Planning for development had been given some serious thought by some of the best brains in the country in the early decades of this century. Sir M. Visvesvaraya ushered in the era of planning with the Economic Conference in Mysore in 1911, which was published from London in 1920 as "Reconstructing India". In 1934 he produced "Planned Economy for India" which advocated the development of modern technology for utilizing the country's resources. In 1937 he published "Nation Building: A Five Year Plan for the Provinces". It was such a well thought out and powerful document that evoked the comment from the then Member Finance, the Government of India, Sir James Grigg, that Sir M. Visvesvaraya was trying to introduce Bolshevik methods in India. But the fact was that the doyen of engineering had given expression to his ideas long before Lenin thought of developing Russia through 5-year Plans.

Nehru's Vision for India's Self Reliance

From 1920 onwards Nehru initiated two distinctive trends of modernism and socialism. Mahatma Gandhi while giving thought to Indian future concentrated on evolving a national spirit. In his earlier writings he had shown reluctance against building heavy industries on the grounds that they represented the evil of constantly growing material wants and eventually led to the
concentration of power by few over many. He was the greatest crusader for ending the poverty of the vast millions and subordinated everything to the service of Daridra Narayan. He differed with Pandit Nehru on the emphasis to be placed on heavy industries but totally agreed with him that there was no question of allowing all heavy industries to be owned by individuals. He stressed that he was in fact against all private ownership and wanted it to be replaced by trusteeship.

Nehru was all along clearly projecting the socialist-goal towards which the free India would gear itself. The turning point came when at the Haripura session of Congress (1938), the National Planning Committee was set up with Nehru as its Chairman. He gathered eminent economist, scientists and other intellectuals to draw up a blue print of the future development of India. In these documents prepared at the Haripura session one finds four central ideas of what was to be the economic philosophy of Nehru - (a) Planning, (b) priority towards the building up of heavy industry as the essential component of the drive towards Arthik Swaraj, (c) the State occupying the commanding heights of the economy and (d) a mixed economy.

It is also in these documents that one finds the glimpses of the importance that he was to give to steel and heavy engineering which so long ago believed to be the key to the industrialization process in the pre-electronic age. Steel as the mother industry - this idea was the central part of his economic thinking.

Nehru aspired for a society in which there was equality of opportunity and the possibility of everyone to have a good life. He said for this to become reality, there must be wealth and production. Economic emancipation could come only
through rapid industrialization\textsuperscript{1} specially with the adoption of modern technology. Thus the public sector began to be looked upon as an article of faith and instrument of change.

With particular reference to iron and steel industry the Government of India set up a panel in 1945 for recommending measures for its development. The panel urged the setting up of additional steel making capacity in the country. In turn, the Government pursued international negotiations with various consultancy firms in order to examine the technical feasibility of setting up of iron and steel industry in India. It appointed Koppen Company of West Germany, Arthur McKee and Sons of the United States of America and the International Construction Company of the United Kingdom as consultants. The recommendations received in 1948 were for the setting up of steel plants with capacity ranging from half to one million tonnes of steel per annum. But pressing national problems soon after independence relegated steel to the background, though only for the time being.

After Independence, we can say that the first decade was that of consolidation of independence. Despite the daunting difficulties of a shattered economy after partition, communal problems, integration of princely states etc., it is significant that Nehru launched the country on the path of planned development. The First Five Year Plan (1951-1956) in this light was not much of a Plan but something of a collection of projects underpinned by budgeting allocations. Still it had its great value as a single source document on which India would be pioneering in the sphere of independent economic development.

\footnote{N.R. Srinivasan, \textit{The Corporate Story of SAIL}, New Delhi, 1990, pp. 26-27.}
The First Five Year Plan laid emphasis on agriculture and related investments as soon after independence feeding the teeming millions adequately became the first priority. The philosophy of industrial policy in a mixed economy was elaborated in the First Plan. It stated that in this transformation of the economy that is called for, Government would have to play a crucial role. A rapid expansion of social and economic responsibilities of the state alone would be capable of satisfying the legitimate expectations of the people.

Once consolidation was more or less achieved the Prime Minister of India appealed not for struggle but for creation. After 1947, 1955 became another turning point in Indian history - it was the year of the celebrated Avadi Resolution of the Congress when the goal of the socialistic pattern of society was proclaimed. It was also the year when Non-Alignment began to be at the centre of our foreign policy. It was as well the year when the Second Five Year Plan framework indicated that physical planning and public sector occupying the commanding heights of the economy with stress on heavy industries were to be the engine of self reliant growth.

On 23 May, 1956 Nehru enunciated the philosophy of the socialist pattern of society and also the instrument of achieving it. He was deeply committed to the development of the basic industries. Decrying the popular notion of equating industrialization with the increase in the output of consumer goods, he said, "If we really wish to industrialize we must start from the heavy basic mother industries. There is no other way. We must start with the production of iron and steel on a large scale. We must start with the production of machines which make machines.
So long as we do not have these basic things, you are dependent on others and you can never grow rapidly enough.\textsuperscript{2}

Beginning with the Industrial Policy Declaration of 1956, coinciding with the commencement of the Second Five Year Plan, massive investments have been made in the industrial and capital goods and minerals sector. Indo-Soviet co-operation became an important element in the new economic strategy for development.\textsuperscript{3} Second Plan specifically indicated investment in the infrastructural facilities for the rapid growth of economy: power, transportation, heavy engineering, steel, fertilizer, etc.

Having gone through the legacy of pre-independence debate on India's development alternatives, we can now well appreciate the initiation of the process of planning in India. Sukhamoy Chakravorty\textsuperscript{4} opines that at that juncture, Nehru's attempt at planning was the way of avoiding the unnecessary rigours of an industrial transition in so far as it affected the masses resident in Indian villages. Furthermore, planning was a positive instrument for resolving conflict in a large and heterogeneous subcontinent.

Sukhamoy Chakraborty further states that the Second Plan Document is probably the single most significant document on Indian planning. This work was heavily influenced by P.C. Mahalanobis; it reflected to a much larger extent the necessity to build ahead of demand in the area of capital goods production. The Mahalanobis strategy which deviated from the "textile first" strategy of a successful

\begin{footnotes}
\item H. N. Dastur, "Industrialization and Steel", in V. Krishnamurthy (ed.), \textit{Tryxt with Steel}, New Delhi, 1988.
\item Mohit Sen, "Nehru's Vision and Steel", in Govt. of India, Ministry of Steel and Mines, \textit{Metals in Indian Development}, New Delhi, 1989, p 3-5
\item Sukhamoy Chakravarty, \textit{Development Planning}, New Delhi, 1993, p.3.
\end{footnotes}
late comer in industrialization like Japan, was the object of a great deal of critical
comment. Mainstream economists found it as an unjustified departure from the
principle of "comparative advantage". While, those who were impressed by the
Soviet model of industrial development thought that the avowed priority for the
capital goods sector corresponded to the logic of accumulation enunciated by
Marx in his models of expanded reproduction.\(^5\) The Second Plan was viewed as
the "real break with the past" - a document that saw the articulation of what may
be called the Nehru Mahalanobis strategy of development.\(^6\)

SECTION -1 : GENESIS OF STEEL INDUSTRY IN INDIA

A) The First Attempt of International Negotiations for Technology Transfer
in Steel

In the historical times, India had achieved a high level of technological skill
in iron and steel manufacturing as is indicated by the iron pillar at the Qutab Minar
in Delhi. That skill however, could not catch up with the modern technology and
in fact it has been lost in the hoary past.\(^7\) Under the British rule there was hardly
any possibility of getting encouragement and support for an Indian iron and steel
plant. There were three reasons for this attitude of the British -

(i) They did not want their market interests for steel in India to be affected

\(^5\) ibid, S.Chakraborty, p 12.
\(^6\) Ibid, p 18.
\(^7\) Sadhan Mukherjee, "Indian Economic Relations with USA and USSR", Steel, The Sinews of The Nation, p.222
They offcourse could not let the very vital raw materials to be shared by the growth of Indian steel.

Even if a distant possibility, they did not want to face any competition to their iron and steel industry from among their own colonies.

Nevertheless, J.N. Tata tried to enlist the British Government's support for his idea of a steel plant in India but failed. But he was persistent in his efforts. Sadly before anything constructive could materialize he passed away in 1904. His son Dorab Tata sought the help of London financiers but even there he received a rebuff. So no help was forthcoming for technology or for financing it.

When there was no sign on any assistance from foreign quarters, only then did the Tatas go in for Swadeshi shares to fund their steel plant. The Indians responded heartily to this national effort of building a steel plant at Jamshedpur. The British however, continued to be the least cooperative. They refused to sell the blast furnace and other equipment to set up a steel plant. Then the Tatas negotiated with USA and Germany to finalise the purchases of technology, machinery and training facilities. The process of acquiring the technology by the Tata Iron and Steel Company (TISCO), which has in the past 85 years acquired the most competitive edge in Indian iron and steel industry, was very simple. Tata exchanged capital for the desired technology and manpower training facility for setting up the plant. The first blast furnace of TISCO was blown on 2 December, 1911 and production of steel started in an Indian factory in 1912. Thus, inspite of

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Sen Sunil Kumar, *The House of Tata*, p.37
much reluctance of our British rulers, our technology transfer deal materialised successfully in private sector in India.

At this point we should also take note of the fact that the Barakar Iron Works Company installed a blast furnace as far back as 1875 at Kulti, Bengal, to make iron using coke from the Jharia coal fields for the first time in India. This was a British mercantile firm which in itself represents the first case of direct technology transfer by the British in the colonised India. The mill was entirely owned by Britishers in the then Indian colony with all the equipment and machinery being of British origin. This was later called the Iron and Steel Company (IISCO). At the time of independence the capacity of this mill was 300,000 tons of ingot. The capacity was increased to 500,000 tons during the First Five Year Plan period (1951-1956) and to 1M tons during the Second Plan Period with the British and World Bank assistance.

For technology transfer, for expansion of IISCO plant capacity partners were found among the Britishers and the other developed rich countries of the West. These were the same nations who were entirely opposed to the development of the industry in the Indian public sector. For six years from 1960-66 IISCO was the pride of Calcutta stock exchange producing more than 90,000 tons of ingot annually. The output touched one million tons in 1962-63 and 1963-64. Then the precipitous decline started with the output falling to 600,000 tons in 1971-72, just before the take-over of the management by the Government of India. Thus this can be sighted as the classic case of failure of technology transfer in India’s private sector steel soon after Independence.

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9 K Krishnamurthy, Technology Transfer in India Steel, Technology Books, Madras, 1985, p 32
B) Steel Industry in the Public Sector

The Attitude of the Western States

We have earlier talked of a committee set up by the British Government of India (1945) which urged the government to go in for setting up additional steel making capacity. These recommendations were received in 1948. Even earlier than this, in the middle of 1942, an American technical mission, the Grundy Committee\(^1\) came to inspect the existing industries and make suggestions for increased production. The Committee's concern was naturally with the production for war purchases. But the report was not published as the British Government of India vetoed its publication. Among the few of its recommendations which were announced were the suggestions for the production of more power alcohol, the expansion of the iron and steel industry and electricity plus greater production of aluminium.

On the one hand the Committee did not approve the leisurely, casual and inefficient methods of the British Government of India. On the other the Committee was struck by the efficiency and organization of the Tata Iron and Steel Company. It was impressed by the good quality and excellent potentiality of Indian labour: "Here we can make two very important inferences. Firstly the Indian economy was mature enough by early 1940s to get into the phase of rapid industrialization through production of capital goods indigenously. This is evident from the objective study of various Committee reports. Secondly the British

\(^{10}\) cited in K. Krishnamurthy, *India's Steel Technology*, New Delhi, 1989, p78.
Government of India was in no way supporting the growth and development of industrialization in the country. It is evident that powerful interests were operating abroad for the purpose of throttling further industrialization of the country, so that in the post-war world, there would not be dangerous competition to the West from the East.\footnote{Comment on the Grundy Committee Report, \textit{Commerce Weekly of Bombay}, November 28, 1942.} So, from the very beginning we can see the Western countries were ignoring the actual potential of India to grow as an industrial nation in this region.

Before Independence, the negative attitude of the British colonialists and other imperialists led to every conceivable obstacle to the setting up of steel industry. The steel production in India started with Jamshedji Tata's efforts, who demonstrated great patriotism and grit in pushing ahead with his project successfully. When it came to the turn of independent India going in for a quantum jump in its steel production, same opposition was witnessed in a new garb.\footnote{ibid, Mohit Sen, p 5} Eugene Black, the then President of the World Bank, observed in the early 1950s that India would be well advised not to even attempt to go in for heavy industries. He opined that it would be to our comparative advantage to leave that to developed countries. The Americans were of the view "You give us the ore and we will give you steel." However, India was determined to refuse the status of a periphery supplier of primary goods. It was determined to fight against these dependency equations and rise as a self-reliant and independent centre of power.

The Western advice to Indian development planners was to concentrate on agriculture, transport and small scale industry. Their main argument was that India should not invest its limited resources in heavy industries like steel. India under
Nehru was not going to be daunted as it took its poverty and underdevelopment as a challenge to stand up to rather than a situation to live with.

As discussed earlier from the first plan period onwards, the Government of India was determined to lay the foundations of the public sector enterprises, and take up iron and steel industry as a major project. The view of the government was amply borne out by the rising demand for steel in the wake of the emerging industrial picture of the country. The iron and steel demand was estimated at about 3 million tonnes by 1960. Hence there was an urgent need to set up fresh capacities in the country. In the First Plan one project was included in the public sector at an estimated cost of Rs.80 crores, to produce about 350,000 tonnes of pig iron by 1955-56. But it did not materialize. In conceding the logic that it was easier to expand existing steel plants the private sector was given permission for limited expansion. But the main chunk of fresh capacity was reserved for the public sector in view of the deliberate policy which the government had adopted earlier.13

Nehru set up a special Ministry, the Ministry of Production under his leadership. It took charge of the few public enterprises that had been set up. The needs for technology and finance were the most crucial for India to set up integrated steel plants. To meet these requirements India invited collaboration from abroad. Attempts were made at attracting United States and the United Kingdom. But both these countries did not show any encouragement and India was roundly rebuffed. From here begins the story of the first few years of negotiating for Indian steel development. In this respect, India's bargaining

strategy was to play one Western countries against the other, which resulted in some diplomatic success.

**Deal With the Germans**

A.K.Chanda, Secretary in the Ministry of Production, went to West Germany to explore the possibility of securing assistance. The FRG however showed some interest hesitantly after consistent persuasion by the Indian officials. For India this came as a major breakthrough. FRG was a country looking for fresh grounds to build its identity after the Second World War. This provided the political motivation for West Germany to enter into the collaboration with India.¹⁴ In December 1953, a consortium of German firms, Krupp-Demag reached an agreement with the Government of India. The German consortium offered to set up half a million tonne steel plant at Rourkela in Orissa.¹⁵ But the Germans put forward many conditions, special terms and so on. This was clearly in line with the Western countries' lack of enthusiasm to offer us help and know how. They put up the demand for equity participation of 20 percent and a rate of interest of 12 percent.¹⁶ Along with this they guaranteed six percent dividend. There were questions raised within the cabinet on whether the public sector in the newly independent India should at all accept foreign equity. But India could not find a way out of this clause of the Germans and was forced to submit to their demands mainly because there were no other quarters of help.

¹⁴ ibid
¹⁶ ibid, Sadhan Mukherjee, p 223.
Era of Indo-Soviet Collaboration in Steel

It stands to the credit of Nehru that he was among the very first of world statesmen to sense that a wind of change was blowing through the Soviet Union. He realized that a decisive break from Stalinism was under way which could make a distinctive impression on contemporary world history. From the very beginning Nehru showed his support to the new President Nikita Khruschev in his efforts to start a new course in the post-Stalinist USSR, and to make it play its indispensable role in preserving world peace.  

Thereafter a state visit by the Prime Minister to the Soviet Union was to have a profound effect upon the progress of Indian industry, particularly under the public sector, over a wide spectrum of industrial enterprises. The Soviets offered to help India's industrial efforts specially in the public sector without any strings attached and on the basis of mutuality of interests. In August 1954, the Soviet Union showed interest in collaborating with India in steel projects. Steel production was to be the first major area of collaboration between the two nations.

The arrival of the Soviet Union as a competitor in the developing countries was undoubtedly a factor which made the West adopt an attitude different from the continued pursuit of its traditional colonial outlook. It is very interesting to note here that the official Soviet position on the export of capital equipment and technology to the developing countries was that it promoted industrialization in the state sector thereby strengthening its position vis-a-vis monopoly capitalism. An alternative view, however, was that under the pretext of consolidating non-capitalist forces, Soviets had evolved a strategy of extricating the developing

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17 ibid, Mohit Sen, p 5
countries from the world capitalist system, to integrate them into a counter system. This was another way of playing the cold war politics. Beginning from 1954 India placed a considerable degree of reliance on the import of capital equipment and technology from the Soviet Union for its core sector needs (steel, aluminium, coal, petroleum, pharmaceuticals, metallurgy etc.)

The Outstanding Document

The Soviet offer to put up the Bhilai plant was a landmark in the history of relations between the two countries. It was the beginning of an adventure in foreign relations in economic and industrial co-operation, in technological collaboration and commercial association which has very few parallels in history. The agreement with the Soviet Union on Bhilai, negotiated mainly under the leadership of S.S. Khera, Secretary, Ministry of Production, is widely accepted as an outstanding document in one of the early composite arrangements for transfer of technology from a developed to a developing country in a basic industry. There was a strong political compulsion for the Russians to prove themselves in the international arena of competition with the West. This was a major thesis in foreign relations propounded by Khrushchev for which India was the stage. But once this agreement was signed on 2 February, 1955, it showed that there existed a clear understanding of the roles of the two sides. During preliminary talks, Khera was refused access to Soviet factories, and the Indian delegation decided to pack up and leave. At this stage some people at the high political level intervened and

the delegation was allowed to look closely at Russian performance at the shop floor, instead of being satisfied merely with figures and diagrams.

A thorough investigation and analysis was made by a big team visiting the Soviet Union. The members of this team were fully satisfied that the technology being given at that time was the best, of course, from the technology available in Soviet Union. It was at the top so far as the blast furnaces and open hearth operations were concerned. More than that, attention was paid to future expansion. There were some disagreements on technical matters, specially on some items suggested by the Indian technicians for product mix. The Russians pointed out the fallacies and the Indian negotiators concurred with the Soviet judgement. In case of electrical equipment, Russians accepted the Indian stance that better quality items could be supplied by adaptation of designs and equipment available in India.

Khera was emphatic that Bhilai Stage I was not a leap in the dark but the best conceived project. Bhilai was an international trend setter as an unprecedented Soviet deal with a non-communist, non-industrialized country. According to Boothalingam, who had the longest tenure as Steel Secretary (1955-62), "the Russian argue and argue, but once they come to terms on an agreement they stick to it closely. They never take a decision and agree afterwards." 

The first Indo-Soviet team arrived at the site of the proposed Bhilai Steel Plant on 6 June, 1955. Construction activity on the site commenced on 6 May, 1956, after the enabling works were well under way. Blast Furnace No.1 was

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19 TVS Ratnam in an interview with K. Krishnamurthy, p 140
20 Ibid, K. Krishnamurthy, p 89.
commissioned on 4 February, 1959, finally completed on 2 February, 1961. Along with the Bhilai steel plant, the Rajhara iron ore mines and the Nandani lime stone mines were simultaneously developed with the Soviet assistance. Coal Mining/beneficiation and power requirement aspects were taken care of by the Soviets.\(^{21}\)

Table -3.1 : Terms of loans for public sector plants

<table>
<thead>
<tr>
<th>Plant</th>
<th>Interest</th>
<th>Repayment Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bhilai</td>
<td>2.5 percent</td>
<td>12 years</td>
</tr>
<tr>
<td>Bhilai Expansion</td>
<td>2.5 percent</td>
<td>12 years</td>
</tr>
<tr>
<td>2. Durgapur</td>
<td>5.5 to 6 percent</td>
<td>11 years</td>
</tr>
<tr>
<td>Durgapur Expansion</td>
<td>5.5 to 6 percent</td>
<td>25 years</td>
</tr>
<tr>
<td>3. Rourkela</td>
<td>6.3 percent</td>
<td>3 years</td>
</tr>
<tr>
<td>Rourkela services and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>3 percent</td>
<td>20 years</td>
</tr>
<tr>
<td>4. Rourkela Expansion</td>
<td>5.75 percent</td>
<td>20 years</td>
</tr>
<tr>
<td>Rourkela refinancing</td>
<td>5.50 percent</td>
<td>16 years</td>
</tr>
</tbody>
</table>

Source: The Politics of Foreign Aid In India. P.J.Eldridge, p 137

\(^{21}\) S.R.Jain, Indo-Soviet collaboration in *Steel, Metals in India's development*, GOI Publication. 1988, p.18
Table 3.1 above gives the terms of loans for three public sector plants. It can be seen that the total credit for setting up the Bhilai steel plant extended by the Soviet Union was Rs. 1019.60 million, bearing a rate of 2.5 percent interest and repayable in 12 years starting from one year after the beginning of supply of machinery. This loan was to be paid back in the form of Indian goods valued in Indian rupees without involving any hard currency. In contrast to the German terms and conditions, the Soviet offer proved to be more compatible with Indian interests.

There are many reasons which explains the excellent results achieved in the steel production at Bhilai. Soviets had delivered to India first rate equipment. Many Indian specialists had practical training at the best metallurgical enterprises in the USSR. Specialists passed on their knowledge to their Indian colleagues both during construction and commissioning of the project, without any hesitations. The training of the Indian engineers and workers both at Bhilai and at factories in the Soviet Union was competent and thorough. There was an extensive transfer of skill in plant operations. There was greater Indian participation in Bhilai's construction works with all relevant drawings passed on to the Indian company. In the first expansion to 2.5 MT, the plants engineering division was closely associated.

Indian Bargaining Strength After The Entry of Soviet Union

Soviet Union made an offer to collaborate in mid-1954 after the Indian government had approved collaboration with Krupp and Demag of West Germany.

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22 ibid, Sadhan Mukherjee, pp 223-4.
23 ibid, S.R. Jain, p 18-19
The "experts" whom the Government consulted gave their advice, seemingly the best in technical terms. They advised a half million tonne steel plant, the same size as Rourkela, small blast furnaces which had already gone out of use as non-economic and to cap it all, they recommended a product mix which would have crippled the project altogether.

The Soviet specialists whose standing depended upon the success of this first major collaboration with this country, tore the "expert" advice to pieces and demonstrated how its adoption would defeat the undertaking. They, in turn, recommended large (1000 tonne) blast furnaces, a million tonne steel plant and a product mix that would benefit the enterprise technically and economically. In the end the Soviet advice prevailed.24

Bhilai agreement gave us the first solid support with which to withstand the neo-colonialist pressure tactics. It gave us the bargaining strength that we lacked earlier. The reaction on the part of the British and West German companies which until the signing of the Bhilai agreement had been trying to keep an upper hand in the deals was quick. West Germany rapidly climbed down from 12 percent rate of interest and offered a credit for a 12 year period at 6 percent interest. They even dropped the demand for equity participation at the Rourkela plant.

After the Bhilai agreement the Germans also came forward with a strong recommendation to increase the capacity of Rourkela to one million tonne and to set up large 1000 tonne blast-furnaces, as discussed above. A revised document with competitive terms resulted in a supplementary agreement signed in July 1955. The design of the plant became a matter of prestige for FRG. The former West

24 ibid, K.Krishnamurthy, page 83.
German Chancellor, Ludwiz Erhard described the Rourkela plant as a race horse of high breed while Bhilai, built by the Russians was to be looked down upon as an agricultural work horse. The Germans went on emphasizing that they provided high technology and Soviet designs and practices were primitive. But the Bhilai work horse was to be easier to ride in the Indian context as was proved in practice in the long run.25

The British Consent for Collaboration

In early 1955 when negotiations were going on with West Germany and USSR, the Indian government decided to go ahead with a third steel plant at Durgapur in West Bengal. The Government of India approached Great Britain for the second time. Under the Colombo Plan, India invited a technical mission headed by Sir Eric Crates from the UK. This mission was to study the economic and technical problems and also select a suitable sight. In August 1955 the mission recommended Durgapur and the suggestions was accepted by the government. A preliminary report and estimates for the plant were submitted in January 1956. The quotation was compared with that of USSR for the Bhilai plant. The final estimates and the specifications furnished by the Indian Steel Works Construction Company Limited.26 were examined by the government with the assistance of its consulting Engineers the International Construction Company, London and the engineering advisor to the Ministry of Iron and Steel. A contract was entered into by the government of India with the Indian Steel Works Construction Company

25 ibid, p.94.
26 A consortium of London Firm which negotiated with Indian Government.
Ltd. on 31 October, 1956. The British agreed to a credit equalling the Soviet amount but with higher interest rate of 4.75 percent to 5.5 percent and for a term of 7 to 15 years. When India had first approached Britain, the short answer was 'not interested' for they seemed genuinely afraid of competition from any large new capacity in India, one of the traditional markets for British Steel during the time of the British rule. After the Bhilai agreement was concluded the British also came forward with an offer of one million tonne steel works at Durgapur. The same people who had argued that India did not need any extra steel at all and should not establish any new steel capacity, now argued exactly the opposite. Durgapur Plant reached its rated capacity in 1964 while the first negotiated plant of Rourkela operated in full capacity only in 1965 - last of all three. To give a statistical comparison between the three one million tonne steel plants we refer to the tables given in the ensuing pages.

An important difference between the Bhilai agreement and the Bokaro agreement was the decision to promote maximum possible participation of Indian organisations in carrying out the designing work and supply of equipment and material for the construction of the works.

Organisationally, Rourkela was the worst off. At Bhilai the foreign collaborators were the Soviet Government and its relevant departments and agencies. For Durgapur the British formed a consortium and another British firm operated as consultants to the Government of India. For Rourkela, the Indian company, Hindustan Steel Limited, and the Steel Ministry dealt directly with 36

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27 Aid for Freedom. ISLUS Publication, New Delhi.
West German firms. The Indian organisation at Rourkela proved inadequate. The Germans were not as well organised as the Russians with their centralised systems.

**Table - 3.2 : Cost of Public Sector Plants**

(in crores of Rupees)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Foreign Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rourkela</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 million tonnes</td>
<td>220</td>
<td>123.40</td>
</tr>
<tr>
<td>Expansion to 1.8 million tonnes</td>
<td>169.63</td>
<td>67.50</td>
</tr>
<tr>
<td></td>
<td>389.63</td>
<td>190.90</td>
</tr>
<tr>
<td><strong>Bhilai</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 million tonnes</td>
<td>201.39</td>
<td>97.98</td>
</tr>
<tr>
<td>Expansion to 2.5 million tonnes</td>
<td>150.46</td>
<td>60.99</td>
</tr>
<tr>
<td></td>
<td>351.85</td>
<td>158.97</td>
</tr>
<tr>
<td><strong>Durgapur</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 million tonnes</td>
<td>206.83</td>
<td>97.16</td>
</tr>
<tr>
<td>Expansion to 1.8 million tonnes</td>
<td>72.28</td>
<td>22.82</td>
</tr>
<tr>
<td></td>
<td>279.11</td>
<td>119.98</td>
</tr>
</tbody>
</table>

*Source: Annual Report of Hindustan Steel Limited*
Table - 3.3 : Interplant comparison of public sector plants

<table>
<thead>
<tr>
<th></th>
<th>Rourkela</th>
<th>Bhilai</th>
<th>Durgapur</th>
<th>Bokaro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingot capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>million tonnes</td>
<td>1.8</td>
<td>2.5</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Saleable capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>million tonnes</td>
<td>1.225</td>
<td>1.965</td>
<td>1.239</td>
<td>1.971</td>
</tr>
<tr>
<td>Gross block per</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tonne</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of saleable steel (rupees)</td>
<td>5,061</td>
<td>3,058</td>
<td>2,590</td>
<td>10,340</td>
</tr>
<tr>
<td>Ingot to saleable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>steel percent</td>
<td>68</td>
<td>78</td>
<td>77</td>
<td>80</td>
</tr>
</tbody>
</table>

* Status as at the end of 1982. Bokaro's intermediate capacity is taken for comparison

Assessment of Indian Negotiations for Technology Transfer

The negotiations for the three public sector plants - at Rourkela, Bhilai and Durgapur, consisted of the first series of major exercise in international economic relations after Independence. The Indian Government went ahead with the construction of three one million tonne plants in the public sector in the latter part of the fifties, in spite of pessimistic opinions expressed by experts in the World Bank and the veterans in Indian industrial enterprises. There was considerable
political courage in exploiting the opportunities that were offered. The challenge was taken. In 1958 Nehru quipped, "We are building three major steel plants and doubling the fourth one. And when people say 'You have been over ambitious in regard to the Second Five Year Plan' I will reply that we propose to be over ambitions every time." 28

A somewhat larger volume of public opinion expressed scepticism as to whether the state could at all play the role of an entrepreneur. It was assumed by these doubting Thomases that public sector enterprises *ipso facto* had to be inefficient and may not even be able to commission the steel plants at all. Some voices were also raised in horror that there was going to be collaboration with the Soviet Union. The assumptions were that Soviet Government would never like a non-communist Government or country to succeed. Indeed, the prejudice was that Soviets would never accept that there could be anything like a non-communist way to self reliance for developing countries. 29 Their fears and assumption were belied. In the final analysis we see that if India had desisted from setting up the Bhilai, Durgapur and Rourkela, we would have to spend large amount in foreign exchange during the third plan for import of steel.

S.S. Khera, then Secretary Steel, Government of India recounts, "Nobody was coming around to help us. The British Board of Trade, when my predecessor went to Britain to try and get a steel plant, they gave a very short British answer, "not interested". And they came forward to India only after we got the Bhilai steel plant going. The Germans came to us, ... but we lost two years on that. Thay wanted us to put up the Rourkela plant on the basis of half a million ton plant. Tha

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28 ibid, S.R Jain, p.17  
29 ibid, Mohit Sen, p.5.
Russians said this won't do at all. We then went for an one million ton plant. The Germans said, oh we made a mistake. Rourkela must also have a 1000 tons blast furnace and it must be a million ton plant. They said it is very good to have bigger blast furnaces but we lost two years on this. “ A large part of the Indian success in negotiating these collaborations can be attributed to the timing. T.T.Krishnamachari, India's First Steel Minister had pointed out that never again in history would India get offers in such competitive terms. The existing situation of cold war made the Indian situation highly profitable, for donors competed among themselves, for the attractive terms and conditions. India did exploit that opportunity for the introduction of technology to engineer a big economic change.

To the credit of Indian negotiations we note that at the time the three public sectors were being negotiated, the first non-alignment summit was still some years away. There was no UNCTAD and no formalized North-South Dialogue. Newly freed from the colonial stronghold of the imperialist successor of the East India Company, India under Jawaharlal Nehru's direction set out on a vast-experiment to procure technology. There was no established theory except perhaps what Nehru himself had propounded in the Discovery of India on how to go about liberating oneself from the clutches of economic colonialism which prevailed even after the exist of the colonial powers.

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30 S.S.Khera, For a bold stand on negotiations in K.Krishnamurthy, Technology transfer in India's steel, ibid, p 146.
31 C Subramaniam, Thoughts on Steel Planning, Pollachi.
In Bhilai's second expansion as a building of Bokaro, several significant advances took place in the transfer of technology from Soviet Union to India. They are briefly enumerated below: -

1) Russians gave Indian consultants assignments for units to be designed and engineered indigenously.

2) Russians supplied working drawings for structural and equipment for manufacture in India.

3) Soviet technical assistance was provided for erection, commissioning and operations.

4) Large Indian organisations like Heavy Engineering Corporations at Ranchi and Mining and Allied Machinery Corporation, Durgapur started manufacture of heavy metallurgical equipment with the help of Soviet drawings.

5) Operation and know-how transfer for big units such as 2000 cubic metre blast furnaces, huge stabbing mills and hot and cold rolling mills was provided.

Another area where Bhilai excelled and became something of an example to the rest of organised sector in India was the evolution here of what is today described as "collective culture". Perhaps a result of the Soviet work ethos and a tribute to the earliest engineers and management wizards of Bhilai the idea of participative management became institutionalised in this steel plant almost since its very inception.

ibid, S.R Jain, p 19
SECTION II : FURTHER STRENGTHENING OF DIPLOMACY : SETTING UP OF BOKARO

During the Third Five Year Plan, expansion of the three public sector plants was undertaken: Bhilai was to go on to 2.5 million tonnes, Rourkela to 1.8 million tonnes and Durgapur to 1.6 million tonnes. Meanwhile the capacity of TISCO was also increased to 2 million tonnes and that of IISCO to 1 million tonnes. All these expansions were completed in 1967-68, bringing the aggregate installed capacity in terms of steel ingots to 8.9 million tonnes and that of saleable steel to 6.729 million tonnes.

Failure of Americans Aid Diplomacy

The need for more steel, however, continued to be felt and India began looking for help to set up another steel plant in the public sector. A project plan for such a plant was finalized in 1959. This time it was felt that this plant could be built by American collaboration. Former President John F.Kennedy had a self-proclaimed commitment to India, which was partly influenced by his desire to counter the Soviet threat of expanding its sphere of influence in the Third World. The Americans interpreted the Bhilai deal as an early example of the Soviet push. In 1958 India was urgently seeking foreign exchange to overcome the crisis that had emerged during the implementation of the Second Plan. Senator Kennedy and Senator John Sherman Cooper then co-sponsored a resolution which called for the “recognition by the US Congress of the importance of the economic development
of the Republic of India to its people to democratic values and to peace and stability in the world. 33

It may also be noted at this point that in 1957, an influential American financier George Woods, who later became the IBRD (World Bank) President, had advocated an American aided steel plant in India which could be compared to Bhilai. This was another way of demonstrating that Americans were also well-wishers of India. In this drama the liberal and pragmatic forces, supporting the U.S. financing of Bokaro, led by Ambassador Galbraith and President Kennedy, were pitted against the steel and shipping interests of the U.S. and the ideological opposition of the U.S. to support public enterprise.

By 1962 the intellectual and emotional commitment of President Kennedy to Indian economic development was fortified by the need to counter the increasing Soviet participation in the Indian economy, especially in steel and machine building. The shibboleth against aid to the Indian public sector was to be replaced by an attitude of selective participation, at least in the steel industry, at the time when Bokaro proposal for U.S. aid came up. At a Washington press conference President Kennedy stated not only that Americans should help the Indians build the Bokaro plant but also that it should be supported in the public sector.

The cause of the American collaboration for Bokaro was advanced and pursued with tenacity, in the midst of unwarranted optimism by John Kenneth Galbraith, US ambassador to India (April 1961 to July 1963), who noted in his book Ambassador’s Journal "The project is very important. Many of the things that we are doing are rather anonymous ... our past help to private sector plants

such as Tata's has evoked the comment, 'The Americans help the Tata's and Birlas who are already rich. By contrast Soviet built plants that belong to the people.' Now we are in the same league provided we can perform.'  

Galbraith, however, was aware of the difficulties of hammering out a concrete proposal that would meet both the U.S. collaborators expectations of overriding control of the management of the project with minimum financial stake, and the Indian desire for maximum participation in terms of consulting, supervision of construction and supply of indigenous equipment and material. In the strategically placed Indian sub-continent, the image of American capitalist attitude was getting considerably tarnished. This made the Americans get up and adopt a more active attitude towards India. Ambassador Galbraith almost personally undertook the responsibility for their steel plant in the Indian public sector. He gave an assurance to Jawaharlal Nehru that the fourth public sector steel plant would definitely be set up with US assistance. However, these negotiations between the two countries did not go well, specially considering the optimism in the atmosphere within which the project was visualized.  

Besides Galbraith and President Kennedy, there were powerful American steel and shipping interests, the American Congress and its various Committees and the American Press. The commitment of about half a billion dollars to a single steel plant in Indian public sector was contrary to the American way of life. The tone and content of this line of reasoning was initiated by the arguments and recommendations of the Committee to Strengthen the Security of the Free World headed by General Lucius Clay. It stated "...while we realize that in aiding foreign  

countries we cannot insist upon the establishment of our own economic system, despite its remarkable success and progress, we should not extend aid which is inconsistent with our beliefs, democratic traditions, and the knowledge of economic organisations and consequences.\textsuperscript{36}

The ideological opposition, asserting the superiority of the private sector over the public sector in the underdeveloped countries in general and the Indian steel industry in particular, was taken up by U.S. Press. A typical example is the following extract from the U.S. News and World Report, which is hostile, opinionated and inaccurate in places:

"The first government mill to be completed was financed by the Russians. American engineers describe the mill as extremely simple in design. Russians have kept control of this whole operation, with the Indian General manager no more than a figure head; The German experience by comparison had been a nightmare. Trouble developed and a special commission of German technicians was appointed to find out what was wrong. The Commission found: Indian personnel with adequate training were extremely scarce. Absentism had risen to 25%. Hindustan Steel Limited had 3,600 headquarters personnel, and a minor decision required from 24 to 30 months, about 30 percent of Indians trained in Germany were given jobs for which they were not trained; British experience at India's third Government steel mill is only a little better; Private steel companies have the trained personnel, experience and means to expand to meet India's steel needs. Government stands in the way. The question is whether American taxpayers now\textsuperscript{36}

ibid, p27
will build new steel facilities to take the place of those that could be financed privately.\footnote{37}

Galbraith's argument before the sub-committee of the House Committee on Appropriations of the U.S. Congress that while the private sector steel plants were efficiently managed, there was no scope of raising private funds for Bokaro inside or outside India, was dismissed. In other words, the fact that the case for steel plant in the Indian public sector arises largely from economic considerations was overlooked.

Americans were insistent on the entire financing and managerial control of the plant to be set up in the public sector. On the other hand Nehru was quite clear from the beginning that he wanted a significant role for the Indian engineers and management. Nehru said, "While Americans will necessarily have to be given a larger measure of authority about technical matters, specially with regard to machines and technology that they supply, but I see no reason why we should push out our own men. We must have a big say in the matter."\footnote{38} Thus the negotiation ended in a stalemate and Ambassador Galbraith's dream came to an end on 22 August, 1963 when the persuasion and tenacity of President Kennedy and Galbraith could not convince the American steel and shipping interests and overcome the strident capitalist approach adopted by the majority in the US Congress.

The Aswan dam in Egypt, which Nasser, President of Egypt ultimately converted into reality and the Bokaro Steel Project, were the two outstanding instances of failures of American foreign aid diplomacy in relation to the

\footnote{37}{ibid, p28}  
\footnote{38}{ibid, p 29}
developing countries. After hopes were raised on massive American financial and technical assistance the US opted to withdraw for ideological and political reasons. The Soviet Union stepped in quickly to fill the breach in both the instances. It is very obvious that by then the Russian had created an image of popular acceptance. The Bokaro incident further sullied the image of US in India and other countries in the non-aligned group. According to Boothalingam, the Russians had all along been interested in building the plant at Bokaro but stepped back into the wings when a group of Indians thought that the Americans would be eager to come in because the West Germans, the British and the Russians had already become involved in the Indian public sector steel industry. There was also the talk of obtaining a superior American technology. The American contractors' collaboration in TISCO expansion had given the US no political mileage to effectively stand-up to the Soviet economic collaborations and expand their political sphere of influence in the region.

Re-entry of Soviets in the Bokaro Plant

Bhilai was hailed as the beginning of a significant era in Indo-Soviet relations, but the offer on Bokaro from the Soviet Union had a mixed reception in India. It was initially applauded as a reaffirmation of Soviet friendship. But it soon became clear that the intention of Soviet Union was to brush aside the national hopes for an increased role of Indians in the venture.

Early in March 1964, open tenders for the separate sections of the Bokaro plant were invited from England, West Germany and the Soviet Union. In April 1964 a draft agreement for engineering and consultancy services was initiated with Dasturco. The Soviet offer of equipment for Bokaro in March was reportedly conveyed to the Indian Steel Minister by the Soviet Ambassador in person. The sequences of negotiations that followed resulted in full fledged Soviet participation in the Bokaro steel plant. The process of negotiations brings out the constraints imposed on the Indian bargaining strength by several crucial policy objectives. At the same time, Dasturco's cost reduction proposals illustrate the limitations imposed on foreign collaborators in developing countries by the availability of local consultancy firms, competent to judge the inadequacies of the proposed schemes for collaboration.

The Soviets made their offer in March 1964. In July 1964 an Indian team led by the Secretary, Iron and Steel Ministry, N.N.Wanchoo, and K.M.George, Managing Director of Bokaro Steel along with Dastoor went to Moscow for discussions. During the crucial talks on the scope of Indian engineering the Indian consultant received scant support from the Government officials in the delegation. This absence of a firm stand naturally encouraged the Russian to demand complete engineering responsibilities and control at Bokaro. What happened in the mid sixties was in a strong contrast with the sure footed approach of S.S.Khera during the Bhilai negotiation nearly a decade earlier.

When the Soviet team visited Delhi in August for technical discussions, Dasturco, despite its six year contract with the Indian Steel Ministry, was kept out
of the discussions. Infact Dasturco's Detailed Projected Report was replaced by the Soviet agency Tiazpromexport's report in December 1965.

After accepting the Soviet Report in March 1966, the Indian Steel Ministry asked Dasturco to submit cost reduction proposal within seven weeks, as required by a clause in the Memorandum of Acceptance of the Soviet Project Report which provided that the Soviet consultants would consider concrete technical suggestions which might be made by the Indian side within 3 months. While Dasturco's Cost Reduction Study was still under preparation, agreements were signed with the Soviet agencies for the supply of equipment, materials and working drawings, and the services of Soviet specialists for the construction of the plant. The speed with which these crucial details were settled appears abnormal for India where slowness of decision making and delays are not un-common. That the Soviet negotiators applied energy, if not pressure, seems obvious.

The strategic policy objectives of the Indian steel industry placed certain constraints on the evolution and outcome of Soviet-Indian negotiations on Bokaro. The first objective was the consideration paramount to the growth of Indian steel industry was that it should take place in public sector. While this was one of the reason for the failure of U.S. collaboration, it was certainly in keeping with Soviet attitude towards participation in Bokaro. Indeed the consolidation of the public sector agency, Central Engineering and Design Bureau (CEDB), the establishment of Hindustan Steel Construction Ltd. (HSCL), a public sector enterprise, probably resulted from Soviet co-operation operation. Early in 1970, the Indian government concluded an agreement with the Soviet Union for the establishment of a refractories plant in the public sector. Finally, an inter-governmental agreement of
February 1970 stipulated that the Bokaro plant was to be constructed with a four, rather than original 1.7 MT capacity.

It does not appear that Dasturco's ouster resulted from the Indian negotiators' commitment to a possible objective of 'steel in the public sector from start to finish. While Soviet Union did not prefer trading business and extend technical know-how to private industry in developing countries, it explicitly preferred to consolidate the 'technology structure' in basic industries in the public sector. Although Dasturco was ousted, both the Soviet Union and Indian government had to contend with the resulting controversies that continued in Indian press and parliament. As the negotiations progressed, the HSCL was assigned the civil construction work and the CEDB, the designing of the Bokaro and its expansion. By legitimately starting the whole controversy and then keeping it alive, Dasturco unwittingly contributed to Bokaro's 'Indianisation' and to its implementation by public sector agencies.

The Indian negotiators were undoubtedly motivated by the desire to solve a persistent problem plaguing the Indian public sector, namely how to utilize the redundant capacities and services in the Indian public sector. In the case of Bokaro, the problem was one of utilizing the services of the engineers, steel technologists and constructional personnel which already existed.

The second policy objective was the relentless pursuit of import substitution. The plants producing components which could be utilized for Bokaro such as the Heavy Electrical Equipment Plant (HEEP) at Hardwar, the HEC at Ranchi, the Mining and Allied Machinery Corporation (MAMC) at Durgapur, and the Kotah Instrumentation Plant are all Soviet-collaborated. A crucial
consideration underlying the decision to construct Bokaro with a capacity of 4 MT, taken in February 1970 was the pressing need to activate the capacities of HEC, HEEP, MAMC and the Kotah instrumentation Plant - especially after the recession of 1966\textsuperscript{40}.

The final policy consideration relevant to the course of negotiations with the Soviets was that while steel in public sector was assigned a high priority in Indian planning, the foreign exchange needs of the three steel plants at Bhilai, Rourkela and Bokaro were met with foreign aid and not through the use of free foreign exchange.

By comparing the elements of American and the Soviet economic aid, we can reach some conclusions, as we did during a general comparison in the second chapter. The economic aid negotiations with the Soviets took into account the Indian national policy objectives of :-

1. expansion of steel capacity only under the auspices of public sector
2. to justify the relentless pursuit of import substitution
3. even though steel plants mostly required foreign collaborations, the foreign exchange requirements were met with foreign aid and not by using our own foreign exchange reserves

On these policy fronts we could not make any conclusive headway's with Americans, while the Soviets always gave substantial, if not full weightage to these policy objectives. Because of this we have registered a number of successful technology transfer negotiations with the Soviets, while we can not say the same or

\textsuperscript{40} ibid. Padma Desai. pp 42-43
the Americans. After a smooth start in the high gear, the Indian steel diplomacy lost some of its momentum with the failure of the American aid diplomacy vis-a-vis Bokaro.

There was a good deal of public criticism of the Soviet stand on one hand and the easy submission of the Government Of India to the wishes of USSR, on the other. Along side was a wide concern over the fact that there had occurred a major setback to Indian engineering and steel plant consultancy. The rather confused Indian reaction was a backlash to the feeling that the Americans had treated India shabbily in the early stages of negotiations and hence the Russians were behaving in a high handed fashion after they did the rescue act for the fourth public sector project in steel. Because of this situation there was an understandable mildness among the Indian negotiators.

The Russians politely demanded work on a new project report suiting their technology so the work entrusted to M.N.Dastur in 1958 by Nehru was completely put aside only a few weeks after his death. The collaboration was taking shape without the active participation of indigenous calibre which was the ardent desire of the late Prime Minister. Government of India had to agree to the demand of the Russians to have their way all through. The Government of India and its people were in for a rude shock when the Soviet report received in December 1965 showed the Soviet estimates amounting to 950 crores. This was double the original proposition made by the Soviet group. And, finally, after the much curiously scrutinized study of the report, it was accepted by the Government of India.
In January next year the second Indo-Soviet Agreement was signed. The capacity of the Russians to manipulate India so thoroughly could be viewed in the light of one of the most difficult political situations in India at that time. First, there was war with Pakistan, second, the demise of Prime Minister Lal Bahadur Shastri who had been pressured into the Tashkent Agreement and finally the accession of Indira Gandhi to the position of Prime Minister of India after some dissension in the Congress Party.

Sadly, in the history of steel diplomacy of India the period of glorious success began to fade with the demise of Pandit Jawaharlal Nehru. Soon the entire bargaining strength was overshadowed by the changed political priorities and other pressing problems facing the country.

Consultancy firms: catalyst to the process of technology transfer

Consultancy firms are one of the most powerful channels of technology transfer. Nehru visualised the need for the development of consultancy firms during the initial phase of technology acquisitions itself. When our planners thought of starting the steel industry, a decision was also taken that we must develop our independent consultancy in 1953. Twenty four engineers were first recruited by Hindustan Steel from all over Europe and America. Accordingly two major engineering consultancy organisations were set up, one in public sector and the other in private sector, namely Metallurgical and Engineering Consultants (India) Limited (MECON), originally set up as the Central Engineering and Design

P.C.Laha, "Inaccuracies" in K.Krnamurthy, ibid, p 144

MECON

In April 1959 Hindustan Steel set-up a consultancy wing with 13 engineers who had worked on the construction of the Rourkela plant. It came to be known as CEDB. Bhilai developed its own engineering cell under the Soviet tutelage and it was integrated with CEDB at the later stage. While the Bhilai unit was associated with the first expansion on the plant to 2.5 MT, CEDB planned the expansion of Durgapur to 1.6 MT and of Rourkela to 1.8 MT.\textsuperscript{42} MECON, in order to develop its detailed design, project management, commissioning and post-commissioning skills had to enter into a collaboration agreement with GIPROMEX of USSR in 1967. This enabled CEDB to engineer alone or with foreign collaboration the expansions of Rourkela and Durgapur, all completed in late 1960s.\textsuperscript{43} In 1969 CEDB decided to diversify away from pure consultancy into equipment and enter into a ten year licensing agreement with Wean United (US) for design, engineering and supply of rolling mill equipment. For years the licensing arrangement with the American firms could not be made use of in a big way because the Soviet experts would not accept the introduction into Bokaro of major western designed equipment.\textsuperscript{44}

\textsuperscript{42} ibid, K.Krishnamurthy in Technology Transfer in India's Steel, p 72.
\textsuperscript{43} Sanjay Lall in Learning to industrialise, \textit{Steel Acquisition of Technological Capabilities by India}, Mcmillan, 1987, p 101
\textsuperscript{44} ibid K.Krishnamurthy, p 77
The Government of India asked Mr. M.N. Dastur, who was working for a US firm of metallurgical consultants in mid 1950s, to start a consultancy firm in India to assist the country in building up local design and consultancy capabilities for the enormous steel programme which it was launching. M.N. Dastur was on a visit to India on a Technical Cooperation Mission, a US assignment. Then he had the opportunity of meeting Nehru, T.T. Krishnamachari and other senior political leaders. It was on their insistence that he was encouraged to leave United States and form a consulting organisation which could participate in the pulsating drama that was being scripted for the development of the iron and steel industry in India. Thus in 1955 the firm of M.N. Dastur was launched. The period 1955-64 was the formative stage, when the basic engineering manpower was built up to handle steel consultancy. The firm grew to 125 employees by 1964 when the contract to provide detailed engineering for Bokaro was won. This enabled Dastur to grow to about 800 employees, and cover several new disciplines (chemical, mechanical, electrical, civil etc.) and to include experts in economic evaluations, industrial and project management, plant operations. But USSR insisted on doing most of the design and detailed engineering itself. Dastur has a well defined strategy of technology acquisition. Each operating division is responsible for collecting data on all major technological changes in its field. There is also a central information pool but the decentralised monitoring system is the main form of technology upgradation. Dastur has constant dialogue with foreign process licensors and capital goods manufacturers and of course with manufacturers and clients in India.

45 ibid, p 68
This enables it to select the best technology for each application. Dastur claims that only one application of a new technology is enough for it to assimilate it. Some elements of processes are kept secret by the licensors but enough information trickles down for Dastur engineers to be able to reproduce the technology on their own. Dastur places great weight on collecting and analysing operational data from the steel plants. Work overseas gives greater exposure to new technologies. Dastur's engineers participate actively in seminars and conferences in India and abroad.\(^{46}\)

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\(^{46}\) ibid Sanjay Lall, p 104-107