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Government Policy and Performance: A Study of Indian Engineering Industry

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GOVERNMENT POLICY AND PERFORMANCE: A STUDY OF INDIAN ENGINEERING INDUSTRY

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Abstract

The Indian industrial policy made a major transition towards liberalisation in the mid-1980s, with the proponents of liberalisation expecting not only a general increase in the efficiency of Indian industry but also improvement in terms of innovative performance. Extensive industrial studies, as well as macro-level data, suggest that liberalisation in the field of industrial licensing and foreign technological collaborations have resulted in large scale entry of new firms across different segments of the economy. In this context, this paper makes an attempt to review the promotion-oriented industrial policies of Indian Engineering industry and also trace the industrial growth from 1950-51 onwards. It has been observed that there were mainly two breaks (kinked points) during this period, one in 1965-66 and the other in 1984-85. A review of policies suggests that these breaks were associated with major shifts in policies of the government. The study indicates that the first break came through industrial policies of the government with a focus on the heavy industries during the initial phases, while the other break came during 1984-85, which could be attributed to changes in policies from a restrictive one in the mid 60's and 70's, to a liberalised one in this sector in the 80's.

Introduction

Although engineering industry had a negligible share in the GDP at the time of independence, it gained its importance with a rigorous planning regime since 1951. Based on the soviet experience in 1930's, Indian policy makers started believing that the indigenous technological capacity and self-sustaining economy would go hand in hand. Therefore, one of the objectives of the Indian planning was to promote heavy machinery building industry. In India, increasing the per-capita income through income redistribution was impossible, so the only option left for increasing per-capita income, employment and consumption, was to substantially increase the level of output (Matthews, 1988). Nevertheless, the big question was as to why the levels of output were low in the initial period. From the planners' view, the reasons were low level of investment and poor quality of capital goods. In the Nehrus-Mahalanobis growth model, an important distinction was made between two types of capital goods i.e. (a) those that produce consumer goods and (b) those that produce capital goods. As the objective of the planners was to achieve long-term growth, more weightage was given to the second category i.e. 'machines producing machines'. The Nehru-Mahalanibis state-dominated industrialisation regime was followed in India for nearly 40 years.

However, since the late 1980s, the government of India shifted its focus from the macro-economic policy towards growth promotion in the sense that it moved away from state intervention and import substitution to a concept of liberalised industry. In view of the rapid liberalisation and subsequent integration with the world economy, Indian firms are facing strong competitive pressures

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from within the country as well as from outside. In India, the reform process was initiated in the mid 1980's, which gained momentum in the 1990's with major changes effected in trade and industrial policies, leading to a significant change in the market.

A number of empirical studies have examined the impact of liberalisation on the Indian firms in general and the performance of capital goods sector in particular (Mani, 1998; Nagraj, 2002, 2003; Balakrishnan and Suresh Babu, 2003). The engineering industry is part of the capital goods industry. Many of the earlier studies, which focused on the capital goods industry, conclude that this industry has been severely affected since mid 1980's due to liberalisation policies like reduction in the tariff rates and liberal trade policy or import of second hand machinery (Desai 2001). The reason for such an apprehension relates to the competitiveness of the domestic market given that growth of this industry in India is dependent on a protected market (monopolistic/ oligopolistic) with a predominant presence of the public sector. The specific characteristics of technology in this industry also raise doubts about its growth in the light of liberalisation.

The engineering industry (electrical and non-electrical) produces a range of products (durable machinery, equipments etc.) used by a wide number of end-users in agriculture, chemical, automobile, petrochemical, fertiliser, textile, mining, power, defence sectors etc. To compete in international markets, the engineering industry needs to focus on product design and development as producing for a foreign market requires more technological capabilities for meeting the international standards than the domestic market. Hence, technological development is very important in developing export competitiveness. It has been argued that there was a lack of incentives to promote technological development in the domestic industry in the initial phases of import substituting industrialisation regime. It is expected that after the liberalisation, the industry would try to access and adopt new technology due to competitive pressures.

Another important issue then was that the firms should have understood the characteristics of the market given the changing scenario of the world markets. Supplying products to overseas markets therefore, posed major problems to exporters in the developing countries, highlighting their inability to establish strong marketing or distribution networks. The role of foreign direct investment (FDI) is very important not only for accessing the technology through joint ventures or licensing but also for learning about the overseas markets and developing the networks. It is in this context that the role of FDI is considered very important in explaining the performance of the developing countries, especially in industries like engineering. So from all the above stated aspects, it is evident that any government should have proper planning framework to promote sustainable development of its industry.

Therefore, in this context, it is very important to review the policies taken up by the government of India from time to time, mainly in the context of engineering industry. In this background, we have arranged this paper as follows: Section 2 presents a general background about the evolution and structure of engineering industry in India. The section that follows discusses methodology and industrial policy across different phases, and is followed by concluding remarks in the last section.

Engineering Industry: Evolution, Structure and policy

The evolution of the Indian engineering industry, as part of the capital goods sector, can be observed in the context of the adoption of the import substitution industrialisation strategy adopted by the government of India. On the one hand, this strategy played an important role in promoting investment in this sector and on the other, it provided suitable environment for its growth in the form of private capital investment. By the early 1970's, India had achieved the capacity to produce almost all verities of engineering goods needed domestically. The setting up of public sector enterprises (PSE) like Hindustan Machine Tools (HMT), Heavy Engineering Corporation (HEC), Bharat Earth Movers Ltd. (BEML), Bharat Heavy Electricals Ltd. (BHEL) Bharat Heavy Plates & Vessels (BHPV) etc. were aimed at achieving self-sufficiency in the promotion of engineering goods. These industries further facilitated the development of other major sectors like fertiliser plants, railways, defence establishments etc.

The market structure in the Indian engineering industry was partly dominated by PSEs like HMT, HEC, BEML, BHEL etc. in product areas like machine tools, earth moving machinery, boilers and partly by private sector enterprises in sectors like textiles, dairy, cement and chemicals. The firms in these industries operated within the protected environment in the form monopoly markets and many of them had collaborations with foreign firms.

In this section, we analyse the growth and performance of the Machinery and Equipment Sector i.e. broadly engineering industry in India and try to figure out whether the growth, if any, was effected due to the government policies. In the Indian context, one can observe three main stages in the evolution of government policies, particularly in respect to engineering industry. These three phases are summarised in Table 1 (See also Appendix 1)

Table 1: Phases in the evolution of government policy with respect to engineering industry

Major Planning Phases	Trade regime	Industrial Regime	R & D Policies	Foreign Collaboration Policy
1. Heavy Industrial based growth (1948-66)	Import substitution	Regulated	Setting up of R & D infrastructure for developing a scientific base	*Liberal*
2. Growth with self-reliance and social justice (1966-67 to 1984-85)	Progressive import substitution	Tightly regulated	Emphasis on technology and development	*Restrictive*
3. Growth based on efficiency and competitiveness (1985-86 onwards)	Progressively deregulated	Progressively deregulated	Emphasis on the performance of R&D institution and its linkages with industry	*Increasingly Liberal*

Source: Constructed by author

Methodology

Before going into the details of the government policy over the period, we attempt to analyse the growth of gross fixed capital formation in machinery and equipment over the period of 1950-51 to 2005-06. Table 1 shows a shift in the policies over the period. Conventionally, in such cases, the sub-period growth rate is estimated either by fitting in a separate exponential curve following OLS

techniques or by using dummy variable techniques. However, the problem with these methods is that they can lead to strange results, e.g., all sub-period growth rates can exceed or fall short of the growth rate of the period as a whole (Boyce,1986). So in this case, log-linear models with some linear restrictions can be estimated.

Briefly, the logic underlying this method is as follows. Consider a simple case where a time series Y_t for the period t = 1, 2....n is broken at k. A discontinuous growth rate of the two sub-periods can be estimated by the equation-

$$\ln Y_t = a_1 D_1 + a_2 D_2 + b_1 D_1 t + b_2 D_2 t + U_t \quad (1)$$

Where D_i (i = 1,2) is a dummy variable considering value 1 in the ith sub period and 0 otherwise.

Discontinuity can be avoided by using a linear restriction such that two lines intersect at break point k

$$a_1 + b_1 k = a_2 + b_2 k \quad (2)$$

It should be noted that $a_1 D_1 + a_2 D_2 = a_1$, now substituting for a_2 ,we derive the restricted form,

$$\ln Y_t = a_1 + b_1(D_1 t + D_2 k) + b_2(D_2 t + D_2 k) + U_t \quad (3)$$

The OLS estimates of b_1 and b_2 from equation (3) give the exponential growth rate of two periods. The restricted equation of the two-kink (k_1 and k_2) model can be derived similarly, yielding the expression

$$\ln Y_t = a_1 + b_1(D_1 t + D_2 k_1 + D_3 k_1) + b_2(D_2 t - D_2 k_1 - D_3 k_1 + D_3 k_2) + b_3 (D_3 t - D_3 k_2) + Ut$$

Table 1 clearly shows the breaks in the year 1965-66 and 1984-85, and the three sub-periods 1950-51 to 1965-66, 1966-67 to 1984-85 and 1985-86 to 20005-06. The growth rate of gross fixed capital formation (GFCF) for these three periods are estimated by using kinked exponential function as presented in Table 2. It can be seen from the table that GFCF declined from 8.41 per cent in the first period to 5 per cent in the restrictive period and later recovering to about 8.90 per cent.

Table 2: Kinked exponential growth rates of GFCF in machinery and equipment at 1993-94 prices

Period	GFCF	GFCF (pub)	GFCF (pvt)
1950-51 to 1965-66	8.41	8.50	5.00
1966-67 to 1984-85	5.00	8.80	6.50
1985-86 to 2005-06	8.90	5.50	9.50

Notes: GFCF: Gross Fixed Capital Formation

Pub: Public Sector; **Pvt**.: Private Sector

Source: National Accounts Statistics, various issues

Within the gross fixed capital formation, public sector investment shows almost stable growth up to the restrictive period but thereafter, it shows a decline in the growth from 8.80 to 5.50 per cent. On the other hand, it shows the private sector registering a continuous growth from 5.00 in the first period to 6.50 in the restrictive period and later reaching 9.5 per cent in the liberal regime.

In Table 3, the growth rates in respect to value of output for the three periods for sub-group- non-electrical and electrical machinery- are presented. Here, one can observe that the growth rates across the two groups over the period decline. The electrical machinery category is found in a better position as compared to the non-electrical category. In the case of non-electrical machinery in the first period, the category fares better than the electrical machinery but registers a sharp decline in the subsequent period.

Table 3: Kinked exponential growth rates of value of output at 1993-94 prices

Period	NE	E
1950-51 to 1965-66	17.7	13.7
1966-67 to 1984-85	7.20	9.50
1985-86 to 2000-01	6.20	9.60

Notes: NE: Non-electrical Machinery

E: Electrical Machinery

Source: National Accounts Statistics, various issues

Now from Tables 2 and 3, it is clear that across the above three sub periods, there is a significant change in terms of gross fixed capital formation or value of output. The driving factors responsible for these trends could be attributed to the policies adopted over the period. Throughout the course of planned industrialisation in India, investment in the engineering industry, coming under the public sector, has been considered as a major tool for improving other sectors. This kind of government attitude was sustained up to the early 1980's but thereafter, the whole scenario changed. Now let us discuses the government policy relating to the above three periods, one by one.

Three phases of Industrial Policy

1. The initial growth phase

India initiated the process of industrial growth in 1948, when it announced its first Industrial Policy Resolution (IPR). India adopted a high growth model, drawing partly from Russian and capitalistic models. Therefore, specific attention was given to the development of basic and heavy industry. IPR recognised the role of foreign capital in the context of rapid industrialisation of the country. During this phase, labour-intensive sector in which the country had a comparative advantage was given less importance because of its low productive capacity to boost the country's industrialisation process. From Table 4, we can see that the average annual real growth rate of capital goods was 22.1% during this (initial growth phase) phase, but in the subsequent plan periods, it was negative and never attained the third five-year-plan projected growth rate. Therefore, during the restrictive phase i.e. after 1966, the growth rate declined dramatically and the reasons behind it are discussed in the next section. The total growth of the manufacturing sector fell drastically during 1961-65 and 1966-68 but there after it started rising and became 13.1 per cent in the period, 1974-78.

Table 4: Growth rates of gross output across manufacturing and capital goods sectors at constant prices, 1960

Period	Total Manufacturing	Capital Goods
Third FYP (1961-65)	11.2	22.1
Annual Plans (1966-68)	2.3	-14.2
Fourth FYP (1969-73)	4.5	9.0
Fifth FYP (1974-78)	13.1	12.7

Source: M R Bhagavan, 1985

The significant growth in the productive capacity of the capital goods was seen as an important factor in raising investments and savings across other industries and promoting exports. To meet the industry demand, therefore, FDI and technology licensing were encouraged. Foreign collaborations, both financial and technical, were allowed in the engineering industry. The three basic principles that governed the official policies regarding multinational corporations (MNCs) were: (a) non-discrimination between foreign and Indian enterprises; (b) full freedom to remit profits and repatriate capital; and (c) compensation on a fair and equitable basis in the event of nationalisation. A slew of concessions to foreign firms were given in the forms of salaries, wealth tax, corporate tax etc. However, there were no fixed criteria in terms of approving the foreign collaborations, though government approval was necessary. Therefore, government approval was subject to the priority of the sector. Tax concessions were granted in respect of technical fees so as to encourage import of technology.

The industrial boom in India started in the late 1950s. The policy of import substitution created a huge demand for foreign technologies, with the average annual number of foreign collaborations increasing from a mere 35 during 1948-55 to 210 during 1964-70. The actual net inflows of FDI also increased continuously over the period. The stock of FDI, that stood at Rs 2560 million in 1948, more than doubled to Rs 5660 million in 1964. The technology-related payments jumped from a mere Rs 12 million in 1956-57 to Rs. 190 million in 1967-68. The building up of the industrial capacity of the country proceeded almost totally on the basis of imported technology. However, in the absence of the need to improve competitiveness, there was little incentive to learn, absorb and assimilate foreign technologies for creating R&D capabilities.

The industrialisation process had very little scope to improve the domestic technology and R&D activity. Nevertheless, another aim of the IPR was to create a conducive environment for domestic scientific research. In 1958, the Scientific Policy Resolution was announced which was intended to serve as a basis for the government policy on domestic R&D. The Resolution considered the creation of a scientific base as a pre-requisite for developing domestic R&D capacity on the premise that it would facilitate the development of scientific research and its application. The policy aimed at ensuring an adequate supply of research-oriented scientists for expanding the scientific base within the country. The Scientific Policy Resolution tried to establish a link between the industry and scientific research. For the above purpose, 25 universities were setup in 1947, which increased to 80 in 1969 (Krishna, 2001). The number of engineering colleges increased from 38 (with 2940 seats) to 138 in 1970 with a capacity of 25,000 seats. In 1968, Indian Institutes of Technology (IITs), modeled on MITs, were set up to provide high-quality engineering education to gifted students. Besides, there was a rapid expansion of the science base through various agencies such as Council for Scientific and Industrial Research (CSIR),

Department of Atomic Energy and Defence Research and Development Organisation. Although the CSIR had no independent lab in 1942, by the late 1950s, 15 such labs were created (Krishna, 2001).

In the light of the above observations, one thing becomes clear that, India built up a relatively good research infrastructure base to support its own industry i.e. an attempt was made to link industry with university and this effort is reflected in the growth rates of gross fixed capital formation during the first period.

2. The restrictive phase

Liberalisation of the industrial policy towards foreign capital inflow continued till mid 1960s. As a result, outflow of Indian currency in the form of remittances of dividends, profits, royalties and technical fees grew sharply and became a significant component of the balance foreign exchange account of the country. In the late 1960s, due to foreign exchange crisis, the outflow of foreign currency through above mentioned roots drew government attention. As a result, more restrictive policies, mainly in respect to foreign collaborations, were devised to stop the outflow of currency.

By the late 1960s, the planning objective shifted from merely growth to growth with self-reliance and social justice. The government of India initiated policies to control the domestic market. The industrial licensing system was introduced in a proper manner; the import-substitution drive was encouraged and the foreign trade sector was progressively tightened. Besides, the Monopolistic and Restrictive Trade Practices (MRTP) Act was devised to regulate the expansion of large scale engineering firms; the reservation policy was introduced to protect the small-scale sector, while major commercial banks and other financial institutions were nationalised with a view to ensuring the flow of credit to the specified sectors, including engineering industry. A highly protected and regulated economic environment was created with no industry-specific priorities. These policies led to as Ahluwalia (1985) and Lall (1987) explain:

- ⇒ Inefficiencies through (a) restricting entry (b) not permitting firms to utilise the full technological capacity
- ⇒ Poor technological level of industry through restricting import of disembodied technology.

Table 5: Number of approved industrial licences (IL), MRTP application (MRTP) and Foreign Technology Collaborations (FTC) in India

Year	IL	MRTP	FTC
1976	465	54	277
1977	464	52	267
1978	371	--	307
1979	402	43	267
1980	683	39	526
1981	669	143	389
1982	936	160	588
1983	985	90	673
1984	917	131	740
1985	2454[a]	na	1041
1986	3418	na	960
1987	2730	na	903

a = includes registration under the scheme of delicensing

Source: Department of Science and technology, Annual Report, 1988

The role of licences in Indian industrialisation process is clear from the data for the number of approved industrial licences for MRTP application, from 1976 to almost 1984, presented in Table 5. , After 1984, due to different government policy responses, the number of industries allowed to operate under the MRTP act was increased or the fixed assets limit was increased from Rs 200 million to Rs 1000 million. Subsequently, the number of approved industrial licences or foreign technology collaborations also increased.

Further, there was a new view that technology should not be imported for local-level development efforts. To generate demand for domestic technologies, the government reversed its policies on foreign technology acquisition. Numerous restrictions were imposed on foreign collaborations in engineering industries. The government listed these into: (a) where no foreign collaboration was considered necessary; (b) where only foreign technical collaboration was permissible; and (c) where both financial and technical collaborations could be considered. FDI was allowed only in core industries where little technological progress had been made i.e. where the country's progress was very unsatisfactory. The Foreign Exchange Regulation Act (FERA 1973) imposed numerous restrictions on the entry and growth of foreign engineering companies. The transfer of technology through licensing was also restricted. Limits were imposed on the maximum royalty payments; duration of agreements, renewals and extensions of technical collaborations; tax rates on royalty, technical fees and lump sum payments were raised to discourage import of technology.

Table 6: Index number of engineering output and of foreign technology collaborations in engineering industry, 1976-1985 (1970=100)

Year	EO (1)	FTC (2)	(2)/(1)
1976	137	160	1.17
1977	146	165	1.13
1978	153	178	1.16
1979	154	171	1.11
1980	156	325	2.08
1981	169	253	1.50
1982	173	354	2.05
1983	178	386	2.17
1984	193	461	2.39
1985	208	554	2.66

Note: EO: Engineering Output

FTC: Foreign technology collaborations

Source: Staffan Jacobsson, 1990

Table 6, taken from Staffan Jacobsson (1990), shows listed index numbers of output and foreign technological collaborations in the engineering industry. It is evident from the table that, the intensity in terms of the use of foreign technology increased after 1980's. From Table 7, we can observe that the share of foreign technology payment (in value terms) in manufacturing value added (column 6) increased from 0.3- 0.5 per cent before 1981-82 to 0.9-1 per cent.

Table 7: Technical efforts in Indian manufacturing industry (10 million and %)

Year	R&D {1}	FTC {2}	(1)+(2) {3}	MVA {4}	(1)/(4) % {5}	(2)/(4) % {6}	(3)/(4) % {7}	(2)/(1) {8}
1974-75	56.2	21.1	77.3	9859	0.57	0.21	0.78	0.38
1975-76	68.9	36.2	105.1	10375	0.66	0.35	1.01	0.53
1976-77	80.2	53.7	133.9	11519	0.70	0.47	1.16	0.67
1977-78	95.7	47.5	143.2	12839	0.75	0.37	1.12	0.50
1978-79	130.9	65.3	196.2	14761	0.89	0.44	1.33	0.50
1979-80	165.3	53.5	218.8	16952	0.98	0.32	1.29	0.32
1980-81	207.1	113.8	320.9	22143	0.94	0.51	1.45	0.55
1981-82	254.6	286.7	541.3	25952	0.98	1.10	2.09	1.13
1982-83	319.4	298.3	617.7	28904	1.11	1.03	2.14	0.93
1983-84	369.5	342.5	712.0	33996	1.09	1.01	2.09	0.93
1984-85	382.1	329.1	711.2	38437	0.99	0.86	1.85	0.86
1985-86	426.0	391.4	817.4	44862	0.95	0.87	1.82	0.92

Note: MVA: Manufacturing Value Added

Source: Staffan Jacobsson, 1990

As can be seen from column 5 and 8, R&D intensity of the Indian manufacturing industry has generally increased over the period from 0.57 percentage of MVA to 0.95 per cent in 1985-86, but the payments for the foreign technology increased faster than expenditure on domestic R&D.

Besides, many policies were initiated to promote R&D within the country like introduction of the Patent Act (1970), introduction of a scheme for recognising in-house R&D units or promotion of industry-institution linkages. In view of the above restricted policy, foreign technology transfers declined drastically between 1968 and 1980. Average annual foreign investment approved declined from Rs.44.6 million in the early 1970s to around to Rs.34 million by the late 1970s. The technology growth rate also slowed down and the royalty payments fell from the average annual growth rate, from Rs. 44.6 million in early 1970's to around Rs. 34 million by the late 1970's. One positive thing we can observe is that India achieved some degree of self-reliance in standard techniques and began exporting technology. Technology receipts, on account of lump sum payments and royalties, jumped from Rs. 2 million in 1968-69 to Rs.20 million by 1979-80 (RBI, 1992).

3. The Liberalised phase

In the mid 1980's, the Indian policy framework changed dramatically. These changes relate in particular to industrial license policy, the MRTP Act and technology import policy. The basic rationale behind the changing attitude of the government was to reduce the barriers and encourage competition so that the industry could enjoy the economies of scale. A major step towards changing the policy was taken in 1983 when the regime of broad banding began. However, many of them got implemented in the late or mid 1980's. This means that the policy framework shifted from 1960s narrow and product-specific licensing to providing licence to broader industries, i.e. a firm could shift from one to another product within the industry.

The plan focus again shifted from growth with social justice to growth with efficiency. The Industrial Policy Resolution of 1980 stressed the need for optimum utilisation of installed capacity along with achieving higher productivity. To meet this objective, it proposed liberalisation of the industrial licensing policies by introducing delicensing and regularisation of excess capacity and the capacity re-endorsement scheme. The actual policy implementation, starting from late 80s, can be seen from the data. In the foreign trade sector, a move was initiated to cut down on import restrictions and tariffs. The process of deregulation was accelerated in the mid1980s, with the industrial licensing being abolished across a number of industries and major reforms introduced in the foreign trade sector. In 1985, delicensing of 25 broad groups of industries, including several components of engineering industry coming under non-MRTP and non-FERA companies, was effected (e.g. rubber, printing, footwear machinery, agricultural implements, etc). Broad banding for effecting changes in product mix was extended to about 28 industrial groups (metallurgical machinery, chemical, pharmaceutical and fertiliser machinery, machine tools, agricultural machinery, earth moving machinery, metal handling equipment, etc.) while capacity re-endorsement facility was provided to a large number for industries to accelerating the modernisation process.

However, it was only in 1990s that, industrial engineering sector was delicensed along with others. The number of industries reserved for the public sector got reduced from 17 to 8 in 1991, and plans were chalked out for disinvestment of public sector undertakings. Besides increased domestic competition, the economy was thrown open to the foreign firms thereby increasing external competition. In many sectors including engineering industry, maximum tariff was reduced from 300 per cent in 1991 to 65 per cent progressively by 1994-95, and the rupee was made convertible on current account. The financial, infrastructure, information technology, telecom and foreign trade sector reforms also continued with other reforms. The reforms undertaken in the 1980s led to rapid expansion of industrial activity and further policy initiatives were announced in the new industrial policy of 1991, by substantially deregulating the industrial sector and liberalising foreign investment and technology imports. Measures were taken to encourage competitiveness in the economy through various ways like reforms in trade policy, aimed at substantial liberalisation of controls and licences, decanalisation of many items of trade, reduction in peak tariff rates etc. In order to meet the requirements of machinery for modernisation of export production sector, a large number of items (initially 201) of industrial machinery were included in the list of capital goods allowed for imports under open general licenses (OGL) i.e. license system was abolished on many capital goods. In addition, in the initial stages of reforms, the capital goods sector including non-electrical machinery was subjected to the fastest tariff reductions. Customs tariffs were reduced from a peak of over 300 per cent in 1991 to as low as 50 per cent by 1995 and further to 25 per cent in 2003. The import duty on capital goods for general projects and machinery which was 85 per cent prior to reforms was brought down to 25 per cent in 1995 and unified rate for nearly four-fifths of the machinery.

Therefore, for the first time during this phase, there was a major change in the policy response towards technological upgradation of Indian industry with a view to improving international expectations. In this respect, the government liberalised the inflows of foreign technologies progressively on one hand, and offered a package for R&D promotion, on the other. The statistics

reveal that the policies adopted during the liberalised phase resulted in a tremendous increase in foreign technology inflows. It can be observed from Table 8 (See also Appendix 2).

Table 8: Indicators of foreign technology acquisition in India (1991-2002)

Industry	Total	No. of approvals technical	Financial	Amt. of FDI approved (US $)	% of total FDI approved
Electrical and electronic equipment	5033	1180	3853	7052.93	9.83
Transport industry	1562	612	950	5518.44	7.38
Non-electrical machinery	2929	1479	1450	1601.47	2.02

Source: Ministry of Science and Technology, 2002

Concluding Remarks

From the above analysis, it is clear that Indian engineering industry has exhibited growth and diversification under the various policy responses, which the government of India undertook from time from to time. Engineering industry is one of the industries, which has undergone liberalisation in the early stages of industrialisation process. In the initial stages, i.e. during the first five-year-plan period, the policy makers gave a lot of attention to the engineering industry. Although this industry was mainly restricted to the public sector, there were many foreign collaborations during this period. The predominant presence of public sector enterprises, across many segments of the engineering industry, played a crucial role in fulfilling the aim of self-reliance. In the second phase (1969-early 1980), its importance decreased and many regulation-oriented policies were announced. However, from the late 80's, it regained its importance again. But the second phase also had its own importance. This was the phase when Indian engineering industry developed its own capacity with different and effective policy. It is evident from the responses that, in the case of non-electrical machinery, the number of approvals in 1976 that stood at 277 jumped to 2270 in 2001 i.e. almost 10 fold within 25 years. From our analysis, one can infer that there still exists a further scope for devising an appropriate industry-specific policy in the Indian context.

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Appendices

Appendix 1: Summary of key Government Policy over the period

Major Planning Objectives	*Key Policy*	*Key changes*
1. Heavy Industrial based growth (1948-66)	• Industrial Policy Resolution (1948) • Basic principles with regard to MNC 1. Non-discrimination 2. Full freedom 3. Compensation • Scientific Policy Resolution (1958) 1. Domestic R&D 2. Link between Industry and University	• Specified industries where licenses were required for firms with fixed investment above a certain level or import content of fixed investment above certain level. • Schedule A of industries reserved exclusively for state enterprises • Schedule B of industries where state enterprises were to acquire a dominant position
2. Growth with self-reliance and social justice (1966-67 to 1984-85)	• Industrial Licensing System • Monopolistic and Restrictive Trade Practices Act. (MRTP) • Patent Act (1970) • Foreign Exchange Regulation Act. (1973)	• Made licensing mandatory for all the industries with investment above certain level. • Specified list of industries reserved for all small-scale sector (firm below certain fixed investment level • Specified industries to which business house (large Indian conglomerates) and foreign companies were to be confined.
3. Growth with efficiency and competitiveness (1985-86 onwards)	• Industrial Policy Resolution • Delicensing • Non-MRTP and Non-FERA • Maximum Tariff Reduction • Open General Licenses • Customs Tariffs Reduction • R&D Promotion	• Removed restriction on business houses to Appendix I industries so long as they entered specified industrially backward areas • Raised the minimum asset limit defining industrial house from Rs 200 million to Rs 1 billion • Set lower limit of limit of Rs 1 billion in assets for referring company to MRTP Commission, limiting the applicability of the Act.

Appendix 2: Foreign Controlled Firms and Their Share in Gross Sales

Industry	1970-71			1980-81			1990-91		
	No of Firms		Foreign Shares in Sales	No of Firms		Foreign Shares in Sales	No of Firms		Foreign Shares in Sales
	Foreign	Total		Foreign	Total		Foreign	Total	
Electrical Machinery - other	40	107	57.8	24	75	55.1	21	130	46.5
Machine tools	1	12	31.8	2	11	34.7	2	11	49.2
Textile machinery	-	-	-	3	15	18.4	2	13	10.8
Non- Electrical Machinery - other	52	123	32.7	53	118	39.7	41	123	37.6

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