exports cannot be propped by subsides indefinitely and can only thrive if prices are competitive.

II

Effect of High Cost

2.1. The sheltered market situation rendered industry or at least segments thereof technologically backward and inefficient. Escalation in prices/costs, brought about partly by growing excise, customs and sales tax levies, had limited domestic consumption. Besides, it restricted exports, These two together held down growth. A situation where industry, and the export sector within that, grow, will transform the economic scene. Exports will have to be built into production of both industry and agriculture and not be an on and off effort. Thus, exports, domestic consumption, and aggregate production are all to be linked and made to form part of the growth process.

High Costs and Domestic Consumption

2.2. Domestic consumption, whether it is of rural or urban households, has been concentrated in the top 2-3 deciles (16th to 28th rounds of NSS, given as Appendix 2.1 and 2.2). The two most recent expenditure surveys, the 32nd (1977-78) and 38th rounds (1983) once again bring out the same point (Appendix 2.3 and 2.4).

2.3. How rising prices and increasing costs affected consumption will be noticed from the following*. Consumer expenditure given in the NSS Surveys was re-arranged into expenditure on 'essential industrial goods' (consisting of sugar, beverages, clothing and footwear) and on 'miscellaneous' and 'durable goods'. In 1970-71 prices, per household (sample) expenditure came down from Rs. 2802 in 1977-78 to Rs. 2778 in 1983. Within this, expenditure on industrial goods declined from Rs. 1106 to Rs. 1092.

2.4. Equations setting out the functional relationship (for the period 1970-71 to 1983-84) between the 'explained' or 'dependent' variable (consumption of industrial goods) at the aggregate levels and 'explanatory' variables (disposable income, cost of living index, prices of industrial goods, indirect taxes, trend variable including increase in population) are given in Appendix 2.5. Different explanatory variables were combined and tried out. By using the parameters so derived, the correctness of the estimated equations was established against actual expenditure. It would appear that of the increase in consumer expenditure on industrial goods in current prices, estimated at 12.8 per cent per year, growth attributable to disposable income was 2.2 percentage points, to indirect taxes 1.9 percentage points, cost of living index-1.4 percentage points and on account of the trend variable 10.1 percentage points (Equation 16). According to another specification, of the 12.8 percent increase in consumer expenditure per year, disposable income accounted for 1.3 percentage points, prices of industrial goods-1.6 percentage points, indirect tax for 2.5 percentage points and the trend factor for 10.6 percentage points (Equation 18). The dominant factor was the trend variable. Disposable income and cost of living index or alternately industrial goods price

*ESRF : Demand for Industrial Goods, Preliminary results of a study under preparation.

index had only marginal significance. Does it mean that indirect taxes were in effect pushing consumption expenditure? Can it be inferred that what spurs growth over a period, is increases disposable income and not increase as takes place in the growth of population.

India's declining share in World Trade

2.5. India's share in world trade has shrunk from 1.88 per cent in 1950-51 to 0.81 per cent in 1965-66 (at the time of devaluation). It was only 0.48 per cent in 1984-85. On account of the devaluation of the rupee in 1966, the share of exports in world trade after 1966-67 is not strictly comparable with that prior to devaluation. The factors which led to high costs had their impact on India's trade as well. No doubt, restrictive trade policies of developed countries also affected exports. But even when international trade was expanding, India did not forge ahead. While many of the NICs adjusted their economic policies to step up exports, including exports of manufactured goods, India was not able to do so.

2.6. Appendix 2.6 presents all countries which increased their Revealed Comparative Advantage (RCA) in manufactured exports by more than 10 per cent between 1966 and 1982 and exported more than $ 2 billion of manufactures in 1982. The Revealed Comparative Advantage (RCA)* index is 'a good measure because it uses international trade as a criterion of competitiveness, while remaining neutral, to the degree of a country's trade orientation. This index takes 'the ratio of a country's or region's share of a particular category of exports to the share of its total exports in world exports. If the country's or region's share of world trade in that particular type of goods is greater than its share of world trade, then it has in it a revealed comparative advantage'. Of the 29 countries referred to in the Table 19 are developing countries. However, India is way behind Taiwan, Korea, Singapore, Malaysia etc. and her exports in 1982 were only US $ 5954 million. The need for capitalising on areas where India has comparative advantage and enlarging our exports is clear.

*C H Dahlman & C R Frischtak, Technological Change and Industrial Competitiveness in some industrial countries. In Conference Papers, Productivity through People, in the Age of Changing Technology, National Productivity Council (NPC), 1986.
Also, International Comparative Advantage in Manufacturers, UNIDO, 1986 (Sales No. E 85. 11.B.9).

III

Causes of High Cost

3.1. Between 1950-51 and 1979-80, for instance, net capital stock* in the country increased at the trend growth rate of 4.67 per cent per annum, while the rate of increase in net domestic product was only 3.42 per cent (both net capital stock and net domestic product are in 1970-71 prices). This is reflected in the high and increasing capital-output ratios and deceleration in growth, whether of the economy as a whole or agriculture and industry. There has been some reversal of this trend in recent years (Tables 3.1. and 3.2.)

3.2. Government have initiated a process of liberalisation to quicken the pace of growth. Big strides have been taken by raising the threshold limit of assets for MRTP houses, garnering the advantage of scale (minimum scale is now suggested for 73 industries), delicensing 27 groups of industries, enlarging the coverage of Section 21 (A) ofthe MRTP Act, broadbanding of production, permitting imports on a more liberal scale than before and adopting a more open approach to technology. Liberalisation has to be followed up, the steps for which are indicated in a subsequent chapter.

Table 3.1.
Average and Incremental Capital-output Ratio

Year	Average Capital-Output ratio	Decade ending	Decennial Incremental Capital-output ratio
1960–61	2.78	1960–61	2.79
1970–71	3.27	1970–71	4.45
1980–81	4.08	1980–81	6.22

Source : Dr. P.R. Brahmananda, Productivity In the Indian Economy, 1982, p 217.

Table 3.2.

	Growth Rate : National Income; Agricultural Production & Industrial Production			
	1950-51 to 1960-61	1960-61 to 1970-71	1970-71 to 1980-81	1975-76 to 1985-86
National Income	3.7	3.2	3.7	3.9
	1949-50 to 1964-65	1967-68 to 1985-86	1967-68 to 1975-76	1975-76 to 1985-86
Agricultural Production (Base : Triennium ending 1969-70 = 100)	3.1	2.6	2.3	2.6
	1950s	1960s	1970s	1975 to 1985	1980 to 1985
Industrial Production (Base 1970 = 100)	6.1	5.3	4.2	5.6	6.5

3.3. Liberalisation has two sides. Concentrating on industry, there has to be greater freedom for manufacturing units, within the country, to move in and out of industry. While the opening up of the domestic economy is an important element in liberalisation, any sudden action could cripple local industry (witness the slump in the capital goods sector compared to the rest of industry and the 1982 experience with caustic soda/soda ash dumping), which is already a victim of high cost, poor

*Birla Institute of Scientific Research : Capital and Technological Progress in the Indian Economy 1950-51 to 1980-81, Page 4.

technology, poor infrastructure situation. Liberalisation is mainly intended to give domestic industry the cutting competitive edge, that is required to place it on level terms with foreign industry. The touchstone of efficiency is the ability to supply quality goods in the internal market, as also be able to export. This requires, first of all, containment of high costs, of inputs as well as final outputs, and secondly, bringing about cost competitiveness.

Capital Costs : Comparative Position

3.4. Capital costs have been generally higher in developing countries to which India is no exception. To give some examples, a Survey* of the less sophisticated petrochemicals plants in developing countries has shown that capital costs are 25-35 per cent higher than for similar plants in developed countries.**

3.5. It would also be noted from Table 1.3 that per tonne investment in a polyester manufacturing plant is 45 per cent higher in a 30,000 tonne plant, 92 per cent higher in a 15,000 tonne plant, and 174 per cent higher in a 6,000 tonne plant in India, as compared to a 30,000 tonne plant in U.S.A. A polyester cotton spinning plant in India is 28 per cent more costly than a similar plant in U.K. and fabric production plant, 19 per cent more costly (Table 1.4).

3.6. A Study made by UNIDO*** has found that investment cost per tonne of steel capacity created in developing countries is twice the cost in industrialised countries. The investment cost per tonne of steel on a green fields site in developed countries was estimated at US $ 700—1000 per tonne in 70's, when a corresponding sized plant in developing countries was costing US $ 1170 per tonne. If the size of the plant were small, cost would be higher at US $ 1700 per tonne. The UNIDO Study worked out that capital costs of plants were 67 to 10 per cent higher for identical new plants in developing countries, 161 to 81 per cent for smaller plants, and 267 to 144 per cent for plants with 50—60 per cent efficiency. That it need not be necessarily so is brought out by the example of the Kwangyang Steel Plant in Korea, where construction work started in 1984 and the plant is expected to be in readiness by 1988. William T. Hogan**** documented itemwise, costs at Kwangyang and those of an identical plant in USA : per tonne cost at sinter plant stage are US $ 17 per tonne in Korea (4.4 million TPA of B.F. sinter) against US $ 44 per tonne in U.S.A. (5.4 million TPA), US $ 85 per tonne (1.4 million of B.F. Coke) at coke oven stage in Korea against US $ 216.7 per tonne (1.5 million TPA) in U.S.A., US $ 41.5 per tonne (2.7 million TPA of hot metal) at blast furnace stage in Korea against US $ 146.2 per tonne (2.6 million tonne TPA) in U.S.A., and U.S. $ 44.1 per tonne (2.7 million TPA) at continuous caster stage in Korea against US $ 96.3 per tonne (2.7 million TPA) in U.S.A. South Korea has assiduously developed its ferrous metallurgical machinery sector and also methodically used its labour force. This is an example for India to follow.

3.7. Charles Edquist***** *et al* have, in a Study of Engineering Industry in India, Republic of Korea and OECD countries, pointed out that capital costs "are often 100 per cent higher in developing as compared to developed countries, not in terms of high interest costs, but in terms of high prices of machines."

3.8. Investment cost of a 1650 TPD Ammonia/ Urea Plant based on natural gas was found to be

*UNIDO First Worldwide Study on the Petrochemical Industry 1975-2000/UNIDO/ICI3.83

**UNIDO Worldwide Industry since 1960 : Progress and Prospects, (E. 79.II.B.3) Page 181—Page 182

***UNIDO : A Benbouali, Long Term contractual arrangement for setting up capital goods in the Iron and Steel Industry, UNIDO ID/WG, 324 6, September 1980, Page 33.

****William T. Hogan, Pohang Steel Continues to Grow, Iron and Steel Engineer, April 1985. quoted by Burnard D Mellok, South Korea, Pointer to a New International Division of Labour, Economic & Political Weekly, (September 21, 1985)

*****Charles Edquist, Steffan Jacobsson & Kishore Jethannandani, Automation in Engineering Industries of India and Republic of Korea, EPW, April 13, 1985.

54—114 per cent more in a developing country as compared to developed countries in the 70's. Per tonne fixed cost for a urea plant in a developing site with some existing infrastructure was US $ 63 and US $ 81 in a developing site located in a remote area as against US $ 46 in a developed country.*

3.9 To take another example, investment cost of a new medium-sized soda ash plant (400—600 TPA) under solvay process in the developing countries of Asia was US $13—15 million per 100 tonnes per day capacity, whereas expansion of the same order of existing facilities was estimated to cost about US$ 8 million. On the other hand, capital cost for a natural soda production facility under U.S. conditions would cost US$ 2.3 million per 100 tonne per day capacity plant and US$ 3.5 million for 400—600 tonne plant.**

3.10 Capital costs are generally 40—50 per cent of the total production costs in resource based industries like aluminium, ammonia, coal ore and around 30 per cent in crude steel, pulp/paper and so on. (Appendix 3.1). These figures refer to 60's and 70's and the position could have changed somewhat but not substantially.

3.11 Even where raw materials have to be transported from developing to developed countries for processing, the latter are better placed, first of all in terms of capital cost, as foreign producers of capital goods have all the advantage on their side.

3.12 Fabrication and equipment costs are relatively higher in India because of outmoded technologies and backward foundries and machining facilities. There is also an excise levy which adds another 15 per cent to costs. While capital goods industry has widened its base, a part of the equipment has still to be imported : this could be 60—75 per cent in fertilisers, 40 per cent in petrochemicals and petroleum refining and 40—45 per cent in sophisticated machine tools according to some estimates.*** Import duties add another 85 per cent to the landed cost of the machinery in case of project imports, as also non-project capital goods, except where exemptions are given.

Relative Movements in Capital Goods Prices

3.13 More generally, capital goods prices have increased at a higher rate in India than in most countries, the average compound rate of growth being 7.2 per cent between 1976 and 1985, against 1.3 per cent in F.R.G., 1.1 per cent in Japan, 5.9 per cent in U.S.A., etc. (Table 3.3)

Table 3.3
Compound Rate of Growth of Wholesale Price Indices of Capital Goods (1976-1985)
Index Number

Country	1976	1980	1985	Rate of Growth (1985 over 1976)
Austria	95.6	100	111@	1.5
Federal Republic of Germany	106.7	100	120	1.3
Japan	91.8	100	102@	1.1
Republic of Korea	67.7	100	123	6.8
Netherlands	85.4	100	119	3.7
United States	72.3	100	128@	5.9
India	75.6	100	140.8	7.2

Source : U.N. monthly Bulletin of Statistics.
@ 1986

Escalations in Capital Costs in India

3.14 Investment cost per tonne of steel capacity which was Rs. 1,100 per tonne in 1953-54, had increased to Rs. 4,600 per tonne by 1974-75 and further to Rs. 14,000 per tonne by 1983-84 (in current prices)****.

*M.C. Verghese : Issues facing the World Fertiliser Industry, Chemical Age of India, 28th Anniversary issue.
**J.D. Adhia, World Soda Ash Industry Review, Chemical Age of India, April 1983.
****Source :* Articles in Journals and through discussions with Financial Institutions and concerned companies.
*****G.O.I , Ministry of Steel and Mines, White Paper on Steel Industry 1976, Page 51 and discussions at the Round Table on Steel Industry organised by the Ministry of Steel, Mines and Coal, Department of Steel, Government of India, on 18th and 19th February, 1985.

3.15 Escalation in capital costs* have been noticed in other industries as well as, the following table brings out :

Table 3.4

Escalations in Capital Costs (Current Prices : Rupees)

Industry	Early 70s	Middle 70s	Late 70s	Early 80s	Middle 80s
1. Fertilisers (Per tonne Investment)	1180	—	4790	5169	—
2. Cement (Per tonne Investment)	339	676	840	1000	1400
3. Paper and Paper Board (Per tonne Investment)	2558 (4887)	— —	6387 (8094)	7269 (N.A)	— —
4. Sugar (Per tonne Investment)	1917	—	3748	5457	—
5. Tyres & Tubes (Per tonne Investment)	646	—	—	1050	—
6. Scooters (Per unit Investment)	—	—	1558	2125	—

(Figures in brackets include a unit with high per tonne investment)

Time Overruns Add to Costs

3.16 Time overruns have been endemic in India and have been adding significantly to the high cost situation that obtains. While even big projects in Japan and Korea, such as in steel, cement get completed in 36-48 and 12-18 months respectively, the time taken in India is 4-5 times what it takes in Japan or Korea. It has been recently noted that 134 out of a total of 264 projects in the public sector costing Rs. 20 crore or more each had been delayed by periods ranging from 3-204 months. Time overruns have thus added to cost. As against the original cost estimate of Rs. 63,000 crore for 93 projects, delays in their execution have added Rs. 9832 crore to the cost. There have been similar delays in private sector projects as well and these have added to cost (Appendix 3.15 & 3.16). Any delay in execution or completion would not only deprive the nation of outputs flowing from them, but would also add to costs by way of interest, wages, salaries of people working on them. There are also instances, where projects which have been completed, like the Korba Aluminium Project involving an outlay of Rs. 250 crore, not being sanctioned the required power, so much so, years after its completion, the plant is not fully operational and the company has in the meantime accumulated losses of over Rs. 200 crore.

Cost of Finance : Long term

3.17 For 7 major industrial countries, the long-term rate of interest (bond rates of different maturities) averaged 11.1 per cent in 1984, 9.9 per cent in 1985 and 7.5 per cent in 1986. Rates in Japan and F.R.G. were less than 6 per cent**. As against this, convertible/non-convertible debentures earned 13.5 per cent and 15 per cent interest respectively in India which has since been reduced marginally. The IDBI's loan rate is 14 per cent. It would be seen how costly finance in India is, in comparison to other countries. Bond issue and term loan rates are the highest in India among the countries for which comparable rates are given (Appendix 3.2 and 3.3).

High Short-Term Rates of Interest

3.18 Rates of interest charged by banks to industry and business as short-term loans are equally high (Table 3.5; also Appendix 3.3).

Table 3.5

Country	Prime Lending rates of Banks %
Hong Kong	6.50
Singapore	5.75
Korea	11.50
India	17.50

Source : Far Eastern Economic Review

* ESRF : Capital-Output Ratios in the Indian Economy.
**World Economic Outlook; IMF, 1987

Even credit for small scale sector (9-12 per cent on loans upto Rs. 25,000, 14-17.5 per cent for loans of more than Rs. 2.5 lakh) or for exports (12-16.5 per cent generally and 8.65 per cent for deferred credit), which are given special treatment, is costlier than similar credit elsewhere.

Overall Cost of Finance

3.19 Interest burden formed a high proportion of gross value added, particularly of the new units in different industries. In some years it worked out to be more than the gross value added itself for the reason of gross value added being negative (Appendix—3.4).

3.20 The total impact of high interest rates was investigated for a sample of 21 new and capital intensive companies in operation for longer than 5 years (Table 3.6).

Table 3.6

Range of interest as % of value added	Number of Companies
0— 20	1
20— 40	6
40— 60	8
60— 80	2
80—100	2
100—150	2

Source : FICCI Study

Even here, interest burden is as high as 20—40 per cent in 6 companies and 40—60 per cent in 8 companies, even if companies in the lowest and the three higher ranges are left out.

3.21 High interest rates inflate cost of production. Their incidence is particularly noticed in capital intensive projects. In the last two years, interest rates have been reduced in most countries. There was no corresponding reduction in India.

Incidence of Capital Servicing

3.22 Higher investment cost means (a) larger depreciation, (b) higher interest payment, more so because of the high rates of interest prevailing here and (c) additional profits that will have to be generated to service the equity. While the amount set apart for depreciation is, no doubt, available for replenishment of existing capital stock, additional investment etc., it adds to cost/final price. Similarly, the high long term as also short term rates of interest being charged have added to the high cost situation. A study of 54 new units across different industries—cement, paper, two-wheelers and mopeds, tyres, alcohols and other chemicals, has brought out that capital related costs i.e., depreciation and interest alone, were as high as 10—60 per cent of the cost of production in 91 per cent of the units. The concentration is particularly heavy in the 10—40 per cent category.

Table 3.7

Frequency distribution of capital related costs as % of cost of production for all industries

0—10	5
10—20	21
20—40	20
40—60	7
60 and above	1

This clearly indicates the need to reduce capital and interest cost per unit of production.

Capacity Underutilisation

3.23 Capacity utilisation in Indian Industry has remained low at around 78 per cent, as compared to 85-95 per cent normally reached in countries like Korea and Japan. The following trend in capacity utilisation in specific Indian industries is of particular concern.

Table 3.8

Capacity Utilisation in Specific Industries

Item	1970	1975	1985
Textiles	75	77	63
Paper & Paper Products	98	64	50
Chemical & Chemical Products	84	76	83

Basic Metal Industries	64	57	65
Metal Products	82	59	--
Electrical Machinery	110	56	68
Electricity	48	46	38

Uneconomic Size of Production and High Cost

3.24 Industries based on natural resources and continuous process industries like chemicals, petrochemicals and fertilizers, etc,, are susceptible to change in costs brought about by size or scale of operation. Not only capital costs, but variable costs also are lower in the bigger sized units. What is the average size in India and how does it compare with capacities elsewhere ? What is its impact on costs ?

3.25 To indicate the relative size factor, the production of SAIL units, taken together, was found to be 22 per cent of the production of the largest steel producer NIPPON Steel, and 31 per cent of the production of the second largest firm, U.S. Steel, in 1981*. The production of the largest integrated steel plant, taken separately, was only 8 per cent of that of NIPPON Steel.

3.26. Plant capacities of manmade fibres/input units in India and some developed countries are given below:**

Table 3.9

(Tonnes)

Item	India	Developed Countries
Polyester staple	7,000	100,000
Polyester filament	2,000	70,000
Nylon filament	3,000	30,000
DMT	24,000	200,000
Caprolactum	20,000	75,000

Around 1980-81, of a total of 43 plants in the world, only 7 had capacity comparable to that of the Indian plants : 13 plants were of more than 100,000 tonnes capacity. Similarly, in caprolactum of a total of 33 plants, only 3 had capacity comparable to Indian plants : 9 had more than 100,000 tonnes capacity.

3.27. The production of an average Indian plant was 4.5 M.T. per year under polyester as against 24.3 M.T. in Taiwan and 89 M.T. in U.S.A. under polyester filament 1.2 M.T. per year as against 11.1 M.T. in Taiwan and 48 M.T. in U.S.A. Similarly under nylon, the average Indian plant's production was 2.5 M.T. per year under filament; 2.6 M.T. per year under tyre cord; 4.1 M.T., per year under acrylic, whereas Taiwan had reached by then 7.3 M.T. under nylon filament and 33 M.T. under acrylic production.

3.28. Production of fibre intermediates such as caprolactum, D.M.T., ethylene glycol and acrylonitrile were far lower than those achieved by Korea and Taiwan. The average capacity in Korea under caprolactum was double that of the Indian plant and in Taiwan five times that of the Indian Plant. Under D.M.T. the average Korean plant produced 5.4 times that of the average Indian plant and the average Taiwanese plant 7.4 times that of the Indian plant.

3.29. To give some more examples, the average size of a cement plant in India was between 600 and 1200 tonnes a day till late 70's. There were plants with capacity as high as 8900 tonnes per day (Kawasaki of Japan). There were several plants with capacity ranging from 3000 to 5000 tonnes per day in Japan as also in some other countries.

3.30. In contrast to 347,000 scooters produced in India by all the units together in 1984-85, units in Japan had production volumes ranging from 0.5 million (Kawasaki) to 3 million (Honda).

3.31. While automobile production in some foreign countries ranged between 0.40 mn-6.33 mn in USA and 0.40 mn-2.5 mn in Europe, the maximum production in India is around 50,000. Similarly, in automotive tyres even medium sized plants within USA, Japan and the continent have production capacity more than all the units put together in India.

*EIU Special Report No. 128, The World's Steel Industry, Structure and Prospects in the 80's, Page 42.

**Ghayur Alam, Growth of Manmade Fibre Industry in India with Special Reference to Changes in the International Technology Market, ICRIER-NCAER Project, May 1982 (mimeo).

3.32. Significant economies can be obtained through increased capacities. It has been estimated, that, for integrated steel mills producing flat rolled products, there is a 20 per cent cost saving for each doubling of mill capacity upto 800,000 tonnes a year, and a further 10 per cent on re-doubling to 1.5 million tonnes. Petrochemical plants could realise 20-30 per cent savings in investment cost from a doubling of capacity. Similarly, investment costs have been reduced in pulp and paper mills upto 25 per cent through doubling of capacities upto 1000 tonnes a day*.

3.33. Cost advantage of bigger sized units is best brought out by the example of cement industry. While fixed and working capital costs per tonne in a 1200 TPD plant incorporating precalcinator technology (MFC) worked out to Rs. 787, it was Rs. 655 for a plant of 2500 TPD (with MFC)**. A similar conclusion was reached by ESRF which established 18 per cent saving in cost of production of cement by raising capacity from 200 TPD to 800 TPD and a further 19 per cent through a quadrupling of capacity from 800 TPD to 3200 TPD***.

3.34. The significant difference in per tonne investment and manufacturing costs between a 30,000 tonne per year polyester plant and 15 and 6 thousand tonne plants, was referred to earlier. (1.3 and 1.4)

3.35. From the evidence put together the point comes out that relatively smaller sized plants not only add to initial investment cost, but also to operational costs.

Technology Factor

3.36. Technology is a vital input of growth. As compared to other developing countries, India was not in a disadvantageous position in early 60's. However, the approach to technology imports became restrictive there after. Nor was domestic R & D strong. Whether it is in terms of stock of direct foreign investment or payments made for disembodied technology, India's level of purchase/ acquisition of technology, as compared to other developing countries like Argentina, Brazil, Korea and Mexico was low (Appendix-3.5).

3.37. Furthermore, technology payments were not conducive to the country receiving the most uptodate technologies, nor did the agreements provide the basis for collaboration in R & D. The terms of payment, to start with, were such that the better kind of technologies were outside India's reach. This was so in view of the relatively low royalty payments allowed (Appendix-3.6). As compared to 1977-79, the share of collaborations with more than 3 per cent royalty increased in the 1980-83 period. By itself this has not transformed the character and content of technology imported. A sizeable number of agreements still fall in the "less than 3 per cent" category.

3.38 Similarly, the average lumpsum payment paid for technology was small by any reckoning (Appendix 3.7).

3.39 R.M. Bell and D. Scott-Kemis, have observed in the course of a very perceptive study : "in many cases, supplier firms appear to have limited or reduced their explicit cost in the light of these policy conditions (restrictions on payment levels and duration of agreement). Indian firms tended to acquire shallower, narrower and more fragmented knowledge, information and know-why".**** Most technology suppliers wanted to reduce their involvement and responsibility and

*UNIDO World Industry since 1960 Progress and Prospects No. E. 79.11B, 3 pp 183-184.

**Uttam Gupta : Technological Changes in the Indian Cement Industry-a Study of the impact of precalcinator, ICRIER-NCAER Project, March 1982, quoting the Report of the Cement Review Committee on Cement Industry.

***ESRF : Economies of Scale in the Cement Industry.

****R.M. Bell and D. Scott-Kemis, "Indo-British Technical Collaboration since the early 1970's," September, 1984, quoted by the World Bank Report, "India. Indusrial Technology Development Review, 1986 (Mimeo).

supplied only "small packaged technology" against the limited lump sum payments made.*

3.40 In contrast, Japan and Korea provide the classic instance of meticulous search for technology, joint buying in special areas like Oxygen Steel making, synthetic fibres, petro-chemicals and computers and semi-conductor technologies through payment of attractive royalties/outright payments. While upto a point, there was joint research, individual firms took over there after.

3.41 As a proportion of turnover, commitment of funds to R&D was small in India (Appendix 3.8). This was attributable to industrial units in India being small in size. Countries like Japan, Korea, Taiwan, etc., also specialised in specific industry fields, where they imported technologies and developed a good export base.

3.42 In the process, India was left behind. While growth of technology in Japan averaged 3.6 per cent per year, even as between 1952 and 1971, India's rate of growth over the 30 year period 1950-80 was a mere 0.7 per cent, under one assumption, and 1.1 per cent, under another. India's technology development rate was lower than that of Brazil, Mexico, Argentina and Chile.** If more recent years are included for Japan, the rate of technological advance would be far more impressive. Technology advaned at 2.2. per cent per year between 1971 and 1979 in Korea.***

High Energy Consumption : A Factor of High Cost

3.43 Energy consumption in India is higher than comparable consumption elsewhere and has been adding to costs. To take some instances, energy requirements for production of aluminium in India is 33 million KCALS per tonne as against the best achieved figure of 21 million KCALS and a theoretical requirement of only 6.37 KCALS.

3.44 To take another example, energy consumption in steel has generally decreased from 9 to 12 G. Cal to 5 to 7 G. Cal per tonne, while it ranges between 9 to 16 G. Cal in India. In steel, our consumption is estimated to be twice that of the Japanese steel plants (Table 3.10).

Table 3.10
Comparison of specific energy consumption in Iron and Steel manufacture in India and Japan

		Specific Energy Consumption in G. Cal per tonne	
		Japanese steel plant	Indian Steel plant
1.	Iron Making		
1.1	Blast Furnace	3.30	6.75
1.2	Sintering	0.75	0.75
1.3	Coke Ovens	0.44	1.50
	Total	4.49	9.00
2.	Steel Making	0 06	1.10
3.	Hot Rolling	0.60	1.10
4.	Slabbing & Blocking	0.19	0.60
5.	Cold Rolling	0.91	0.70
	Grand Total	6.25	12.50

3.45 In paper industry, even the relatively modern mills in India consume 70 per cent more of heat energy and 7 per cent of additional electric energy to produce one tonne of paper, as compared to mills in the Scandinavian region. A Swedish mill purchases on an average only 40 per cent of its total energy requirement per tonne of paper against 79 per cent by a large mill in India. The operational efficiency of energy conservation

*L. Hoffman, et. al., "Problems and Perspectives of the Transfer of Technology between the Countries of the European Community and India, February, 1984, quoted by the World Bank Report on India, Industrial Technology Development Review.

**Birla Insititute of Scientific Research, Economic Research Divisions, Capital and Technological Progress in the Indian Economy 1950-51—1980-81, 1985, page 19.

***Dr. J.W. Kim, Measurement of Total Factor Productivity, Towards Higher Productivity : Experience of the Republic of Korea, APO, 1986.

system of a typical Indian integrated mill is estimated to be only 58 per cent as against 76 per cent in a mill in Sweden.

3.46 There can be significant energy saving in our fertilizer industry. For example, a plant designed in 60's would consume 1000 KWH of electrical energy per tonne of ammonia, while plants designed and installed in 70's would consume only 450 KWH. A typical ammonia plant of 1350 tonne/day capacity would consume 1100 tonnes/day of hydrocarbons and the total installed power of 40 MW would raise steam of 250 tonnes per hour. If even a part of this energy is saved and converted for use in the plant, there could be significant energy saving. The technology of most fertilizer plants in India is old and they could be upgraded to adopt and implement energy saving devices.

3.47 Appendix 3.9 sets out specific energy efficiencies by country and gives a comparative picture of fuel consumption by known processes with the critical minimum (Appendix 3.10) and potential fuel savings in the industrial sector (Appendx 3.11).

Infrastructural Bottlenecks : A Constraint

3.48. Commercial energy in million tonnes of coal replacement grew at the rate of 5.8 per cent per year between 1970-71 and 1986-87. This was on top of 7.2 per cent growth in the first decade of planning and 7.1 per cent in the second decade. However, significant gaps persist between the demand for and supply of power. The overall gap presently is about 8 to 10 per cent, 7.9 per cent in 1985-86 and 9.4 per cent in 1986-87, but the gap in the case of industry ranges from 10 to 75 per cent, particularly for H.T. users (there are cases where there is 100 per cent powercut for long stretches). Unscheduled power cuts, frequent trippings and voltage fluctuations have not only affected production and quality of goods but have added to costs.

3.49. Add to this, power and fuel costs are rising significantly. Coal prices had gone up by 7.16 times by 1986-87 as compared to 1970-71 (compound annual rate of increase of 13.1 per cent); Petroleum products by 6.23 times (compound annual rate of increase of 12.1 per cent) and Electricity by 5.64 times (compound annual rate of increase of 11.4 per cent). Energy group prices as a whole increased at 12.4 per cent per year between 1970-71 and 1985-86 as against 8.9 per cent increase by all commodities. To an extent, this was forced because the cost of investment in power and additional facilities, for instance, have grown from Rs. 24 lakh per MW in the first Plan to Rs. 73 lakh per MW by 1979-80 and Rs. 159 lakh per MW in 1984-85.

3.50. The gap in the supply of power has to be supplemented through installation of captive power plants which have come to account for 22 per cent of the total energy consumed by industry in 1981-82 (such as aluminium, cement, chemicals, fertilisers, iron and steel, paper and textiles etc. and excluding captive generating sets of less than 100 KW capacity). Its impact on overall costs can be assessed, considering the high cost of installation and maintenace and the cost of diesel oil etc. The cost of generating one KWH of power from diesel sets was Rs. 2 in 1982/1983 while the cost of power supplied by State Electricity Boards ranged from 20 paise to 62 paise for large industry. In most countries, power availability is 2 to 3 times the requirement. Not only does it make for uninterrupted running of units, but fuel costs are finally a smaller proportion of total costs. As a percentage of total input cost, fuel costs were 9.7 per cent in 1982-83, as against 6.1 per cent in 1970-71.

3.51. The quality of coal leaves much to be desired. Similarly, road and rail transport or telecommunications, for that matter, do not offer the required support. Infrastructure should be improved significantly even if it cannot be immediately brought on par with facilities abroad.

Increase in Prices of Major Raw Materials/Inputs

3.52. Yearly increases in prices of some raw materials of significance to engineering industry and ferilisers, to take two typical instances are set out in (Appendix 3.12). It has been further shown by the Confederation of Engineering Industry what

impact a 1 per cent increase in input prices directly has on the cost of output of a tonne of steel (Appendix 3.13). The CEI has simultaneously brought out the declining trend in the prices of certain input items in select countries while there was a contrary trend in our costs. (Appendix 3.14).

Need for Providing Inexpensive Inputs

3.53. The need for providing basic inputs cheaply does not have to be overemphasised. While the pre-eminent position Japan as well as South Korea achieved owes a great deal to the hard work put in by their entrepreneurs and workers and the importance they attach to productivity and quality, it was ensured by them that all basic inputs remained inexpensive and competitive. The role of what are called mother industries in providing steel, DMT, caprolactum, naphtha and so on at competitive price is of significance in triggering growth. India should take a lesson from this.

Over-staffing

3.54. There is considerable over-staffing in factories which has not only pulled down productivity, but has added to costs. Organised labour has been responsible for pushing costs as wages are linked to cost of living index and the element of neutralisation is high. This is when the contributions of most of the labour is marginal, if not negative. How large the staff is, could be seen from that, while 30,000 workers in Australia produce 145 MT of coal every year, more than 6 lakh workers in India produce nearly the same amount, if at all. Similarly, about 15,000 workers in Pohang Steel Plant in South Korea produce 9 million tonnes of steel, whereas 1.25 lakh workers in India have barely touched production level of 6-6.5 million tonnes. Over-staffing is not restricted to public sector undertakings only, but is all pervasive, in Government, as well as private sector. Thus, employment per tonne of steel or coal in India has been estimated to be 30-35 times of what it is in South Korea and Australia*. Over the years, industries elsewhere reduced their worker complement : Japanese coal industry employed 407,000 workers in 1950, but this figure came down to 31,000 only, in 1981; Japanese textile industry employed 1200,000 in early 60's, but the number is presently less than 600,000**. To quote another example, a textile unit in Germany had employed 480 persons in 1975, but the labour force had come down to 150 by 1986. The number of industrial units had gone up significantly in India over the years. Hence the question of the absolute number of persons employed coming down would not arise. Per unit of production, the number of persons employed is far higher in India, whether it is public or private sector, as compared to industries elsewhere in world.

Import Substitution: At What Cost?

3.55. In the first phase of industrialisation of any country import substitution provides the main thrust. Independently of as to whether the volumes involved are economically produced or not and also independently of the technology factor and availability of infrastructural facilities, import substitution was resorted. The domestic resource cost often bears no relation to imported price/cost. In areas of strategic significance or in areas where a country has natural advantage, the cost factor need not deter investment initially. However, the trend is to go in for substitution irrespective of as to whether it is economic to produce a given item or not. An additional factor contributing to the high cost situation is the policy of fractionalisation of capacities. This taken along with the high cost associated with import substitution aggravated the situation further.

Toning up Management

3.56. Most of the factors which have been mentioned above define the environment in which management has to function. If there is no power, machinery cannot be used all the 24 hours of a day Naturally this leads to an increase in the cost of production. The high rate of interest, delays in the sanctioning of projects, high import duties on

* ASSOCHAM, High Cost Industry : Management of Structural Change, Workshop Proceedings, the Associated Chamber of Commerce and Industry of India 1987.

**Ib id, ASSOCHAM, Workshop Proceedings.

capital goods and so on, are factors beyond the control of management and which can only be corrected through appropriate Government action. However, it needs to be asked whether within the constraints, managements have done their best to achieve economies and minimise the cost of production. It does appear that there is considerable scope for improving management techniques and introducing greater element of professionalism. No doubt, quite a few industries have been operating on fairly efficient lines. In many more there is scope for improvement.

3.57. The reluctance to change has come partly from the absence of effective competition within the country. Also, the system of industrial licensing created a situation in which the market was, more or less, shared among the different producers without adequate competition among them. Gradually, over the years, and particularly since the process of liberalisation initiated in 1985, the degree of competiton has increased and some cost consciousness has emerged. Competition compels units to reduce costs and improve efficiency. This pressure has to increase further. Economy in the use of labour, fuel, power, raw materials etc. will become inevitable when enterprises have to stand in competition with the best within the country.

3.58. In response to the need a number of management institutes have come up and professionalisation of management is gradually taking place. The technical qualifications of entrepreneurs are now much better than what they were in the 60's. The new generation of entrepreneurs is aware of the issues. There is greater element of scientific management in their enterprises. What Government needs to do is to accelerate this process by making efficiency a need for survival.

IV

Impact of High Cost on Productivity

Some Physical Indicators

4.1 The high cost situation as it developed in India pulled down productivity on all fronts. Productivity refers to efficient use of resources, men, machines and materials. To take some physical indices, first, an Indian worker produces on an average 45 tonnes of steel per year in SAIL and 58 tonnes in TISCO, whereas productivity in South Korea in the Pohang Factory was as high as 612 tonnes. In Japan, productivity in steel ranged between 331 tonnes for NKK plant to 392 for NSC. Taiwan recorded 352 tonnes in China Steel and Brazil 109 tonnes per man year in Usimanas.* In cement, an American worker's production was 6.8 times that of an Indian and the Japanese worker's production 5.8 times (these figures referred to the position in middle 70's.)**

4.2 According to a Study made by ESRF, U.S. industry's productivity was 12 times that of India in 1977. Japanese industry's productivity was 7.75 times that of India*** (a cross section of industries was taken for different countries). While the productivity gap between India and Japan and India and U.S.A. widened over the years, that between Japan and USA, for instance, has narrowed to the advantage of the former.

Value Added Per Worker As a Measure of Productivity

4.3 Gross value added per worker had declined over the 1973-80 period in India by 15.8 per cent in constant price terms. In contrast, the Republic of Korea, Singapore, U.K. and Japan showed increases ranging from 26.1 to 95.3 per cent (all in constant prices). U.S.A. is the only other country which had witnessed a decline in gross value added per worker of 6.6 per cent (Appendix 4.1). Some bias may have been introduced through the use of official rates of exchange. It may be noted that in current price terms, also increase made by India was not large (Appendix 4.2). Similarly gross output per worker in constant prices increased by only 14.6 per cent in India as against increases as high as 123 per cent in Republic of Korea, 74 per cent in U.K., 54 per cent in Singapore (Appendix 4.3). Once again conversion of output, estimated in national currencies, into dollars at official exchange rates could have introduced some bias in calculations.

Productivity Index (Value added per worker) Industry-wise

4.4 However, the point comes out, that, in almost all product lines, U.S.A. had an advantage, except for iron and steel, with regard to Japan in some years, textiles and iron & steel with regard to Canada, for one or two years. It only means that despite the reduction in value added per worker in U.S.A. her earlier high productivity stood her in good stead. Japan has generally been improving her productivity in different branches, though productivity tended to decline in

*R P. Billimoria : Eliminating Restrictive Practices in the Steel Industry, Round Table on Steel Industry, 1985 p.12
**Newspaper article, quoting National Productivity Council.
***E.S.R.F., International Comparison of Labour Productivity.

between i.e., in 1975, possibly as a result of the first oil shock.

4.5 While in the case of Republic of Korea, there was generally an upward movement despite some decline in productivity in some industries in 1975, there is no clear discernible trend. In Singapore, Australia and Canada, per worker productivity may have moved up in some industries, but once again, there is no clear pattern. In U.K. on the other hand, there has been increase in productivity in many industry groups particularly electrical and non-electrical machinery, leather and fur products and rubber products. What is most striking about India is the extremely low productivity in relation to U.S.A. as also the other countries. India's productivity in 1980 was 1/8th of US productivity in iron and steel, 1/14th in non-electrical machinery and 1/7th in electrical machinery, 1/17th in textiles and 1/13th in rubber products and so on. Republic of Korea's productivity in electrical machinery was four times that of India, 4.6 times in iron and steel, 8.4 times in non-electrical machinery 4.9 times in textiles and so on. Productivity has, over the years, in fact, declined in some product groups.

4.6. Labour productivity measure is a partial measure, but considering that we have taken gross value added, which includes depreciation, which in turn is related to the stock of capital, it has wider significance than pure labour productivity measure.

4.7. Appendix 4.4 brings out that non-wage value added per employee as a percentage of per employee total value added in USA was in close proximity to similar percentages in other countries. This would reinforce the point that the high total value added figures for USA were not on account of the relatively higher wages prevailing there, but owing to other components such as depreciation, profits, etc. being higher.

4.8. We juxtapose next growth rates in labour and capital productivity. For a corresponding period, labour productivity has grown by just 0.89 per cent per year in India against 10.5 per cent and 11.2 per cent in Taiwan and Korea (Appendix 4.5) Phillippines and Singapore recorded a more modest, but still higher growth of 3.6 per cent than India, though over a slightly different period. While there was negative growth under capital productivity in India, it surged forward in Taiwan at 9.5 per cent annum. Percentage growth rates do not convey everything, because these are set against absolute productivity figures. These have in any event been low in India as observed earlier.

4.9. Another Study giving labour productivity growth rates in India and some other countries cited by T V Mansukhani, brings out the relatively small or insignificant productivity gains in India as compared to U.K., U.S.A., Japan and Germany, in the 60's and Japan and Germany in the 70's. (Appendix 4.6)

4.10. In the 50's and 70's, Indian growth rates compared favourably with those of U.S.A. and U.K., but once again, the original difference in absolute levels should not be lost sight of.

4.11. Absolute difference* in labour productivity apart, evidence has been put together to show that by the token of total factor productivity, India's performance is even more disturbing, 0.8 per cent growth per annum in the manufacturing sector against 2.5 per cent in U.S.A. in the 50's, 0.7 per cent against 2.2 per cent in the 60's and −1.9 per cent against 1.3 per cent in the 70's. The gap is equally striking for the economy as a whole.

4.12. Isher J. Ahluwalia** has after suitably adjusting the productivity figures worked out by *NISHIMIZU and ROBINSON*, concluded that total factor productivity for manufacturing industry declined by 0.2—1.3 per cent per annum in India in the 60's and 70's, while it increased at the rate of 5.7 per cent in South Korea, 2.0 per cent in

*T.V. Mansukhani, Paper on Productivity and technology cited earlier.

**Isher J. Ahluwalia, Industrial Growth in India : Stagnation since the mid 60s, Oxford University Press, 1985, Page 135.

Turkey, 0.8 per cent in Yugoslavia and 3.1 per cent in Japan. Both Brahmanand* and Goldar** came to identical conclusion. Goldar has additionally shown that Total Factor Productivity (TFP) has been sluggish, with a rise in labour productivity and simultaneous fall in capital productivity attributable to capital intensity and substitution of labour by capital. Sluggish TFP growth in India (average compound growth of 1.75 per cent in 1959-78 period) compared to Taiwan (3.59 per cent), Korea (3.47 per cent), Singapore (3.75 per cent) among developing countries was responsible for pulling down India's competitive position in the international market for manufactures. TFP increased by 4 per cent or thereabouts in most developed countries.

4.13. This calls for a policy, not only aimed at the creation of new facilities but creation of uptodate facilities, whether it is agriculture or industry, that is under reference and a thorough overhaul and upgradation of all existing industry, besides upgradation of skills, techniques and so on. The difference in productivity levels obtaining in India and those obtaining elsewhere underlines the stark fact that considerably small output is being produced and made available from given resources reducing the availability of goods below its potential.

4.14. What is of significance is that for each production process, there is a range of machines available and there are, similarly, engineering standards or norms which give the amount and quality of machines, materials, labour, required for producing a given unit of output. It is not that machine output ratio is more in the realm of realisation than the labour-output ratio. For increasing the volume of goods and services or for raising productivity, it is required that modern machines are installed and techniques or technologies having bearing on production are adopted and labour is retrained.

*P.R. Brahmanand, Productivity in the Indian Economy : Rising Inputs for Falling Outputs, 1982.

**B. N. Goldar, Productivity Trends in the Indian Manufacturing Industry, 1951-78, Indian Economic Review, Vol. XXXVIII No. 1.

V

Agenda for Change

5.1. The right kind of atmosphere for competitive growth has to be created. Government have in recent years taken certain policy measures. Something more remains to be done to give further thrust to growth and make the economy competitive. This involves changes at the policy level and improvement at the implementation stage. They fall under different heads. The earlier set of policies resulted in the slowing down of growth and low productivity besides rendering the economy uncompetitive. The high cost situation which developed slowed down growth. To spur growth and restore competitiveness certain steps are indicated.

Improvement in Infrastructure

Overall power generation/shortages

5.2. Power generation increased by 8.9 per cent per year in the Sixth Five Year Plan. There was an overall slippage of 28 per cent in the execution of projects during the Sixth Plan. The Seventh Plan envisages additional capacity of 22245 MW. In 1985-86, there was, despite an increase of 4223 MW capacity, slippage of 5.3 per cent. During 1986-87, slippage was higher at 22.6 per cent. The gap between demand and supply of power was estimated to come down from 6.7 per cent in 1984-85 to 5.2 percent by 1989-90. The gap on the other hand has widened in the first two years of the Seventh Plan, 7.9 percent in 1985-86 and 9.4 percent in 1986-87.

5.3. Among the major states, power shortage ranged from 26.9 per cent in Bihar and Karnataka to 3.4 percent in Gujarat. In 5 states it was more than 10 per cent. FICCI has estimated that a 1 per cent shortfall in power leads to a loss of about Rs. 700 crore in industrial production. Power cuts (demand cuts/energy cuts) have more recently been as high as 50 per cent on H. T. industries and 40-60 per cent on continuous process industries. There have also been restrictions on supply of electricity beyond a certain number of hours/days in some States.

5.4. Transmission losses of the SEBs averaged 20.8 per cent in the Sixth Plan. Plant Load Factor (P.L.F) on all-India and all-sector basis was on the average 53.2 per cent in 1986-87 (P.L.F. was 72.3 per cent for Central Sector and 49.8 per cent for SEBs). The gap between demand and supply at the end of the Seventh Plan may still be around 10,000 MW. Additional investment of at least Rs. 10,000 crore is required. The NTPC has raised Rs. 284 crores from the capital market.

—The existing capacity has to be more optimally utilised and projects in the pipeline completed.

—Transmission losses should be reduced to 8 per cent, the norm in most countries.

—Public and private sector should come together to put up units (two projects in Orissa and Faridabad have been cleared). Where private sector units come forward, proposals should be cleared and surplus power allowed to be fed into the common grid at mutually agreed rates.

—Management contracts should be given to private sector companies to run existing units.

Coal

—Coal production and movement should be improved and coordinated to meet industry's and power stations' requirements. Ash content has to be reduced to avoid damage to equipment.

Telecommunications

—An important area in infrastructure is telecommunications, where shortcomings have been noticed. Their impact has begun to be felt by industry, particularly the export sector.

—Private sector should be allowed to come into the manufacture of equipment in a bigger way, more so, because plan outlays in this area have been reduced.

Energy Conservation

—The likely savings in energy in the industry sector are indicated in Appendix 5.1. Investments required to be made and nature of improvement/changes desired are indicated. Energy conservation equipment should be exempted from excise, customs duties and sales tax. Soft loans should be provided to finance the entire investment.

Cost of Finance

5.5. Interest rates compare unfavourably with rates prevailing in foreign countries, whether it is short or long term finance. That makes for high cost and could have kept out investment at the margin.

—As a first step, interest rates charged by banks to medium/large scale industry and wholesale trade should be brought down to a maximum of say, 14 per cent. This could be done by reducing the spread between the weighted average of lending rates and the weighted average of borrowing rates to not more than 2 per cent. Also, the rate of interest charged on short term Government loans can over a period be increased by 1-2 percentage points and more importantly by increasing the rate RBI pays on SLR deposits with it from 3 to 5-6 per cent. A reduction of 1 per cent on bank deposits with simultaneous adjustment of interest rates on competing financial assets (post office and small savings, debentures), as has been recently done, will not affect the overall level of savings, as savings or a least large chunks of it, are contractual and are, therefore, not sensitive to small changes in interest rates.

—Equally important is that the rate of interest charged by financial institutions on long term loans is brought down to 11-12 per cent. Even so, interest rates in India would be higher than corresponding rates in most countries particularly NICs which have an impressive export record.

Some Other Changes in The Area of Finance

—Debt-equity ratios should be aligned to the capital intensity of projects, once their viability is cleared. The present system of a general overall ratio imposes heavy burden on the promoters and increases cost.

—Convertibility clause needs to be deleted, as it has adverse impact on new investment, expansion and adds to cost. It may be noted that the IFC, a World Bank subsidiary gives the option to the company rather than the other way round.

Inventories

5.6. Factors responsible for high inventories are : (a) restrictive import policies; (b) seasonal character or nature of the raw material availability; and (c) fear of a sudden strike disrupting supply and hence work. In contrast, inputs are available on tap, as it were, or can be obtained at short notice in most countries. Their developed telecommunication and transport ensures this. Such facilities naturally reduce the need for large inventories which are said to be as low as what are required for just one day or a week or a month at the most, in Japan, Korea and most countries of

Western Europe and Northern America. As against this, inventories are large in India and in view of the high interest costs, they impose a serious burden.

5.7. Customs Duty/Excise Duty on Capital Equipment

It was noted earlier that capital costs are generally on the high side in the developing countries. As against this, capital at the elbow of workers is much smaller. In all items where there is no domestic production capacity, customs duties/excise duties should be reduced in stages so that capital costs in turn work out to be lower than what they are presently.

—Excise duty, which is presently 15 per cent on the average, on capital goods, may be scrapped altogether

—There should be a simultaneous reduction in customs duty on items where excise duty has been removed.

—On all capital goods items, where there is no domestic manufacturing capacity, customs duty may be reduced in 2-3 stages to a reasonable level of say 25 to 30 per cent. Similarly, customs duty of 85 per cent on project imports should also be reduced in stages, on items which have to be imported and are not being manufactured in the country.

5.8. High taxation rates mean that on given investment a larger return will have to be generated to meet the tax obligation, besides having to pay a certain return on the equity capital raised. High taxation in other words adds to costs. It has the additional effect that corporate retentions are lower for that reason.

5.9. Delays add to costs

Whether it is at the stage of processing or during implementation, there are innumerable delays. Bunching of projects, spreading of resources too thinly over a large area, are the special features of the public sector. This has to be corrected to reduce delays and the pace of completion of projects quickened. There are a large number of half completed irrigation, power and industrial projects in the public sector. While the original cost of 13 on-going projects in the steel industry was placed at Rs. 4644 crores, it had gone up to Rs. 11415 crores by the end of 1985. To reduce delays further, particularly in relation to the private sector, the following steps may be considered :

—It should be made obligatory for the Government to grant industrial approvals within a stipulated period. Where proposals are neither cleared nor rejected within the stipulated period. they should be deemed to have been cleared. In the event of rejection, specific grounds and reasons should be given.

—Broadbanding should be extended to all commodities which can be produced with the machinery already installed plus 10 per cent of balancing equipment.

—Preference should be given to existing units to come up to economic size rather than allow setting up of smaller sized new units.

—To cut down delays, it would be best if the area of licensing is reduced to the bare minimum. Industrial licensing exemption limit should be raised to Rs. 50 crores except in the case of industries that are reserved for small scale sector.

—It has often been seen that proposals are either delayed or thwarted by linking them to MRTP. MRTP is primarily a market phenomenon. Only when a company has a sizeable share in the market, its expansion may be subjected to scrutiny. As a concept, market share has no economic content unless the company commanding a large share uses it to the deteriment of consumers. As there have been delays in the clearance of projects, it is suggested that Chapter III of the MRTP Act should be deleted, so that projects can be cleared more quickly. Also, in view of

the fact that the MRTP threshold limit has been raised from Rs. 20 to Rs. 100 crore, companies which do not come within the purview of the Act should be deregistered as soon as possible and their applications cleared expeditiously.

In order to encourage economies of scale, minimum scale has been notified for 73 industries. However, there are a large number of units below the minimum limits fixed. In view of the importance of the scale factor in bringing down costs, units should be allowed not only to reach the suggested limits, but go beyond, as the limits fixed fall far short of the capacities prevailing elsewhere.

5.10. Need for Technology Upgradation

The importance of technology in furthering growth has been brought out in an earlier section*. India is falling behind because of our somewhat restricted approach to technology and also because domestic effort was not adequate to the task.

—In recent years, the number of collaboration agreements has gone up and the terms and conditions relating to import of technology have been liberalised. Also, direct foreign investment has been increasing, indicative of the more open approach to technology imports. This trend has to be carried further. There is consequently need to take a fresh look at FERA, so that conditions are created for facilitating direct foreign investment and the formation of joint ventures.

—It has been noted in an earlier section that most technology imports into India are still small package technologies directly related to a given manufacturing process but not of such a nature as would lead to innovative effort. Government should carefully weigh problems relating to import of technology and be prepared to allow higher royalty and lumpsum payments consistent no doubt with the level and quality of technology being imported.

—There is simultaneously need for stepping up R&D activity in the country. Instead of dissipating effort on a number of projects, it would be best if some areas, such as those required to meet the consumption requirements of our people, as also enable exports of quality goods on a competitive basis, are taken up. FICCI has been holding that public and private sector R&D bodies and Government laboratories should together inter-mesh their research activity so that there is no duplication of effort and the best is obtained out of the research investments being made. Investment in research is investment in future. Since most of our companies are still small, they will not be in a position to undertake meaningful research and development work by themselves. Hence, the need for collective R&D. This is already being done in a small way in textiles, automobiles, etc. To accelerate research, it would be desirable that there is a tax on turnover to the extent of say 0.75 or 1 per cent of the turnover. Suitable set off must be however given to companies already doing research. Also, companies which are running losses and are not in a position to set apart funds for research effort may be exempted.

5.11. Raising Productivity

Productivity levels in India were observed to be very low in relation even to the newly industria-

*Charles Edquist, *et al*, article referred to earlier, EPW, April 13, 1985. What technology can do to reduce costs was illustrated by Edquist with reference to NCMTs (Numerical Control Machine Tools). Their introduction had cut down costs (in turning, milling, drilling and boring functions) by 3-40 per cent according to a German Study and a maximum of 60 per cent according to a Swedish Study. "The main source of saving lies" according to. Edquist in "increased labour productivity". Labour per unit of output can decline by anything from 1/3rd to 2/3rd". Also, capital cost and costs associated with work in progress can be brought down through improved machine utilisation.

lising countries, let alone the developed countries*. How small per employee/per worker productivity is in different fields was noted in an earlier section. There has been, in fact, a certain deterioration in India over the years.

—Security of service is, no doubt, an important component in motivating workers, but it has been given the primacy of importance to the detriment of efficiency.

—Both industry and Government should wake up and take definitive measures to raise productivity in industry. With upgradation of technology and modernisation there is bound to be a certain improvement in productivity*. However, that alone will not achieve the desired result.

—There is considerable over-manning in almost all industries, exmples of which were given earlier. Modernisation and technology upgradation will create conditions of surplus labour in most industries. The unemployed would, no doubt, be exposed to personal difficulty inspite of retrenchment benefits to which they are eligible. To overcome this problem, two alternative schemes can be thought of: a) Golden Hand Shake (retrenched labour can be given, say two years wages on graded basis as compensation) and, b) Unemployment Insurance Scheme can be initiated, to begin with, for the corporate sector (contribution fixed on a percentage of the wage bill to be shared by industry, labour and Government).

5.12. Adopting Appropriate Price Policy

The key to the success of any developmental plan lies in ensuring reasonable price stability. With the increases in Governmental expediture as also with the linking of dearness allowance to cost of living, prices have been going up at a fast pace. Thus, a situation has come about, when, with cent percent high degree of neutralisation, of additions to cost of living, wages are rising disproportionate to increases in productivity.

—Administered prices have been increasing at a rate faster than increase in wholesale prices (Appendix 5.2) Increase in administered prices in items like coal, steel, and power tariff rates, etc. is on account of the fact that these units have adopted 'cost-plus-pricing system', which has worked against improvement in efficiency and is only further adding to costs. Retention prices are being fixed either to meet increases in losses or to build up surpluses as in the case of petroleum products for offering budgetary support. Increases in administered prices have, over the last few years, been pushing up the rest of the prices because the items covered by administered prices are required as inputs by industry. Thus, the objective of raising the prices is self-defeating because it only tends to push costs and prices across the board. A reference was made earlier to the concept of mother industries and the provision of crucial inputs at competitive prices. This is something which goes beyond the IPRS. Before prices of items like coal, steel, etc., are raised, the Government should seek parliamentary approval so that there is proper discussion of the factors, which have led to the increase in prices, and such discussion raises awareness of the danger of pushing costs too high. It has been seen how much our cost prices are out of alignment with world costs/prices. Public sector enterprises should keep certain broad criteria

*Charles Edquist, *et al*, article referred to earlier in EPW April 13, 1985. Referring to the use of robots, Edquist has shown that the number of workers required has decreased per piece of machinery from 7.6 to 2.5 on average. Capital use has significantly improved and also labour costs were reduced. Similarly CAD/CAM application has varied types of effects on industry, doing for instance complex operation as in electronics, reducing lead time in production, reducing the time required for basic design and also allowing for re-use of information. Similarly, NCMT can reduce cost and save on labour. It has been estimated that labour productivity increased by 200 per cent through their use. Also semi-skilled worker can be engaged to work on 2nd/3rd shifts as skilled workers are reluctant to work on 2nd or 3rd shift.

in view before they fix administered prices : capacity utilisation should be at least 80 per cent and raising the prices on account of lower capacity utilisation should not be allowed. Besides, a proper review should be made of interrelationships such as raw materials to production, labour to production, energy to production and a certain minimum return of 12 per cent on the capital invested allowed. Some public sector units were beefed by artificial support like concessional interest, price preference in Government purchase and so on, which have to be phased out.

—A strict review of non-productive expenditure and budget deficits should be made so that the country does not get into a high cost situation arising out of excess liquidity. Simultaneously, prices of essential commodities like foodgrains, edible oils, tea, kerosone, washing soaps, textiles, drugs, sugar, etc., which affect the people most should be constantly monitored. A Committee consisting of representatives of Government, industry, trade and agriculture should monitor the price trends and take advance action.

5.13. Exports should be built into production plans

—Exports should be built into the regular production schedules of companies. If inputs are provided at prices at which they are made available in major exporting countries and the disabilities resulting from poor infrastructure, high capital and interest costs are compensated, India's exports would look up. In that event, export would not be a marginal activity related to the vagaries of the domestic market, but would become an integral part of manufacturing activity. This may not be possible to achieve all at once. To start with, some products and markets could be identified for special effort and the horizon for exports widened thereafter.

—More immediately the balance of trade situation has been creating concren. To an extent, imports of items like edible oils, fertilizers can be reduced. Import avoidance and import substitution should be pursued vigorously keeping the domestic cost efficiency aspect in view. The possibility of creating export processing zones should be explored more fully. Also, there are possibilities of reducing imports by entering into special arrangements. This can, for instance, be done by getting some of the raw materials available here, such as iron ore, converted into steel abroad, and steel brought back, such that there is no serious outflow of foreign exchange.

5.14. More importantly, it is necessary to explore avenues for increasing exports. FICCI has identified the following thrust areas for doubling exports in the next two-three years :

—Hand tools

—Machine tools

—Transmission towers

—Commercial vehicles

—Computer software

—Automotive tyres

—Processed foods

—Leather and leather goods

—Readymade garments, fabrics, knitwear and yarn

—Not only is there need to identify thrust areas, but there is also need to identify winner companies. There is need to prepare market specific as also product specific plans. Besides, there has to be an operational plan backed by institutional arrangements for each product. There are, for instance, a number of schemes which partly overlap and which are partly different from each other; these are CCS and duty drawback, import of canalised items, advance licencing scheme, supplementary licencing scheme, market development assistance, import-export passbook scheme, RBI regulations, IPRS for steel

to cent per cent export-oriented units and credit authorisation scheme.

—There are approximately 20 agencies with which an exporter has to deal. All these naturally cause significant delays in decision making and clearances. Add to this, the role of the Industry Ministry, which is the licencing authority for investment approvals covering investment approval for export purposes and there are substantial delays in SIA, DGTD, Department of Company Affairs, etc. FICCI has been proposing for long the concept of a single window agency, one agency which would give approvals covering all aspects of export. What is really required is a day-to-day operational clearance mechanism, a single window, which is used as 'Green Card' for pushing exports.

5.15 An agency similar to JETRO or KOTRA is what is required to lend support to the coordinatingagency within the Government through supply of the right kind of information. To start with, all countries where our manufacturing exports, or even exports for that matter, generally exceed Rs. 100 crore may be taken up for setting up a National Centre for Trade Information on the JETRO, KOTRA model and provide information about different aspects such as quality, price, tenders, tariff, product design, GSP concessions, etc. and also take care of special circumstances like product liability.

5.16 Our shipping services are inadequate and freight rates are unusually high. Also port charges are far higher than the rates prevailing in Asian ports such as Colombo, Hong Kong, South Korea, etc. These should be brought down. Similarly, railways should not only give priority to transporting exports items, but also provide 50 per cent concession in freight rates. Similarly, air freight subsidy should be provided. Containerisation has made significant strides all over and we should plan for efficient container vessels.

51.7 The single window clearance, we had referred to earlier, should provide one combined transport document (CTD), which would become readily negotiable.

5.18 Export incentives are provided by almost all countries in one form or the other. In contrast, incentives here are insignificant. Export should be given high priority and treated as investment. Export incentives should be linked to turnover rather than profits. Though concessional rate of interest at 9.5 per cent is offered to exporters, we are nowhere near countries like Switzerland which charges 7%, Japan 6%, Malaysia 5% and Pakistan 3%. Bank commission charges towards advance guarantees, bid bonds, and performance bonds should be reduced to levels prevailing in Japan and Korea. More immediately, there should be realistic fixation of CCS rates to take care of cost disadvantages, which cannot be brought down immediately owing to various problems.

5.19 As against Rs. 1824 crores exports realised in 1984-85 of the items in Table 5.1 it is projected that their exports will go up to Rs. 4825 crores in the next few years if the measures indicated are taken

Table 5.1

(Rs. Crore)

	Exports in 1984-85	Projections in next 2/3 years
Hand tools	37	135
Machine tools	26	100
Commercial vehicles	72	220
Transmission line towers	22	100
Computer software	24	300
Automotive tyres	47	100
Leather & Leather products	456	1000
Readymade garments	858	2000
Processed food	282	870
TOTAL	1824	4825

5.20 Additionally, special mention needs to be made of possibilities of export of cereals, fruits and

vegetables, marine products, etc. where India's presence is presently negligible. We have some surplus in wheat and rice : and if intensive farming is resorted to in the already irrigated areas and such areas as will come under irrigation in the next few years, there is considerable scope for stepping up production for domestic consumption as also exports. Even apart from cereals, fruits and vegetables offer good export prospect. Marine products once again, which appeared to be an item that was evoking interest has gone into the background. If adequate steps are taken, it is possible to export cereals, fruits, vegetables and marine products to the extent of Rs. 5000 to Rs. 5500 crore in the next five years annually. Processing and preservation of perishable commodities should be taken in hand.

Should we Devalue?

5.21 The Indian rupee has lost in relation to major currencies like DM (33%), Japanese Yen (22%), Pound Sterling (29%) and Swiss Franc (32%) between March 1986 and March 1987. The question has been raised if there should be a further devaluation of Rupee in relation to other countries in addition to the reduction, it has undergone.

5.22 Most discussions of exchange rate policy are often made in terms of nominal exchange rate, but the more decisive rate is the nominal exchange rate adjusted by the difference between domestic and foreign rates of inflation, which is the real exchange rate. If the Rupee appreciates, to that extent, our competitiveness in reduced and if it depreciates, our competitiveness is higher. Notice that the difference between the nominal exchange rate and the real exchange rate is almost 10 percentage points for 1984 (Appendix 5.3). It has been estimated on the basis of our experience during the 70's, that if there is a 1 percentage point fall in real exchange rate, it could lead to 2 percentage rise in exports after allowing for the natural growth of exports. This may not be true in all circumstances. Any decision about more drastic reduction in Rupee value will have to be judged in terms of the basket of imports and exports, possibility of changes in the direction of trade after adjustment and the impact of devaluation on debt and other payment obligations. In our situation imports would only become more expensive and not fall as imports are price in-elastic. It is doubtful if exports will increase far more on account of large scale devaluation, our exports should basically become cost effective. The RCA ratings worked out by UNIDO for individual commodities for different countries are instructive. They have shown, that with some effort at cost containment, the country could regain the earlier advantage and emerge as a sizeable exporter.

Summing up

5.23 The key to increased exports is held by cost reduction and quality improvement besides quick and prompt service. Cost reduction will help push up domestic demand too. This has to be brought about through reduction in capital and interest costs, economies of scale energy saving, improvement in infrastructure, modernisation and productivity increase. Indirect taxes have pushed up costs and acted as a drag on consumption. Phased reduction of indirect taxes will be a helpful factor in stimulating demand. Consumer credit can also be helpful in this regard. What will sustain demand in the long term is adequate increase in disposable income, per capita disposable income, across different sections of the people and macro-economic policies oriented to effecting reductions in costs and improving incomes.

APPENDICES

Appendix 2.1.

Market Size of Industrial Consumption Goods (Rural)

(in million 1964-65 prices)

Fractile Class (Percentage)	Rounds					
	16	18	20	22	24	28
0–10	777.84 (2.08%)	874.34 (2.51%)	844.5 (4.11%)	731.88 (3.97%)	791.00 (2.33%)	981.67 (2.49%)
10–20	1131.70 (3.02%)	1164.27 (3.34%)	1097.38 (5.35%)	1005.72 (5.45%)	1150.38 (3.39%)	1369.90 (3.47%)
20–30	1460.53 (3.90%)	1483.87 (4.25%)	1446.04 (7.04%)	1249.68 (6.77%)	1369.00 (4.04%)	1674.94 (4.24%)
30–40	1750.93 (4.68%)	1835.43 (5.26%)	1722.84 (8.39%)	1503.60 (8.15%)	1639.60 (4.84%)	1841.32 (4.66%)
40–50	1990.00 (5.32%)	2063.72 (5.92%)	2009.18 (9.79%)	1847.13 (10.01%)	1983.24 (5.85%)	2456.95 (6.72%)
50–60	2630.66 (7.03%)	2401.59 (6.89%)	2371.88 (11.55%)	1986.54 (10.77%)	2316.38 (6.84%)	2606.68 (6.60%)
60–70	3096.16 (8.27%)	2972.31 (8.52%)	2915.94 (14.20%)	2648.72 (14.36%)	3164.86 (9.34%)	3538.45 (8.96%)
70–80	4150.98 (11.09%)	3702.83 (10.62%)	3545.89 (17.27%)	3116.73 (16.89%)	3732.64 (11.01%)	4114.16 (10.42%)
80–90	6012.95 (16.06%)	4967.55 (14.24%)	4576.73 (22.29%)	4361.43 (23.64%)	4997.14 (14.75%)	6322.62 (16.10%)
90–100	14432.36 (38.55%)	13411.90 (38.45%)	12154.73 (59.20%)	8411.68 (45.59%)	12742.72 (37.60%)	14589.17 (36.94%)

Source : Paper by Dr Rangarajan : EPW Annual number 1982

Appendix-2.2

Market Size of Industrial Consumption Goods (Urban)

(Rs million, 1964-65 prices)

Fractile Class (Percentage)	Rounds					
	16	18	20	22	24	28
0–10	247.05 (1.97%)	246.04 (1.85%)	237.28 (2.45%)	218.59 (2.13%)	269.60 (1.83%)	333.5 (2.40%)
10–20	364.66 (2.90%)	381.85 (2.87%)	321.61 (3.32%)	323.52 (3.15%)	407.84 (2.76%)	473 98 (3.39%)
20–30	496.84 (3.96%)	468.05 (3.52%)	409.61 (4.23%)	409.86 (3.99%)	506.08 (3.43%)	555.27 (3.97%)
30–40	588.71 (4.69%)	595.33 (4.48%)	468.28 (4.83%)	474.34 (4.62%)	606.61 (4.11%)	684.79 (4 90%)
40–50	691.83 (5.51%)	759.70 (5.71%)	566.75 (5.85%)	560.69 (5.46%)	822.23 (5.57%)	799.15 (5.72%)
50–60	854.00 (6.80%)	939.10 (7.06%)	652.65 (6.74%)	707.14 (6.89%)	928.77 (6.30%)	1000.37 (7.15%)
60–70	1059.31 (8.44%)	1111.48 (8.35%)	819.22 (8.46%)	921.36 (8.98%)	1198.38 (8.12%)	1092.62 (7.81%)
70–80	1440.84 (11.48%)	1409.15 (10.60%)	1073.79 (11.09%)	1178.21 (11.48%)	1659.91 (11.25%)	1532.16 (10.96%)
80–90	2114.86 (16.85%)	2272.08 (17.09%)	1588.16 (16.40%)	1779.34 (17.33%)	3312.47 (22.45%)	2135.65 (15.27%)
90–100	4696.1 (37.41%)	5111.93 (38.45%)	3548.74 (36.64%)	3692.56 (35.97%)	5041.41 (34.17%)	5372 89 (38.43%)

Source : Paper by Dr C Rangarajan EPW Annual number 1982.

Value of Consumption of Board Groups of Items Per Person for a Period of 30 Days by Monthly Per Capita Expenditure Classes

All-India : Rural

No. of Sample Villages : 8216

Sl. No.	Items	Monthly per capita expenditure classes in rupee														All expenditure classes
		0-10	10-15	15-20	20-30	30-35	35-40	40-50	50-60	60-70	70-80	80-100	100-150	150-200	200 & above	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	Total cereals	1.29	8.37	9.56	13.87	16.82	18.40	20.65	23.07	24.73	26.01	27.20	29.06	31.64	38.44	22.59
2.	Gram	0.01	0.03	0.06	0.09	0.11	0 15	0.18	0.23	0.31	0.36	0.44	0.59	0.80	0.96	0.29
3.	Cereal & Subst.	0.09	0.35	0.30	0.26	0.23	0 24	0 23	0.21	0.19	0 22	0.23	0.23	0.24	0.27	0.23
4.	Pulses	0.09	0.35	0.55	0.96	1.32	1.62	1.99	2.46	2 81	3.26	3.71	4.58	5.62	7 12	2.63
5.	Milk & products	0.11	0.23	0.25	0.48	0.83	1.26	2.08	3.42	4.98	6.80	9.20	13.91	20.90	27.52	5.29
6.	Edible oils	0.10	0.41	0.51	0.88	1.20	1.46	1.79	2.24	2 64	3.01	3.45	4 26	5.32	8 34	2.46
7.	Meat, egg, fish	0.10	0.29	0.32	0.58	0.81	0.97	1.25	1 65	1.97	2.32	2.64	3.34	4.46	6.84	1.84
8.	Vegetable	0.21	0.71	0.85	1.19	1.50	1.76	2.07	2.48	2.80	3.15	3.45	4.11	5.09	6.57	2 60
9.	Fruits & nuts	0.09	0.12	0 11	0.16	0.23	0.28	0.38	0.50	0.66	0.88	1 19	1.88	2 80	4.43	0.77
10.	Sugar	0.05	0.25	0.30	0.51	0.70	0.86	1.09	1.42	1.79	2 19	2.74	3.78	5.30	8.44	1.82
11.	Salt	0.03	0.09	0.10	0.11	0.12	0.12	0 13	0.13	0 13	0.14	0 14	0 15	0 16	0.20	0.13
12.	Spices	0.24	0.57	0.72	1.01	1.23	1 41	1.59	1.83	2.05	2.26	2.56	3.08	3.74	4.92	1.96
13.	Beverages & refts.	0.19	0.33	0.38	0 45	0.61	0.77	1.01	1.31	1,67	1.97	2.50	2.58	5.88	8.76	1.72
14.	Food total (1-13)	2.60	10.10	13.97	20.53	25,71	29.30	34.44	40.95	46.73	52.57	59.40	72.55	91.95	122.81	44.33
15.	Pan, tob. intox.	0.34	0.53	0.60	0.89	1.09	1.27	1.49	1.78	2.08	2.25	2.62	3.37	4 49	7.03	1.99
16.	Fuel & light	0.80	1.54	1.94	2.41	2.75	3.05	3.39	3.83	4.27	4.72	6.17	6.11	7.73	11.12	4.13
17.	Clothing	0.13	0.24	0.34	0.57	0.90	1.26	1.93	3.07	4.56	6.07	8 84	15.33	28.26	62.89	5.99
18.	Footwear	0.02	0.03	0.01	0.02	0 05	0.06	0.10	0.18	0.30	0.44	0.70	1.36	2.37	8.17	0.51
19.	Misc. goods & services	0.66	0.69	0.87	1.35	1.90	2.41	3.23	4.34	5.80	7.30	9.95	16.00	26.62	68.65	7.12
20.	Durable goods	0.02	0 03	0.07	0.10	0 16	0.24	0.36	0.65	0.92	1.33	2.09	4.10	8.85	208.83	4.82
21.	Non-food total (15-20)	1.97	3.06	3.83	5.34	6.85	8.29	10.50	13.85	17.93	22.11	29.37	45.27	78.32	366.69	34.56

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
22.	Total exp. (14+21)	4.57	13.16	17.80	25.87	32.56	37.59	44.94	54.80	64.66	74.68	88.82	118.82	170.27	489.50	68.89
23.	Consumer rent	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.05	0.08	0.08	0.15	0.27	0.49	5.84	0.19
24.	Consumer tax cess	—	—	—	—	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0 08	0.09	0.14	0.02
25.	No. of sample households	341	375	958	6701	6069	7290	15719	14625	11769	8749	10951	10505	3108	2606	99766
	Average	3.07	6.17	6.07	5.87	5.73	5.61	5.54	5.36	5.26	5.05	4.84	4.58	4.08	3.72	5.22

Source : National Sample Survey, 32nd Round : July 1977—June 1978.

Appendix 2.3 A

Value of Consumption of Broad Groups of Items per Person for a Period of 30 days by Monthly per Capita Expenditure Classes

All India : Urban

No. of Sample Blocks : 4871

Sl. No.	Items	Monthly per capita expenditure classes in rupee														All expenditure classes
		0-10	10-15	15-20	20-30	30-35	35-40	40-50	50-60	60-70	70-80	80-100	100-150	150 200	200-300	300 & above	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	Total cereals	1.16	3.61	7.47	11.61	13 93	15.44	17.13	18.58	19.57	20.33	21.15	21.65	22.54	22.91	24.18	19.66
2.	Gram	—	0.03	0.0:	0.06	0.08	0.09	0.10	0,13	0.20	0.21	0.27	0.32	0.41	0.52	0.61	0.24
3.	Cereal subs.	—	0.21	0.18	0.13	0.13	0.12	0.08	0.08	0.08	0.09	0.09	0.10	0.13	0.13	0.14	0.10
4.	Pulses	0.01	0.27	0.51	1.05	1.39	1.74	2.13	2.53	3.03	3.31	3.78	4.40	5 22	5.81	6.83	3.43
5.	Milk & milk prod.	0.11	0.23	0.42	0.80	1.22	1 72	2.57	4.05	5.47	7.02	9.36	13.70	19 91	26 48	34.76	9.16
6.	Edible oils	0.06	0.31	0.58	1.10	1.49	1.81	2.29	2.90	3.56	4.08	4.87	6.08	7.60	8.84	11.10	4.46
7.	Meat, egg, fish	0.10	0.42	0.45	0.60	0.94	1.12	1.52	1.92	2.38	2.85	3.36	4.40	6.11	8.26	12.13	3.33

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
8.	Vegetables	0.16	0.53	0.70	1.20	1.63	1.91	2.36	2.85	3.40	3.80	4.43	5.50	7.11	18.73	11.09	4.23
9.	Fruits nuts	0.11	0.40	0.24	0.25	0.34	0.38	0.50	0.65	0.87	1.15	1.56	2.50	4.27	6.89	11.88	1.88
10.	Sugar	0.05	0.20	0.50	0.78	1.01	1.13	1.38	1.72	2.02	2.32	2.76	3.40	4.23	4.92	6.30	2 54
11.	Salt	0.01	0.04	0.07	0.09	0.09	0.09	0.10	0.11	0.11	0.12	0.13	0.10	0.16	0.17	0.24	0.13
12.	Spices	0.11	0.49	0.77	1.09	1.35	1.48	1.70	1.92	2.11	2.29	2.53	2.97	3.46	4.00	5.07	2.42
13.	Beverages & refts.	0.84	1.88	1.52	1.28	1.47	1.63	2.04	2.63	3.31	3.92	4.78	7.80	13.92	21.02	35.66	6.09
14.	Food total (1-13)	2.72	8.62	13.42	20.01	25.07	28.66	33.90	40 07	46.11	51 49	59.07	73.22	95.07	118.68	159.99	57.67
15.	Pan. tob. intox.	0.15	0.39	0.54	0.70	0.90	1.11	1.29	1.50	1.77	1.95	2.26	2.85	4.00	5.20	10.30	2 34
16.	Fuel & light	0.27	1.32	1.87	2.40	2.86	3.23	3.76	4.35	5.02	5.56	6.33	7.83	10.14	12.02	16.00	6.17
17.	Clothing	0.02	0.31	0.16	0.31	0.51	0.61	0.83	1.52	2.19	3.25	4.60	9.04	15.61	28.04	67.89	6.78
18.	Footwear	0.10	—	0.02	0.02	0.04	0.04	0.06	0.13	0.18	0.26	0.43	0.84	1.49	2.39	4.94	0 59
19.	Misc. goods & servs.	1.13	1.57	1.46	1.99	2.64	3.05	4.04	5.45	7.02	8.80	11.38	17.82	28.82	44.20	118.06	14.05
20.	Durable goods	0.07	0.43	0.46	0.41	0.65	0.88	1.28	1.87	2.59	3.46	5.06	8.96	15.82	28.22	142.57	8.55
21.	Non-food total (15-20)	1.74	4.03	4.51	5.92	7.60	8.92	11.26	14.82	18.77	23 28	30.06	47.34	75.88	120.07	359.76	38.48
22.	Total exp. (14+21)	4.46	12.64	17.93	26.06	32.67	37.58	45.16	54.89	64.88	74.77	89.13	120.56	170.95	238.75	519 75	96.15
23.	Consumer rent	0.02	0.32	0.39	0.28	0.47	0.64	0.82	1.14	1.58	1.99	2.90	4.72	8.44	14·28	29.06	3.67
24.	Consumer tax cess	—	—	—	0.01	0.01	0.01	0.03	0.04	0.06	0.07	0.12	0.22	0.49	0.80	1.79	0.18
25.	No. of sample hhs.	164	71	166	1141	1287	1872	5031	5901	5768	5236	8373	11426	5411	4080	2235	58162
	Average	2.45	5.36	5.30	6.34	6.44	6.34	6.17	6.05	5.68	5.47	4.99	4.31	3.45	2.98	2.53	4.89

Source : National Sample Survey, 32 Round July 1977-June 1978

Value of Consumption of Board Groups of Items Per Person for a Period of 30 Days by Monthly Per Capita Expenditure Classes

All India : Rural

No. of Sample Villages : 7799

Sl. No.	Items	Monthly per capita expenditure classes in rupee													All expenditure classes
		0-30	30-40	40-50	50-60	60-70	70-85	85-100	100-125	125-150	150-200	200-250	250-300	300 & above	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Total cereals	12.98	19.28	23.18	26.77	29.89	33.32	37.04	39.50	41.53	44.46	47.20	47.63	58.04	36.31
2.	Gram	0.14	0.18	0.16	0.15	0.17	0.18	0.20	0.28	0.36	0.44	0.52	0.73	1 19	0.29
3.	Cereal substitutes	0.26	0.18	0.20	0.16	0.18	0.16	0.17	0.22	0.25	0.30	0.33	0.34	0.35	0.21
4.	Pulses	0.71	1.17	1.77	2.14	2.58	3.02	3.53	4.27	4.94	5.83	6.86	7.57	10.97	3.96
5.	Milk and milk product	0.15	0.52	1.04	1.65	2.54	3.93	5.87	8.45	12.26	16.97	22.59	26.81	36.29	8.45
6.	Edible oil	0.80	1.28	1.79	2.24	2.72	3.36	3.92	4.71	5.58	6.66	8.22	9.39	16.19	4.53
7.	Meat, egg, fish	0.86	0.62	0.83	1.21	1.63	2.05	2.74	3.54	4.47	5 89	7.46	9.22	12.25	3.40
8.	Vegetables	1.44	1.88	2.54	3.00	3.65	4.28	4.92	5.72	6.48	7.54	8.76	9.89	12.50	5.30
9.	Fruits and nuts	0.07	0.20	0.25	0.40	0.54	0.75	0.90	1.44	2.06	2.90	4.13	5.28	8.46	1.56
10.	Sugar	0.29	0.62	0.94	1.27	1.60	2.03	2.51	3.23	4.16	5.13	6. 6	7.64	13.31	3.16
11.	Salt	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.29	0.19
12.	Spices	0.79	1.19	1 45	1.59	1.91	2.16	2.39	2.76	3.14	3.65	4.27	4.83	6.30	2.64
13.	Beverages & refts.	0.33	0.57	0.85	1.12	1.57	2.05	2.72	3.66	483	6.41	8.98	11.96	17.32	3.72
14.	Food total (1-13)	18.98	27.83	35.16	42.04	49.14	57.47	67.19	77.98	90.27	106.42	126.04	141.57	193.52	73.73
15.	Pan, tob., intox.	0.77	1.15	1.43	1.82	2.09	2.48	2.90	3.46	4.12	5.09	6.00	7.40	10.71	3.36
16.	Fuel & light	3.37	4.03	4.68	5.36	5.98	6.70	7.32	8.32	9.41	10.50	12.11	13.39	16.80	7.92
17.	Clothing	0.31	0.41	0.70	1.22	1.80	2.77	4.32	6.99	11.58	18.70	32.71	50.03	78 42	9.66
18.	Foot-wear	0.02	0 05	0.11	0.18	0.24	0.35	0.56	0.93	1.43	2.25	3.35	4.92	7.84	1.11
19.	Misc. goods & servs.	1.37	2.29	3.26	4.46	5.65	7.28	9.44	12.95	18.06	24.79	35.26	44.36	77.67	14.10
20.	Durable goods	0.02	0.04	0.08	0.14	0.25	0.32	0.53	0.94	1.66	3.38	6.04	10.46	52.37	2.55
21.	Non-food total (15—20)	5.88	8.00	10.27	13.19	16.02	19.91	25.07	33.58	46.27	64.71	95.47	130.55	243 81	38.71

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
22.	Total exped. (14+21)	24.86	35.84	45.44	55.24	65.17	77.40	92.27	111.58	136.56	171.14	221 52	272.12	437.34	112.45
23.	Consumer rent	—	0.01	0.01	0.02	0.03	0.04	0.09	0.13	0.16	0.38	0.62	0.82	1.88	0.18
24.	Con. taxes	—	—	0.01	0.01	0.01	0.02	0.02	0.05	0.07	0.11	0.11	0.13	0.38	0.05
25.	No. of sample hhs	505	1450	3117	4903	6133	10402	10044	13485	8599	8925	3828	1796	2686	75913
	No. of size of household	5.20	5.84	5.71	5.77	5.65	5.51	5.42	5.25	5.00	4.70	4.34	4.15	3.72	5.21
	No. of household	92	164	409	932	1424	3037	3604	6178	5316	7441	4430	2843	6113	41983
	Family size	3.75	5.79	6.44	6.11	6.43	6.05	5.82	5.62	5.28	4.68	4.11	3.71	3.06	4.85

Source : National Sample Survey, 38th Round : January to December, 1983.

Appendix 2.4A

Value of Consumption of Broad Groups of Items Per Person for a Period of 30 Days by Monthly Per Capita Expenditure Classes

All India : Urban

No. of Sample Blocks : 4327

Sl. No.	Items	Monthly per capita expenditure classes in rupee													All expenditure classes
		0-30	30-40	40-50	50-60	60-70	70-85	85-100	100-125	125-150	150-200	200-250	250-300	300 & above	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Total cereals	8.35	15.73	19.15	21.76	24.19	27.22	29.42	31.05	33.49	34 46	35.72	36.52	38.27	31.85
2.	Gram	—	0.02	0.05	0.13	0.13	0.12	0,16	0.21	0.30	0,37	0.48	0 54	0.69	0.31
3.	Cereal subs.	0.08	0.05	0.05	0.04	0.05	0.06	0.08	0.10	0.13	0.15	0.19	0.19	0.25	0.13

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4.	Pulses	0.58	1.17	1.92	2.44	2.93	3.27	3.85	4.52	5.33	6.03	7.10	7.65	8.97	5.29
5.	Milk & milk products	0.39	0.93	1.38	2.44	3.58	4.83	6.53	9.70	12.95	17.69	23.47	29.39	41.74	15.15
6.	Edible oils	0.72	1.43	2.23	2.79	3.41	4.13	5.07	6.43	7.75	9.20	11 13	12.60	15.68	7.94
7.	Meat, egg, fish	0.42	0.82	1.28	1.64	2.00	2.58	3.32	4.16	5.28	6 71	8.44	10.18	14.80	5.92
8.	Vegetables	0.98	1.91	2.66	3.26	3.84	4.56	5.50	6.54	7.81	9.21	11.01	12.78	16.49	8.17
9.	Fruits and nuts	0.19	0.27	0.34	0·51	0.68	0.93	1.19	1.70	2.48	3.50	5 29	7.04	12.59	3.46
10.	Sugar	0.50	0.87	1.32	1.70	2.02	2.38	2.83	3.45	3.97	4.59	5.36	5.94	7.42	4.03
11.	Salt	0.08	0.12	0.13	0.13	0.14	0.15	0.16	0.16	0.17	0.19	0.20	0.22	0.25	0.18
12.	Spices	0.80	1.24	1.60	1.79	2.04	2.26	2.57	2.94	3.29	3.68	4.22	4.68	5.49	3.33
13.	Beverages & refts.	1.48	2.37	2.09	2.66	2.80	3.78	4.70	5.94	7.92	10.98	15.79	21.51	40.08	11 21
14.	Food total (1-13)	14.57	26.93	34.20	41.31	47.81	56.27	65.38	76.90	90.87	106.76	128.40	149.24	202.72	96.97
15.	Pan, tob., intox.	0.88	1.17	1.27	1.66	1.73	2.02	2.63	3.14	3.58	4.42	5.42	6.37	9.04	4.01
16.	Fuel & light	2.63	4.05	4.88	5.67	6.44	7.22	8.19	9.44	10.79	12.57	14.82	16.22	21.45	11.36
17.	Clothing	0.11	0.13	0.38	0.40	0.82	1.38	2.33	3.57	5.83	10.92	18.85	26.56	63 25	12.52
18.	Foot-wear	0.01	0.03	0.10	0.18	0.19	0.31	0.50	0.78	1.18	1.75	2.81	3.80	7.37	1.80
19.	Mis. goods & servs.	3.67	3.49	4.80	6.24	8.14	10.00	13.23	17.58	24.02	33.71	49.46	65.14	120.77	33.68
20.	Durable goods	0.05	0.01	0.07	0.08	0.12	0.21	0.27	0.59	0.92	1.83	2.88	5.75	27.45	3.69
21.	Non-food total (15-20)	7·35	8.88	11.50	14.23	17.44	21.14	27.15	35.10	46.32	65.20	94.24	123.84	249.33	67.06
22.	Total expend. (14+21)	21.92	35.81	45.70	55.54	65.25	77.41	92.53	112.00	137.19	171.96	222.64	273.08	452.05	164.03
23.	Consumer rent	0.80	0.47	0.68	0.71	0.93	1.37	1.97	2.60	3.88	5.75	9.24	13.71	22.50	5.93
24.	Con. tax cess	—	—	0.04	0.05	0.03	0.06	0.07	0.14	0.24	0.36	0.75	0.91	2.77	0.50
	No. of households	92	164	409	932	1424	3037	3604	6178	5316	7441	4430	2843	6113	41983
	Family size	3.75	5.79	6.44	6.11	6.43	6.05	5.82	5.62	5.28	4.68	4.11	3.71	3.06	4.85

Source : National Sample Survey : 38th Round : January to December, 1983.

Specification of Equations

Y = Total disposable income in current prices

X_3 = Consumer cost of living index (implicit series derived by using private final consumption expenditure)

X_3^1 = Wholesale prices of industrial goods

X_4 = Indirect taxes (total quantum)

X_5 = Population

$e^{\lambda t}$ = Trend variable

C = Consumer expenditure on industrial goods

Equation 16

$C = A\,(Y)^{h1}\,(X_3)^{h3}\,(X_4)^{h4}\,e^{\lambda t}$

h1 = 0.12793

h3 = −0.21127 $R^2 = 0.9979$

h4 = 0.19600

λ = 0.04378

Equation 17

$C = A\,(Y)^{h1}\,(X_3)^{h3}\,(X_4)^{h4}\,(X_5)^{h5}$

h1 = 0.11687

h3 = 0.18496 $R^2 = 0.997$ [illegible]

h4 = 0.21031

h5 = 4.35031

Equation 18

$C = A\,(Y)^{h1}\,(X_3^1)^{h3}\,(X_4)^{h4}\,e^{\lambda t}$

h1 = 0.0864

h_3^1 = 0.1809 $R^2 = 0.9980$

h_4 = 0.1857

λ = 0.0459

Equation 19

$C = A\,(Y)^{h1}\,(X_3^1)^{h3}\,(X_4)^{h4}\,(X_5)^{h5}$

h1 = 0.1101

h_3 = 0.2026 $R^2 = 0.7982$

h_4 = 0.2133

h_5 = 4.4818

Appendix 2.6

Revealed Comparative Advantage Ratio and Manufactured Exports for Countries with Growth of RCA Exceeding 10% between 1966 and 1982

Country	Rel Comp Ave 1966	Rel Comp Ave 1982	Ratio of RCA 1982/1966	Manufactured** Exports 1982
Hongkong	(1) 1.21	(1) 1.33	1.10	18,971
Germany*	(2) 1.18	(3) 1.30	1.10	1,55,111
Italy*	(3) 1.15	(3) 1.30	1.13	70,191
Austria*	(4) 1.14	(3) 1.30	1.14	14,377
Sweden*	(5) 1.13	(2) 1.31	1.15	24,372
Portugal	(5) 1.13	(3) 1.30	1.16	4,154
France*	(7) 1.10	(12) 1.24	1.12	79,801
Denmark*	(8) 1.08	(13) 1.23	1.14	13,322
Yugoslavia	(9) 1.05	(9) 1.27	1.21	8,614
Chile	(10) 0.98	(20) 1.08	1.10	2,932
United States*	(10) 0.98	(19) 1.10	1.12	1,71,296
Brazil	(10) 0.98	(18) 1.12	1.14	16,086
Colombia	(10) 0.98	(11) 1.25	1.28	3,023
Ireland*	(14) 0.96	(10) 1.26	1.31	7,396
Spain	(15) 0.91	(15) 1.22	1.33	18,853
Korea	(16) 0.84	(3) 1.30	1.53	18,132
Canada*	(17) 0.83	(−6) 0.97	1.16	49,598
Argentina	(18) 0.81	(−5) 0.90	1.11	4,079
Singapore	(18) 0.81	(13) 1.23	1.52	13,118
Taiwan	(20) 0.80	(8) 1.29	1.61	17,190
India	(0) 0.77	(0) 0.99	1.28	5,954
Israel	(−1) 0.10	(16) 1.21	1.21	5,175
Algeria	(−2) 0.41	(−1) 0.48	1.16	4,572
Malaysia	(−3) 0.50	(−2) 0.65	1.30	5,647
Philippines	(−4) 0.51	(21) 1.02	2.02	3,591
Turkey	(−5) 0.53	(−3) 0.83	1.56	3,513
Greece	(−6) 0.54	(20) 1.08	1.10	2,967
Thailand	(−7) 0.56	(−4) 0.86	1.54	4,551
China	(−8) 0.76	(17) 1.13	1.50	17,533

*Industrialized country
**In Million US Dollars

Source : INDSP Data Base

Note : Figures in brackets indicate the ranking of the country in descending order of comparative advantage, in relation to India which is given in figure '(O)'

Approximate Shares of Labour, Capital and Raw Material in Total Production Costs for Resource-Based Industries

(percentage)

Industry	Raw material	Labour	Capital
Copper, refined (ore input)	60	—	—
Aluminium (input)			
Alumina (bauxite)	24	10	40
Aluminium ingots			
Alumina	28	13	30
Bauxite	7	16	41
Semi-fabricated products			
Aluminium	43	21	15
Bauxite	3	28	31
Steel (input)			
Pig iron (ore, coal)	55 — 74	2 — 4	19 — 30
Crude steel			
Pig iron	65 — 74	2 — 5	10 — 13
Ore, coal	36 — 55	3 — 7	24 — 34
Rolled steel			
Crude steel	55 — 74	1 — 4	17 — 38
Ore, coal	21 — 30	3 — 8	40 — 50
Ammonia (Natural gas)	22 — 43	2 — 6	41 — 46
Wood products (timber)			
Sawmills	32	18	12
Plywood	31	10 — 16	12 — 23
Pulp/paper	26	4 — 6	30 — 34
Leather (input)			
Corrected grain leather (raw hides)	56	9 — 18	11 — 17
Quality welted shoes (leather uppers, soles etc.)	48	5 — 18	22

Sources : For copper, M.S. Brown and J. Butler. The Production, Marketing and Consumption of Copper and Aluminium (new York) Praeger, 1968). p.5; for aluminium, N. Girvan, Foreign Capital and Economic Underdevelopment in Jamaica (Univeristy of the West Indies, 1971) p.78; for steel, W. Baer, The Development of the Brazilian Steel Industry (Nashville, Vanderbilt Press, 1969), p 124; for ammonia, Fertilizer Industry Industrialization of Developing Countries : Problems and Prospects, Monograph No. 6 (United Nations Publication, Sales No. 69. II.B. 39, vol. 6), p 20; for wood products, J Page, "The timber industry and Ghanaian development", in Commodity Exports and African Economic Development (Lexington, Mass., D.C. Heath, 1974). p. 107, K.G. Koehler, "Wood processing in East Kalimantan", Bulletin of Indonesian Economic Studies, vol. 8, No. 3 (November 1972); p. 112 and National Counc l of Applied Economic Research, Paper Industry : Problems and Prospects (New Delhi, NCAER, 1972), p. 157-159, for leather, "Draft world-wide study of the leather and leather products industry" (UNIDO/ICIS. 45), pp. 77.78 and 111.

Major Industrial Countries : Interest Rates[1]

	1978	1979	1980	1981	1982	1983	1984	1985	1986	Jan. 1987
Short-term interest rates[2]										
Canada	8.5	11.9	13.4	18.3	14.4	9.5	11.3	9.6	9.2	8.0
United States	8.2	11.2	13.1	15.9	12.4	9.1	10.4	8.0	6.5	5.9
Japan	4.4	5.9	11.0	7.7	7.1	6.7	6.3	6.7	5.1	4.3
France	8.1	9.5	12.2	15.4	14.6	12.4	11.7	9.9	7.7	8.5
Germany, Feb. Rep. of	3.7	6.6	9.5	12.0	8.8	5.7	6.0	5.4	4.6	4.5
Italy	11.4	12.0	17.5	20.0	20.0	18.0	17.1	14.0	12.6	11.4
United Kingdom	9.2	13.6	16.6	13.8	12.3	10.1	9.9	12.2	10.9	11.0
Seven major countries above[3]	7.3	9.8	12.6	14.1	11.8	9.2	9.9	8.4	6.9	6.4
Four major European countries above	7.2	9.6	12.8	15.5	13.0	10.6	10.3	9.8	8.3	8.2
Long-term interest rates[3]										
Canada	0.7	10.2	12.5	15.2	14.3	11.8	12.8	11.0	19.5	8.9
United States	8.5	9.3	11.4	13.7	12.9	11.3	12.5	11.0	7.7	7.1
Japan	6.1	7.7	8.9	8.4	8.3	7.8	7.3	6.5	5.2	5.1
France	9.0	9.5	13.0	15.7	15.6	13.6	12.4	10.9	8.5	8.9
Germany, Fed. Rep. of	5.7	7.4	8.5	10.4	9.0	7.9	7.8	6.9	5.9	5.8
Italy	13.7	14.1	16.1	20.6	20.9	18.0	15.0	13.0	10.4	8.7
United Kingdom	12.5	13.0	12.8	14.7	12.9	10.8	10.7	10.6	9.9	10.0
Seven major countries above[3]	8.4	9.3	11.2	13.1	12.4	10.9	11.1	9.9	7.5	7.1
Four major European countries above	9.2	10.1	12.0	14.3	13.6	11.8	10.9	9.9	8.8	8.0

1. Composites for the country groups are averages of interest rates for individual countries weighted by the average U.S. dollar value of their respective GNPs over the preceding three years.

2. Interest rate on the following instruments : Canada, three month Financial paper; United States, 90-day bank certificates of deposit in secondary market; Japan, discount rate on two-month private bills, France the Federal Republic of Germany, Italy, and the United Kingdom, three-month interbank loan rate.

3. Average yield to maturity of central government bonds with terms of 10 years or more for Canada, 20 years for the United States and the United Kingdom, and over the counter sales yields of interest bearing govt. bonds with maturities of 10 yrs. or more for Japan. Average yield to maturity of National Equipment Bonds of 1965, 1966 and 1967 for France, pub ic authorities bonds with terms of three yrs. or more for the Federal Republic of Germany, and bonds issued by the Consortium of Credit for Public Works with an average maturity of 15 to 20 yrs. for Italy.

Source : World Economic outlook 1987.

Appendix-3.3

Comparative Interest Rates
(% per annum)

	Name of the Country	Over Draft	Term Loan	Bond Issue Rates
1.	India	16.50	14.00	14.00
2.	Argentina	11.00	3.33	—
3.	Austria	8.75	5.75 6.125	6.75—7.00
4.	Belgium	9.75	7.31	8.75
5.	Canada	9.25	9.25—9.50	8 —8.50
6.	France	10.1 —10.25	7 —7.25	11.35
7.	Germany	7.00	6.50	6.13
8.	Hong Kong	6.50	6.50	—
9.	Japan	3.38	—	5.10
10.	Kuwait	10.00	8.00	7.50
11.	Netherlands	7.00	5.38	6.50
12.	Singapore	6.50	4.25	7.18
13.	Sweden	11.00—11.50	11.50—11.75	12.25
14.	U K	10.00	0.15— 4.00	12.00
15.	U S A	7.5	—	8.13—11.00

Source : Business International—Money Report, April 27, 1987.

Appendix 3.4

Interest Burden on New Units

Name of Industry	Range of interest as percent of gross value added in initial years				
	%	%	%	%	%
Paper and Paper Boards	29.6 to 2309.0	39.0 to 2572.2	27.2 to 170.6	28.3 to 395.5	15.4 to 1059.2
Cement	27.8 to 92.6	35.0 to 43.9	29.5 to 45.4	26.3 to 53.2	9.5 to 360.3
Fertilisers	40.0 to 396.2	34.5 to 613.0	29.3 to 69.5	18.4 to 59.5	18.8 to 55.4
Tyres and Tubes	88.4 to 712.7	58.2 to 206.2	31.4 to 133.0	22.6 to 428.3	16.6 to 50.5
Scooters	13.62 to 761.07	5.08 to 879.42	3.39 to 426.62	1.06 to 807.84	0.45 to 255.67
Tractors	19.93 to 2604.63	17.92	13.82 to 246.38	8.74 to 12.82	15.58 to 298.70
Dry Cells	28.15 to 66.42	31.60 to 177.46	35.75 to 94.70	34.58 to 86.21	18.51 to 26.1
Sugar	123.15 to 312.00	41.11 to 577.41	52.62 to 60.93	60.41 to 183.17	65.20 to 232.73

Source : Capital output ratios by Economic and Scientific Research Foundation

A. Stock of Direct Foreign Investments as per cent of Gross National Product (GNP) and per cent of Gross Domestic Investment (GDI) Stock[1]

	Argentina		Brazil		India		Korea		Mexico	
	% GNP	% GDI Stock	% GNP	% GDI Stock	% GNP	% GDI Stock	% GNP	% GDI Stock	% GNP	% GDI Stock
1967	10.6	7.4	11.8	9.1	3.1	2.3	1.6	1.7	7.3	6.2
1977-79	4.8	2.6	6.6	4.2	2.1	1.1	3.1	2.4	5.6	3.3

B. Payment for Disembodied Technology as per cent of Gross National Product (GNP) and as percent of Gross Domestic Investment (GDI)

	Argentina		Brazil		India		Korea		Mexico	
	% GNP	% GDI Stock	% GNP	% GDI Stock	% GNP	% GDI Stock	% GNP	% GDI Stock	% GDP	% GDI Stock
1973-75	.10	.90	.20	.77	.04	.18	.10	.40	.20	.80
1979	na	na	.04	1.70	.08	.36	.20	.40	.30	.90

[1]The stock measure of GDI is obtained by summing GDI in current U.S. dollars from 1960 to the year for which the foreign investment stock is reported.

Source : India Industrial Technology Development Review, Industry Department. World Bank 1986.

Apendix 3.6

Yearly Distribution of Collaborations According to Royalty Rates

Year	0 to 3%	3.1% to 5%	Greaterthan 5%	Total
1977	64 (41.03) (11.31)	89 (57.05) (10.13)	3 (1.92) (25.00)	156
1978	77 (44) (13.60)	96 (54.86) (10.92)	2 (1.14) (16.67)	175
1979	81 (43.09) (14.31)	105 (55.85) (11.95)	2 (1.06) (16.67)	183
1980	124 (39.74) (21.91)	186 (59.62) (21.16)	2 (0.64) (16.67)	312
1981	65 (28.14) (11.48)	165 (71.43) (18.77)	1 (0.43) (8.33)	231
1982	112 (41.33) (19.79)	158 (58.30) (17.97)	1 (0.37) (8.33)	271
1983	43 (34.68) (7.60)	80 (64.52) (9.10)	1 (0.80) (8.33)	124

Figures in brackets indicate %

Source : Ghayur Alam, Payments for Technology by Indian Firms : their Nature and Effect on Technology Acquisition and Technology Development, National Council of Applied Economic Research, ICRIER—NCAER Project on Technology Development and Policy, February, 1985.

Appendix 3.7

Yearly Distribution of Average Lump Sum payments for All Collaborations

(Rs. Lakh)

Year	No. of Collaborations	Total lump sum	Average lump sum
1977	197	3160.98	16.04
1978	200	6210.43	31.05
1979	234	3621.56	15.47
1980	370	10242.29	27.68
1981	315	13252.29	30.38
1982	422	12823.37	22.11
1983	162	2581.96	22.11

Source : Ghayur Alam, Payments for Technology by Indian Firms : their Nature and Effect on Technology Acquisition and Technology Development, National Council of Applied Economic Research, ICRIER—NCAER Project on Technology Development and Policy, February, 1985.

Appendix 3.8

Subsectoral Research Intensities (%)

	India (1980/81-1982/83)	U.S.A. (1980-82)	South Korea (1982)	Japan (1980)
Electrical & Electronic	0.72–0.84	(2.7–2.9) (3.0–3.7)	2 44	3.7
Chemicals	0.87–1.00	2.4–2.9	0.58	2.55
Drugs & Pharmaceuticals	1.72–2.05	5.0–6.1	NA	NA
Industrial Machinery	1.03–1.19	2.0–2.9	1.28	NA
Agricultural Machinery	0.48–0.71	2.5–3.3	NA	NA
Transportation	0.87–1.17	3.7–4.0	0.73	2.34
Metallurgical Indnstries	0.44–0.53	0.9–1.2	NA	NA
Cement & Gypsum	0.61–0.76	1.2–1.3	NA	NA
Textiles	0.35–0.55	0.5–0.6	NA	NA
Soaps & Cosmetics	0.16–0.51	1.9–2.4	NA	NA
Rubber Goods	0.44–0.66	1.8–2.3	NA	NA

Source : India, Industrial Technology Development Review, Industry Department, World Bank, 1986 (Mimeo)

Appendix 3.9

Specific Energy Efficiencies by Country (10^4 BTU per Ton of Product)

	Crude Steel	Pulp & Paper	Cement	Petroleum Product	Aluminium
Austria	1,785.6[e]	1,365.0	357.1	n.a.	5,340.9
Belgium	n.a.	n.a.	n.a.	n a.	n.a.
Canada	2,202.2	2,673.5	377.0[f] 587 3[g]	712.7	n.a.
Denmark	936 4	1,400.7	650.8[h]	210.3	n.a.
Germany	1,293.6	1,738.8	360 3	317.4[i]	5,876.6–5,963.9
Ireland	554.3[a] 661.1[b,d]	n a.	608.6	168.6	n.a.
Italy	1,325.3	1,349.1	380.9	177.8	n.a.
Japan	2,036.8	2,032.4	474.6	182.5	5,495.7
Luxembourg	2,781.6	—	—	—	—
Netherlands	1,865.0	—	521.4	n.a.	5,118.7
New Zealand	2,932.0	2,745.0	693.6	520.6	8,588.7
Norway	750.0[a]	2,614.9	457.1	n.a.	6 313.1[l]
Spain	714.2[a]	873.0	515.8	238.1	11,110.4
Sweden	1,578.5	1,940.4	554.3	194.4	6,540.1
Switzerland	—	2,210.2	n.a.	n.a.	n.a.
Turkey	1,984.0	n a.	388.9[f] 551.5[g]	n.a.	n.a.
United Kingdom	1,896.7	2,487.9	549.2	291.3[i]	8,359.0[k,i]
United States	2,154.6	2,297.5[e]	640.4	355.9	3,755.7[j]

a Electricity only
b Scrap iron
c Pig i on
d Electric Arc Furnaces and open Hearth Furnaces
e Purchased energy only
f Dry process
g Wet process
h 100 per cent wet process
i Refineries own use
j Excluding bauxi e mining
k Assuming 100 per cent electricity
l Electricity

Source : International Energy Agency, Energy Conservation in the International Agency (Paris, 1976), pp. 17-18, by permission of the Organisation for Economic Cooperation and Development.

Appendix 3.10

Comparison of Specific Fuel Consumption of Known Process with Theoretical Minimum for Selected U S Industries

	1968 Specific Fuel Consumption (BTU/ton)	Potential Specific Fuel Consumption Using Technology Existing in 1973 (BTU/ton)	Theoretical Minimum Specific Fuel Consumption Based Upon Thermodynamic Availability Analysis (BTU/ton)
Iron and steel	26.5×10^6	17.2×10^6	6.0×10^6
Petroleum refining	4.4×10^6	3.3×10^6	4.4×10^6
Paper	39.0×10^6[a]	23.8×10^6	Greater than -0.2×10^6[c] Smaller than $+0.1\times10^6$[c]
Primary aluminium production	190×10^6	$152-10^6$	25.2×10^6
Cement	7.9×10^6	4.7×10^6	0.8×10^6

a Includes 14.5×10^6 BTU/ton of paper produced from waste products consumed as fuel by paper industry.
b Does not include effect of scrap recycling.
c Negative value means that no fuel is required.
Source : Elias P. Gyftopoulos, Lazaros J. Lazaridis, and Thomas F. Widmer, Potential Fuel Effectiveness in Industry, Cambridge, Massachusetts : Ballinger, 1974.

Appendix 3.11

Potential Fuel Savings in the Industrial Sector

(in 10^{15} BTU)

Conservation Measures	Potential Savings
Good housekeeping measure throughout industry (except for feedstocks)—save 15 per cent	3.85
Fuel instead of electric heat in direct and applications	0.17
Steam-electric cogeneration for 50 per cent of process steam	2.59
Heat recuperators or regenerators in 50 per cent of direct heat applications—save 25 per cent	0.74
Electricity from bottoming cycles in 50 per cent of direct heat applications	0.49
Recycling of aluminium in urban refuse	0.10
Recycling of iron and steel in urban refuse	0.11
Fuel from organic wastes in urban refuse	0.70
Reduced throughput at oil refineries	0.87
Reduced field and transport losses associated with reduced use of natural gas	0.80
Total savings	10.43
Actual fuel use in 1973	29.65
Hypotehtical fuel use with conservation	19.22

Source : Marc H Ross and Robert H Williams, "Energy and Economic Growth," in U S Congress, Joint Economic Committee, Sub-Committee on Energy, Joint Committee Print, 95th Cong., ist sess. (1977).

Appendix 3.12

Trends in Prices of Major Raw Materials/Inputs

Raw Materials Inputs	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87 (upto Sept.)	
Delivered Prices								
Indigenous coal	286	367	420	467	566	608	710	
		28.3	14.4	11.2	21.2	7.4	16.8	
Iron ore	79	94	103	120	134	143	154	
		19.0	9.6	16.5	11.7	6.7	7.7	
Limestone	97	121	147	181	187	220	248	
		24.7	21.5	23.1	3.3	17.6	12.7	
Dolomite	93	114	128	162	176	194	218	
		22.6	12.3	26.6	8.6	10.2	12.4	
Ferro Manganese	3538	4149	4663	5184	5936	6387	7400	
		17.3	12.4	11.2	14.5	7.6	15.9	
Ferro Silicon	9116	8197	8000	8219	9985	11565	11443	
		−10.1	−2.4	2.7	21.5	15.8	−1.1	
Zinc	13325	15195	18859	20453	27169	27910	28000	
		14.0	24.1	8.5	32.8	2.7	0.3	
Boiler coal	138	180	201	232	259	293	371	
		30.4	11.7	15.4	11.6	13.1	26.6	
Furnace oil	2164	2655	2734	3039	3056	3403	3519	
		22.7	3.0	11.2	0.6	11.4	3.4	
Purchased power	316	413	475	536	587	700	745	
		30.7	15.0	12.8	9.5	19.3	6.4	
Avg. Earnings per man per year (Rs.)	16651	19015	21643	25177	27612	30060	32000	
		14.2	13.8	16.3	9.7	8.9	6.5	
Cost of production of Saleable Steel (Rs./t.)	2556	2864	3407	3930	4482	5111	5836	5400*
		12.1	19.0	15.4	14.0	14.0	14.2	

Note : *Estimated for 1986-87
Figures under each column data represent percentage change over previous year

Source : Steel industry costs : CEI

Appendix 3.13

Impact of 1% Increase in Input Prices on the Final Output Cost

Items	Impact on Output Cost with 1% Increase in Input Prices (Rs./t)
— Coal	8.00 — 10.00
— Ferro Alloys	2.00
— Power	3.00
— Stores & spares	10.00
— Inward freight	4.00
— Petro fuels	2.00

Note :

1. The impact in cost with 1% increase is with reference to usage factor for each material. The indirect impact of the increase in the base price of an item of material has not been considered. For example, if the coal price is increased it will have an indirect impact on power tariff, railway freight and other items of stores & spares. Additional impact of interest charges due to higher requirement of working capital has also not been considered in computing the impact on internal resources.

Source : Steel industry costs : CEI.

Appendix 3.14

Percentage Change in Prices of Iron Ore in Select Countries

Inputs/Years	U.S.A.	Japan	W. Germany	U.K.	France	India
1982	6.9	5.1	5.5	−7.4	−2.6	9.6
1983	3.1	−3.3	4.1	−6.6	3.2	16.5
1984	2.0	−11.4	−9.8	−24.9	−13.9	11.7
1985	0.5	−4.0	−7.2	−9.1	−10.6	6.7

Source : Steel Industry Costs : CEI

Appendix 3.15

Overrun in Components of Project Cost During Seventies

Sl. No.	Components	Projected Value Rs. Crores	Actual Value Rs. Crores	Overrun Rs. Crores	Per cent rise
1.	Land-Building	163.6 (10.5)	216.4 (11.9)	52.8 (20.5)	32.3
2.	Plant and Machinery	925.5 (59.4)	1081.1 (59.6)	155.6 (60.5)	16.8
3.	Technical Know-how	52.4 (3.4)	53.7 (3.0)	1.3 (0.5)	2.5
4.	Misc. Fixed Assets	129.2 (8.3)	169.8 (9.4)	46.6 (15.8)	31.4
5.	Preliminary and preoperative expenses	136.7 (8.8)	164.6 (9.1)	27.9 (10.8)	20.4
6.	Others including contingencies	80.9 (5.2)	37.1 (2.0)	−43.8 (−17.0)	−54.1
7.	Capital cost (1 to 6)	1488.2 (95.5)	1722.7 (94.9)	235.5 (89.1)	15.8
8.	Margin Money for Working Capital	69.7 (4.5)	92.4 (5.1)	28.0 (10.9)	40.2
9.	Project Cost (7—8)	1557.9. (100.0)	1815.1 (100.0)	257.2 (100.0)	16.5

Source : The Financial Institutions as quoted by ESRF, Capital—output Ratio in the Indian Economy.

Appendix 3.16

Trends in over-runs in Project cost

	Average Cost over-runs per cent
(A) Period	
1964-65 to 1969-70	19.7
1970-71 to 1974-75	30.2
1975-76 to 1979-80	20.7
(B) Industry	
Intermediate Goods	25.1
Consumer Goods	16.2
Capital Goods	16.1
I. Intermediate Goods	
(a) Glass Manufacturing	93.2
(b) Rubber Products	34.8
(c) Metal Products	34.4
(d) Basic Metals	34.0
(e) Basic Chemicals	26.5
(f) Cement	12.1
(g) Fertiliser	9.9
II. Consumer Goods Industries Cotton Textiles, Sugar and Food	16.2
III. Capital Goods Industries Electrical and Non-electrical Transport	16.5

Source : The Financial Institutions as quoted by ESRF, Capital—output Ratio in the Indian Economy.

Appendix 3.17

Estimated Cost of delay in the implementation of Major Public Sector Projects (Rs. Crs.)

Sl. No.	Sector	No. of Projects	Expr. upto 31.12.86	Total Cost (Ant.)	Cost weighted avg. period of completion (months) Orig. *coxto / co	Now ant. *caxta / ca	Cost Weighted avg. time overrun (months)	Cost of delay upto 31.12.86 Rs. crore col 4 × .15 × col 8 / 12
1	2	3	4	5	6	7	8	9
1.	Atomic Energy	5	1345.42	2096.25	95.74	123.30	27.56	463.5
2.	Civil Aviation	1	—	541.90	26.00	26.00	—	—
3.	Chemicals & Petro-chemicals	1	133.00	1167.00	61.00	61.00	—	—
4.	Coal	17	1797.11	5449.84	89.67	116.62	26.95	605.3
5.	Communications	1	111.97	177.02	89.00	89.00	—	—
6.	Fertiliser	5	1149.28	2357.92	52.04	60.12	8.08	116.1
7.	Mines	2	2206.67	2745.04	71.01	80.30	9.29	256.1
8.	Steel	4	6267.28	10642.99	92.91	165.94	73.03	5721.4
9.	Petroleum & Natural Gas	12	4855.65	8097.90	39.69	56.77	17.08	1036.9
10.	Power	30	6560.48	15220.77	79.50	96.40	16.90	1385.7
11.	Public Enterprises (Cement, Paper, Automobiles Photofilm. etc.)	3	446.38	786.12	57.49	90.64	33.15	184.9
12.	Railways	8	581.95	13006.14	84.42	92.08	7.66	55.7
13.	Surface Transport	4	76.08	975.70	57.67	64.04	6.37	6.0

Source : Report of the Ministry of Programme implementation.

*Co to Sum of the (Original cost/original period of completion in months of individual projects)

*Co Sum of original cost of all the projects in the sector.

*Cata Sum of the (Latest Anticipated cost x Latest anticipated completion period of individual project)

*Ca Sum of the anticipated cost of all projects 0.15 = 15% rate of interest.

Appendix 4.1

Gross Value Added Per Worker

	Current				Constant (1980) Prices			
	1973	1975	1980	% 1980 over 1973	1973	1975	1980	% 1980 over 1973
1. India	1114	1353	1872	68.0	2224	2078	1872	15.80
2. Republic of Korea	3074	4185	11984	289.9	6136	6428	11984	95.30
3. Singapore	5188	7566	7566	130.9	10355	11621	14051	35.60
4. Australia	12595	16196	25613	130.4	25140	24877	25613	1.88
5. U.K.	8102	11099	25336	212.7	16172	17048	25336	56.70
6. U.S.A.	25336	21507	25764	1.68	42928	39574	40078	−6.60
7. Japan	13204	14846	33241	151.7	26355	22803	33241	26.13

Source : United Nations : Year Book of Industrial Statistic, Different Issues.

Appendix 4.2

Gross Output per Worker

	Current				Constant (1980) Prices			
	1973	1975	1980	% 1980 over 1973	1973	1975	1980	% 1980 over 1973
1. India	4464	5833	10212	128.7	8910	8959	10212	14.6
2. Republic of Korea	8228	12090	36668	345.6	16423	18570	36668	123.2
3. Singapore	17407	28949	53616	208.0	34744	44466	53616	54.3
4. Australia	30931	38019	66263	114.2	61738	58397	66263	7.3
5. U.K.	18737	27668	65114	247.5	37399	42498	65114	74.1
6. U.S.A.	46856	60562	96674	106.3	93525	93023	96674	3.3
7. Japan	13204	14846	33241	151.7	26355	22803	33241	26.1

Source : United Nations : Year Book of the Industrial Statistics. Different Issues

Productivity Index (Value added per worker in US $)

	U.S.A.			Japan			Singapore		
	1973	1975	1980	1973	1975	1980	1973	1975	1980
1. Food Products	31832	30825	47042	10787	13419	26947	6200	7518	12551
	(100)	(100)	(100)	(49.4)	(43.5)	(57.3)	(28.4)	(24.4)	(26.7)
2. Textiles	11985	14779	23357	9826	9717	20482	3639	2907	7653
	(100)	(100)	(100)	(81.9)	(65.7)	(87.7)	(30.4)	(19.7)	(32.8)
3. Leather & Fur products	11810	15375	22840	4947	11450	21190	3846	2469	5000
	(100)	(100)	(100)	(41.9)	(74.5)	(92.8)	(32.6)	(16.1)	(21.9)
4. Paper & paper Boards	20254	30458	46043	15463	16178	33762	4096	4255	10353
	(100)	(100)	(100)	(76.3)	(53.1)	(73.3)	(20.2)	(14.0)	(22.5)
5. Rubber Products	19679	24960	34464	12896	14507	32824	6252	5251	10864
	(100)	(100)	(100)	(65.5)	(58.1)	(92.3)	(31.8)	(21.0)	(31.5)
6. Chemical and chemical products	36119	51751	79117	29155	30573	71211	12131	15292	30109
	(100)	(100)	(100)	(80.7)	(59.1)	(90.0)	(33.6)	(29.5)	(38.1)
7. Iron & Steel	18780	27675	41095	23454	20616	62061	16148	15108	32333
	(100)	(100)	(100)	(124.9)	(74.5)	(151)	(85.9)	(54.6)	(81.1)
8. Non-electrical machinery	18746	25818	40859	13665	16085	34784	4850	9320	17313
	(100)	(100)	(100)	(72.9)	(62.3)	(85.1)	(25.8)	(36.1)	(42.4)
9. Electrical Machinery	17111	23138	37708	11712	12191	2969	4595	5761	10808
	(100)	(100)	(100)	(68.4)	(52.7)	(78.7)	(26.9)	(24.9)	(28.7)

	R.O. Korea			Australia			Canada		
	1973	1975	1980	1973	1975	1980	1973	1975	1980
1. Food Products	2344 (10.7)	3925 (12.7)	14783 (31.4)	12430 (56.9)	16909 (54.9)	25272 (53.7)	16900 (77.4)	21717 (70.5)	30955 (65.8)
2. Textiles	2157 (18.0)	2959 (20.0)	7736 (33.1)	9666 (80.7)	12085 (78.6)	21000 (91.9)	12242 (102.1)	14505 (98.1)	23054 (98.7)
3. Leather & Fur products	2667 (22.6)	4256 (27.7)	8274 (36.2)	9000 (76.2)	11833 (76.9)	18600 (81.4)	10213 (86.5)	12000 (78.0)	19250 (84.3)
4. Paper & Paper Board	3750 (18.5)	3762 (12.4)	11326 (24.6)	14033 (69.3)	18133 (59.5)	28615 (62.1)	20000 (98.7)	26690 (87.6)	44295 (96.2)
5. Rubber products	1571 (8.0)	2217 (8 9)	6876 (20.0)	11789 (59.9)	15316 (61.4)	24357 (70.7)	179634 (91.2)	20740 (83.1)	30103 (87.3)
6. Chemical and chemical products	4983 (13.8)	7974 (15.4)	31630 (39.9)	17683 (49.0)	23034 (44.5)	39907 (50.4)	25333 (70.1)	32296 (62.4)	53362 (67.4)
7. Iron & Steel	7811 (41.6)	6277 (22.7)	22482 (54.7)	12857 (68.6)	19719 (70.9)	28235 (68.7)	21000 (112)	24507 (88.6)	34442 (83.8)
8. Non-electrical machinery	2283 (12.2)	2753 (10.7)	10785 (26.4)	10891 (58.1)	14898 (57.7)	22728 (55.6)	16087 (85.8)	21476 (83.2)	32393 (79.3)
9. Electrical machinery	2421 (14.1)	3259 (14.1)	9123 (24.2)	10000 (58.4)	13775 (59.5)	22148 (58.7)	16277 (95.1)	20664 (89.3)	30792 (81.7)

	United Kingdom			India		
	1973	1975	1980	1973	1975	1980
1. Food Products	8802 (40.3)	11680 (37.9)	26662 (56.7)	620 (2.8)	614 (2.0)	698 (1.5)
2. Textiles	6429 (53.6)	7671 (51.9)	15527 (66.5)	925 (7.7)	922 (6.2)	1594 (6.8)
3. Leather & Fur Products	6310 (53.4)	8683 (56.5)	17438 (76.3)	1435 (12.2)	1130 (7.3)	828 (3.6)
4. Paper & Paper Boards	8589 (42.4)	10909 (35.8)	24422 (53.0)	2780 (13.7)	2418 (7.9)	2387 (5.2)
5. Rubber products	8500 (43.2)	11667 (46.7)	24469 (70.9)	3048 (15.5)	2025 (8.1)	2721 (7.9)
6. Chemical and chemical products	14889 (41.2)	18381 (135.5)	40296 (50.9)	2251 (6.2)	1980 (3.8)	2128 (2.7)
7. Iron & Steel	8679 (46.2)	10690 (38.6)	18031 (43.9)	749 (4.0)	2011 (7.3)	4834 (11.8)
8. Non-electrical machinery	6730 (35.9)	11377 (44.1)	25787 (63.1)	1219 (6.5)	1819 (7.0)	2818 (6.9)
9. Electrical machinery	7090 (41.4)	9480 (40.9)	22871 (60.6)	1603 (9.4)	2264 (9.8)	2248 (6.0)

Source : UNIDO, Industry and Development Global Report, 1985.

Ratio of Non-wage Component of Value Added Per Worker to Total Value Added Per Worker (Current (1980) Prices) $

Particulars	Australia			Republic of Korea			India		
	Non-wage component of value added per employee (i)	Total value added per employee (ii)	(i) as % of (ii)	Non-wage component of value added per employee (i)	Total value added per employee (ii)	(i) as % of (ii)	Non-wage component of value added per employee (i)	Total value added per employee (ii)	(i) as % of (ii)
Food Products	12397	25272	49.1	11043	14783	74.7	319	698	45.7
Textiles	8780	21000	41.8	4979	2157	64.4	619	1594	38.8
Leather	8200	18600	44.1	5446	8274	65.8	719	828	86.8
Paper	13412	28615	46.9	7450	11326	65.8	1662	2387	52.8
Rubber	10286	24357	42.2	4200	6876	61.1	1263	2721	46.4
Non-electrical machinery	9663	22728	42.5	6346	10785	58.8	1504	2818	53.3
Electrical machinery	9262	22148	41.8	5797	9123	63.5	1850	2248	82.3
Iron & Steel	11985	28235	42.4	17482	22482	77.7	1426	4834	29.5

Particulars	U.K.			U.S.A.			Japan		
	Non-wage component of value added per employee	Total value added per employee	(i) as % of (ii)	Non-wage component of value added per employee	Total value added per employ yee	(i) as % of (ii)	Non.wage component of value added per employee (i)	Total value added per employee (ii)	(i) as % of (ii)
Food products	16052	26662	60.2	32394	47042	68.9	17943	26947	66
Textiles	6479	15527	41.7	12089	23357	51.8	11902	20482	58
Leather	8216	17438	47.1	12222	22840	53.5	13071	21190	57
Paper	11643	24422	47.7	27913	46043	60.6	21653	33762	64.1
Rubber	11677	24469	47.7	17639	34464	51.2	19389	31824	60.9
Non-electrical machinery	12629	25787	48.9	22497	40859	55.1	20982	34784	60.3
Electrical machinery	10841	22871	47.4	21018	37708	55.7	18681	29690	63.0
Iron & Steel	4581	18031	25.4	18478	41095	54.9	45133	62061	73

Appendix 4.5

Growth rates of productivity in Manufacturing Sector

(% increase per annum)

Country	Period	Growth rates in	
		Labour productivity	Capital productivity
India	1951-52 to 1975-76	1.44	−2.00
	1960-61 to 1975-76	0.89	−0.30
Taiwan	1967 to 1977	10.52	9.51
	1960 to 1977	11.20	N.A.
Philippines	1956-57 to 1973-74	3.60	N.A.
Singapore	1970 to 1977	3.60	N.A.

Source : P.C. Luther, Paper on Productivity in Indian Industry presented at the National Seminar on Productivity Management at Enterprise level, National Productivity Council.

Appendix 4.6

Percentage compound annual rate of growth of Labour Productivity

Country	1950-60 (Others) / 1948-60 (USA)	1960-70	1970-80 (India) / 1970-78 (Others)
U K			
Whole economy	2.2	2.8	1.8
Manufacturing Sector	3.0	3.6	1.8
Japan			
Whole Economy	7.2	8.2	5.3
Manufacturing Sector	8.5	9.3	5.8
Germany			
Whole Economy	5.2	4.8	3.6
Manufacturing Sector	6.1	5.6	5.1
U S A			
Whole Economy	3.6	3.5	0.9
Manufacturing Sector	3.0	2.8	2.0
India			
Whole Economy	2.5	2.6	0.9
Manufacturing Sector	4.2	1.9	2.0

Source : T V Mansukhani, Paper on Productivity and Technology Factors and Linkages in Manufacturing Industry, presented at the National Seminar on Productivity-Management at Enterprise Level, National Productivity Council.