CHAPTER V
INDIA'S STEEL DIPLOMACY IN THE CHANGING
INDUSTRIAL ENVIRONMENT

SECTION I: THE CONTINUED EXTERNAL DEPENDENCE
FOR TECHNOLOGY TRANSFER IN THE STEEL
INDUSTRY

In the twenty five to thirty years, beginning from the mid-fifties, we got technology from Germany, from Britain and from the Soviet Union, but we could not develop an Indian steel technology. Today we talk about Japanese technology. In the beginning Japan purchased technology very rapidly. All fundamental technology has been practically developed in Western Europe and in America. But they, the Japanese absorbed, assimilated and then they further improved their technology. We have not been able to assimilate technology so that we can develop it further. Therefore, any meaningful transfer of technology is possible only if we have our own well-developed R & D and design units for steel technology. Without that the transfer of technology can only be considered to be of a very superficial nature.

During last two decades tremendous technological progress has taken place in steel technology in Europe, the USA, Japan and the USSR where new and improved processes have been developed, large-scale automation has been

1 Gokhul Mukherjee in an interview with K Krishnamurthy
2 I .M. Aga Advisor production Bureau of Public enterprises commenting on the Book Technology Transfer in India's Steel by K. Krishna Moorthy.
introduced and energy conservation measures have been adopted - all leading to substantial reduction in the unit cost of production. Timely acquisition and use of technological know-how is a highly beneficial development strategy for the less developed economies to bridge the technology gap. Repetitive imports, however, can be ill afforded as they result in heavy drain of scarce resources. Acquisition of technology, therefore, requires several steps by way of preparing the absorptive capacity for intake and use of incoming technology and for its subsequent development to keep abreast with levels of productivity achieved elsewhere.

Some of the major performance indices for integrated steel plants are productivity of blast furnace, coke rating in blast furnace, quality of hot metal produced particularly as regards Silicon, Sulphur and Phosphorus contents, tap to tap time in steel making, refractory consumption figures per unit production, lining life in converter, energy consumption at different stages and ultimately per ton of finished steel, yield in rolling and quality of finished product. However, during the last two decades, these figures in Indian steel plants have either remained stagnant or deteriorated, particularly during the last few years. On the other hand, all the developed countries as well as countries like South Korea and even Brazil, which are relative late-comers to steel technology, have been consistently improving technological performance of their steel industry in relation to steel industries elsewhere. The gap is continuously widening, affecting adversely the financial performance of our industry. This trend is required to be corrected if our steel industry is to be viable. Steel industry being in the core sector acts as the backbone to our national industrial base.³

³ Dr. S.K. Gupta in Technology of SAIL, GOI Publication, p-226
The technology gap was the cause of our technological dependence in the fifties and after a brief period of global competitiveness, we are again placed at a position of dependence to the same extent. Today technological obsolescence is another factor that is burdening our industry.

Most of the developed nations in the world are now at the cross-roads as the demand for steel in their domestic markets is fast nearing the point of saturation and they are becoming heavily dependent on export markets to sustain them. This has led to a cutback on their production and lowering of capacity utilisation. The prospects for the steel industry in India are, in fact, far from gloomy and we are in an advantageous position as there is a large and expanding domestic market and there are opportunities of exporting our steel products, especially to other developing countries. Moreover, steel, as the major commodity for ushering rapid industrialisation in other medium and heavy sector industries, is not likely to be threatened by other materials in the foreseeable future in India. One can therefore be quite sure of the positive growth of the Indian iron and steel industry in the years to come.4

The steel industry in India has developed as a component of nation building plans and export of steel has not been accorded a high priority. Export has been resorted to in spurts during periods of recession, but as soon as domestic conditions improve, exports have been disallowed. This 'start and stop' industry policy has been a major reason for the poor performance of the Indian steel in the world markets and has led to tremendous mistrust of the Indian suppliers.

4 S.K. Gupta and G. Mukherjee, ibid, p8
The current economic compulsions of the country have made an unprecedented export thrust imperative for India. It is, therefore, important that a long term strategy is evolved for the export of steel and steel based engineering products. All future planning of steel should have a deliberate provision for export. Export is also essential to bring in the concepts of improved quality and customer service as well as lower prices - the three main criteria to be competitive.\(^5\)

In the Eight Five Year Plan, a drastic correction is attempted in current state of affairs. For this it is necessary to plan for production with a deliberate intent to export. Such a policy has several advantages:

(a) Given all the natural resources for producing steel as far as possible, we should export steel instead of iron ore. The foreign exchange earned by exporting 30 MT of iron ore can be earned by exporting about a million tonnes of good quality steel. The export of such a large quantity of iron ore as the country does, throws an enormous burden on the country's infrastructure such as railways and ports. Their capacities get tied up in handling very large quantities of low value raw material. Also the good quality iron ore can get utilised for manufacturing steel within the country instead of being sold to some other country for steel production.

(b) By deliberately entering the export field and maintaining our international presence even to a reasonable level, the domestic steel industry will benefit considerably in terms of productive discipline, cost efficiency and quality of production.

(c) Export of steel would earn substantial foreign exchange for the country.\(^6\)

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\(^5\) Demand and Supply scenario, in *Metals in India's Development*, p-67

\(^6\) R. Venktanarayan in *Iron & Steel planning for the next Decade* ibid p-9
We have seen that over the next one and a half decades, there exists a distinct prospect for creating 20 to 25 MT, and even more steel making capacity. While some of this, without doubt will be created through the expansion of existing capacities, especially in the main integrated steel plants, the bulk of this additional capacity is likely to come up as greenfield projects.

Currently there also exists investors enthusiasm regarding the prospects for Indian steel. Issues at the forefront relate to market conditions, technology choice and investment quanta, such that the venture is competitive and this competitiveness is sustainable.\(^7\)

The Indian scenario at the end of the seventh plan period (1985 - 90) can be interpreted to have tremendous diplomatic potential due to -

1. the technological obsolescence in the majority of the plants
2. the existing gap in the production technologies
3. the growing demand for steel in the Indian economy
4. Indian plan to emerge as steel exporting economy in the world market
5. the economic reforms in the country

All these factors create an advantageous position for the Indian negotiators to bargain for state of the art technology effectively.

\(^7\) R.P. Sen Gupta, The Indian Steel Industry, ICRA - Part I, p-24
SECTION -II : THE STEEL INDUSTRY IN THE GLOBAL CONTEXT

Apart from the changes in the technology of the integrated plant sector, the overall technology composition at the industry level has also undergone significant changes. In the 1990s, mini-mills—that is, production facilities which melt steel scrap in Electric Arc Furnaces (EAF) and then proceed by continuous casting—have emerged as an important technology for the expansion of steel capacity globally. In the new technology regime of this decade the capital cost of a mini-steel plant works out to be as low as about $300 - $400 per tonne of capacity, which is about a quarter that of an integrated plant. The labour requirement per unit of steel in scrap-based EAF mini plants varies in the range of 0.5 to 1.5 man hour per tonne per year. The energy requirement of modern mini-plants is only about 2 to 3.5 Giga calories per tonne. Environmental issues have become very important in characterizing the range of permissible technologies.

It should be noted that at the global level the gap between the integrated plants and the EAF plants in respect of quality and product range is narrowing. The use of automation for process control has contributed to the narrowing of this gap and also that of factor productivity, arising from relative scale effects.

In a dynamic technological situation it is important for steel plants be able to introduce innovations by rapidly changing its practices and testing the pilot plant results in full scale implementation. It is easier for a mini plant to make such adaptation than it is for an integrated plant. The integrated plants are, in fact under great pressure in most developed countries because of aged plant conditions (in a large number of cases), well organised labour unions, high fixed costs, limited
flexibility in adaptation of new technological practices. Further, some of its technology components (like coke making and sinter plants) are inherently problematic environmentally.

There have been three major factors behind these changes.

a) Cost reduction

b) Environmental consideration

c) Emergence of new products as substitutes of steel.

Cost containment

The typically high fixed costs of integrated steel plants made these plants vulnerable to periodic fluctuations in the size of the market demand - an inevitability in a capitalist market. The smaller steel plants have a greater flexibility because of having a break even point at a lower level of capacity utilisation. The capital servicing cost of 1 tonne of steel is $120 to $150 for a integrated steel plant while it is $30 to $40 for a modern scrap based EAF steel plant

Environmental Issues

In the last one decade, environmental considerations have imposed additional burden of costs to the steel industry. At present 15% of the capital cost in steel plants can be imputed to environmental control equipment in developed countries. The disposal cost of wastes is estimated at as much as $20 per tonne of steel for integrated plants and $10 per tonne for EAF plants. Coke making and
Sinter plant areas are becoming sources of increasing difficulty because of tightening of environmental regulation. The cost of rebuilding and refurbishing these sections in steel plants are likely to be prohibitively expensive, if standards contained in the regulations are to be strictly maintained. The work force in developed countries are also becoming increasingly reluctant to work in such polluted areas of a plant. An important reason for the attraction of EAF steel mills or of integrated plants in the DRI - EAF route (explained in Appendix -1) or the recently developed COREX - BOF route is the possibility of elimination of these polluting sections.

Substitutes

Steel is increasingly facing competition from materials like aluminium, plastics and composites. Many of the new materials have been developed in defence research and applications. Automotive industry, for example, has made substantive substitution away from steel by use of some of these new materials. In order to meet this challenge mere emphasis on cost effectiveness is not adequate. It is also important for the steel industry to develop special grades of steel which can add quality to make steel more attractive than other metals, the benefit of better quality being commensurate with costs. As integrated plants start from iron making only they will be in a position to command facilities for evolving new steel grades.

\[^{s}\] ibid. R.P. Sengupta pp-25-28
SECTION III: THE BACKGROUND TO THE ECONOMIC ENVIRONMENT

A) Global Context

From mid-1980s there have been some spectacular and far reaching changes in global economy. Private capital, in search of profit opportunities is flowing into open economies, that are also willing to adapt and adjust their structures to market forces\(^9\). Technical assistance is no longer the bottle neck. Today technology is there in the world market like any other product/commodity. Only those who can finance the utilization of such technology can lead the way. The crucial factors are managerial decisions about marketing and finance, legal obstacles and government assistance, international commercial barriers and opportunities. Today countries know what they need and where they get it. Also their governments have assumed an enabling rather than a regulating role in the process of industrialization. Industrial technology is changing rapidly. The vertically integrated mass production for this technology has yielded to flexible limited batch production with just in time inventory and very importantly geographical division of labour.

These multipronged changes in the world economic order affected the interaction among states as well as the functioning of the many multilateral organizations.

Along with International Monetary Fund and the International Bank of Reconstruction and Development, International Trade Organization (ITO) was to

be created to deal with problems of international trade in 1945. But there were some serious controversies regarding the setting up of ITO. The USA, the UK and a few other countries set up in 1947 an interim organization about trade named General Agreement on Tariff and Trade (GATT). Over the years it was felt that all the three organization were dominated by the USA and GATT in particular was biased in favour of the developed countries and was informally called the "rich men's club". 10 The newly independent countries of the third world were fighting relentlessly for their rights and objectives vis a vis the developed countries. Finally United Nations Conference on Trade and Development (UNCTAD) was set up in 1964.

During negotiations for setting up of UNCTAD the developing countries organised themselves into Group of 77 (G77). This was later joined by most of the other developing countries. The pressure of G-77 made UNCTAD gain in stature and at one time it appeared as if it might replace GATT. In spite of the powerful US support, the sustained pressure of G-77 during negotiations made GATT progressively more liberal and consequently the Tokyo Round of GATT gave very important concessions to the developing countries, namely the General Scheme of Trade Preferences. But neither the G-7 nor the G-77 were content with this. They started pressing for further amendments.

The Uruguay Round of discussions commenced in 1986 with this purpose. But since its inception and by the time the negotiations were completed there was a major change in the multilateral diplomatic strategy. As S.R. Sengupta puts it in

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his article, G-77 maintained its united pressure for a few years, but the USA exploited the differences among the different sections of G-77 countries e.g., exporters, importers, oil producing, and newly industrialized countries to break their unity. In this it cleverly used the Super and Special Article 301 of US Trade Act and various diplomatic, financial and other pressures. Till 1989 the core group of G-77 led by India and Brazil was functioning quite effectively, but India accepted unilaterally some of the proposals of the US. Sen observes that as a result India was isolated and as a consequence the erstwhile supporters of India made their own compromises with the US. And then the emergence of US as the single superpower greatly increased its clout.

So the changes in the world power structure were impacting on multilateral organisations that made the rules for trade. This became a reality mainly because the interactions among states had undergone serious modifications. The Transnational Corporations (TNCs) got specially interested in trade negotiations at this juncture. The US pressed that GATT should no longer be confined to tariff and trade in goods but should be also extended to services, investment and intellectual property rights. The proposal for World Trade Organization (WTO) to oversee all these four proposed areas were put forward by the Director General of GATT, Arthur Dunkel in the form of a draft document known as the Dunkel Draft. With some modifications these proposals were accepted by all members officially in March 1994.

The culmination of the three important facts,¹¹ (1) the predominance of finance and investment in the realm of global economic activity, (2) the WTO

¹¹ ibid. p 2802
regime, and (3) the scattered solidarity of the developing countries, tended to help the commercial interests of the developed countries in terms of an easier access to world markets;

B) Indian Context

The Finance Minister Dr. Manmohan Singh under the prime ministership of P.V. Narasimha Rao heralded the era of large scale liberalisation.

Liberalization of imports and foreign exchange transactions, sanctioned by the 1985 policies, ate rapidly into India's foreign exchange reserves. The sudden increase in the import bill of oil caused by the Gulf war, though brief, was another severe drain. In the aftermath of Gulf war the foreign exchange remittances from Indian workers from the Gulf states dried up. By the summer of 1991 the foreign exchange reserves were down to a level insufficient to cover essential imports for a few weeks.

The total external debt had meanwhile climbed to US $70 billion. Five years after the optimistic projections of the government in 1985 while launching its liberalization policies, its fiscal position had not got any better, but worse. Accumulated domestic borrowing of the Indian government had reached a staggering 55 percent of the GDP by 1991. In the same year consumer price inflation had risen to 14 percent from the 8 percent in 1985. The balance of payment crisis and the fiscal crisis of the state were deeply structural in their implications and could not be resolved by short-term measures. But a quick
short-term 'fix' had to be found to stave off the impending disaster. The solution was seen as yet another massive loan from International Monetary Fund. This IMF loan was conditional on the Indian government's commitment to implementing the IMF's standard prescriptions of Stabilization and Structural Adjustment (SAP).

Structural adjustment and stabilization policies encourage the economy to grow on free market lines which would drastically curtail the role of state in the economic activities. This would give the private sector (both domestic and foreign) the dominant role in all sectors of the economy, promote unimpeded imports of foreign goods and services and technology.

The government announced the New Industrial Policy as a part of the SAP. In the following pages, we highlight those features which are going to affect the technology collaborations in the new SAP regime.

**New Industrial and Technological Policies Under SAP**

This industrial policy introduced by the government of India as a part of SAP extends and completes ten liberalization measures of 1985. The following is the summary of these policies and the associated technological measures.

1. The licensing system has been abolished for all branches of mining and manufacturing industry except those involving strategic and security

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concerns, social and environmental concerns, hazardous chemicals and elite consumer durables.

The upper limit on investment in plant and machinery has been raised from Rs. 3.5 million to Rs. 6 million for small scale units in general and 7 million for the so-called ancillary units of bigger firms, and for export oriented small scale firms. No licensing is required for expansion of existing production capacities or for adding new product lines within the existing commodity area of the firm (so called broad banding). This is going to have very good consequences for the growth and maturity of the Indian Steel Industry.

2. Permission to import capital goods would be automatic for projects which would ensure foreign exchange through foreign investment. This way a bright future awaits for all technology transfer propositions in the Steel industry.

3. A virtual open door policy for foreign investment with an upper limit of 51 percent of equity in any given firm comes into effect in 34, so called high priority industry (see Table 5.1 on next page). To qualify for such automatic clearance the foreign exchange cost of the imported capital goods must be covered by the foreign equity. Thus, all obstacles to direct foreign investment and profitable joint ventures with foreign equity participation in India's steel industry are removed.

4. Technology agreements with foreign suppliers would be automatically approved for the above mentioned 34 high priority industries subject to
Table 5.1

High Priority Industries Which Qualify for 51 Percent Foreign Equity Holding and for Automatic Approval of Foreign Technology Agreements

1. Metallurgy
2. Boilers and Steam Generators
3. Prime Movers (Other than Electrical Generators)
4. Electrical Equipment
5. Transportation Equipment
6. Industrial Machinery
7. Machine Tools
8. Agricultural Machinery
9. Earth Moving Machines
10. Industrial Instruments
11. Scientific and Electro-Medical Instruments and Laboratory Equipment
12. Nitrogenous and Phosphatic Fertilizers
13. Chemicals (Other Than Fertilizers)
14. Drugs and Pharmaceuticals
15. Paper and Pulp, including Paper Products and Industrial Laminates
16. Automatic Tyres and Tubes
17. Plate Glass
18. Ceramics
19. Cement Products
20. High Technology Reproduction and Multiplication Equipment
21. Carbon and Carbon Products
22. Pre-Tensioned High Pressure RCC Pipes
23. Rubber Machinery
24. Printing Machinery
25. Welding Electrodes other than those for welding Mild Steel
26. Industrial Synthatic Diamonds
27. Photo-synthesis Improvers
28. Extraction and Upgradating of Minor Oils
29. Pre-Fabricated Building Material
30. Soya Products
31. High Yielding Hybrid Seeds and Synthetic Seeds
32. All Food Processing, excluding flour, Milk food and malted food, excluding items reserved for the Small Scale Sector
33. Packaging for Food Processing Industries, excluding items reserved for Small Scale sector
34. Hotel and Tourism related industries

Source: ibid, M.R.Bhagwan, p M17
upper limits of Rs. 70 million for lumpsum payments and 8 percent of sales for royalty payments.

These payments for which foreign exchange would be automatically approved would last for a maximum of 10 years from the date of agreement or seven years after the commencement of production.

5. No permission would be required for hiring foreign technical personnel.

6. The eight industries hitherto reserved exclusively for public sector would now be open to private sector. They are defence, atomic energy and associated fuels and materials, fossil fuels, the mining of ferrous and non-ferrous ones, as well as some strategic and precious metals and railway transport.

7. Public sector plants would be subjected to critical review which would not exclude the possibility of closure, liquidation, rehabilitation or privatization. The criteria that would guide any action in these directions would be related to inefficiency in performance, low levels in technology, smallness of scale, low social priority and not the least the existence of well developed private sector capacities to supply the same commodities. Hence competitiveness would increase and they would have a more urgent incentive towards technology upgradation and modernization.

The government has announced its intention to sell 20 percent of its holdings in the public sector while simultaneously directing public sector firms to generate more internal resources. Public sector firms will now on be held to agreed levels of performance through binding memoranda of
understanding. Their boards would be made more professional and autonomous and given greater power.

8. The central provisions of the Monopolies and Restrictive Trade Practices (MRTP) have been scrapped. Mergers and take-over are now fully permitted. Prior government approval for expanding present undertakings or for starting new ones is no longer necessary.

9. Both imports and exports have been greatly liberalized. Capital goods are being particularly favoured both with easier import rules for a great majority of items and enhance incentives for their exports. These changes will enable much faster and smoother technology upgradation to foreign collaboration and equity participation.

Points 5 and 6 mentioned above, ensure a completely new environment to promote technology transfer in the steel industry. The private participation in the core sector would lead to growth and larger scale development in steel sector.

The above policies have been launched with the conviction that they will lead to rapid rates of industrial growth and exports through first, high inflow of foreign investment and technology; second, higher investment by domestic private sector; third, increased efficiency in both public and private sectors, and fourth, increased competitiveness in domestic and foreign markets both in terms of price and quality.\textsuperscript{14}

\textsuperscript{14} ibid M.R.Bhagwan, pp M8-M9
SECTION IV : NEW POLICY ENVIRONMENT FOR IRON AND STEEL INDUSTRY

New Policy Environment for Iron and Steel Industry in India\textsuperscript{15} is enumerated below : -

- dereserved and delicensed,
- Pricing and distribution controls removed.
- Iron and Steel included in the list of high priority industries,
- External trade policy liberalized,
- Import of capital goods made free,
- Duty on capital goods import reduced sharply,
- Import of raw materials freely allowed and import duties reduced,
- Export of iron and steel items freely allowed.

The future of steel in India is now entering into a new phase of potential success. The share of infrastructure of and construction together accounts for about 80\% of total steel consumption. Investment decisions as targeted by the government in a plan, and the rate of public sector capital expenditure as decided in the annual budget have always had a critical impact on the level of domestic steel demand. The public sector capital investment plays a dual role of generating expansionary forces both in the demand and supply side of industries like steel, which are dominated by the public sector.

The government's economic reforms and the associated policies, however stress that the Indian steel production should, in principle largely withdraw from

\textsuperscript{15} J.S.Bagchi, "The Evolving Role and Development Strategy in India for Steel to the Year 2010", Key note address to the Asian Steel Summit, Hongkong, 13-15 September 1995
public investment. The production economy and the pattern of investment should hereafter be guided as far as possible by domestic as well as the global market process. The government expects that the space thus created by the withdrawal of the state will be occupied sooner or later by private Indian or foreign investors.\textsuperscript{16}

This place then will be available to the private sector as a powerful incentive for the regeneration of steel diplomacy in India. The responsibility of the government would be ensure that the investment environment that is created in the economy is retained.

India's absorptive potential of steel is very high by any standard of comparison with other countries. The actual ability of the economy to absorb steel would thus depend on public policy regarding the rate and the strategy of investment and the pace of development.\textsuperscript{17} The fast pace of steel technology negotiations in the past five years is a proof that steel diplomacy is making full use of the new opportunities in the new era of India's industrial environment of liberalizations.

SECTION V: INTERNATIONAL CHANGES
FACILITATING TECHNOLOGY ACQUISITION

Activation of technology transfer activities in the private sector have resulted from opportunities for economic diplomacy. In 1991, total foreign investment approved in all sectors was a meagre US $234.9 million. This

\textsuperscript{16} R.P. Sengupta, "Market Prospects for The Indian Steel Industry", ICRA, Sector Focus Series No. 2, New Delhi, 1994, p 10
\textsuperscript{17} ibid. p 11
increased at a steady pace to reach US $2855 million in 1994. Actual inflows also exhibited a similar trend to touch US $947 million in 1994. Foreign investments have gone up in the steel sector also. Approvals accorded in the iron and steel sector have touched approximately US $290 million. The approved equity participation is in the area of steel making, pig iron, refractories, processed scrap and coke.$18$

On April 13, 1992 India signed the Multilateral Investment Guarantee Agency Protocol for the protection of foreign investment in India. The provisions of the Foreign Exchange Regulation Act, 1973 were modified in 1993 as a result of which companies with foreign equity can operate like any other Indian company. Foreign companies were also permitted to use their trademarks on domestic sales with effect from May 14, 1992.

Bagchi notes in his keynote address to the Asian Steel Summit that one of the most important changes in the government policies that has marked the Indian investment scenario in general and steel industry in particular is initiation of large scale but judicious privatisation in industry. This has been done not only to exploit fully the inherent strength of the private entrepreneurial capabilities but also to tap more effectively the private savings and to attract foreign direct investment into India. The response to these policy changes and the approach of the government has been overwhelming in the steel sector.$19$ Opening up of the steel sector to private enterprise within the new SAP regime has seen unrestricted technology collaborations.

$18$ ibid Bagchi, 1995 (Keynote Address)
$19$ Bagchi, Secretary, Ministry of Steel, 1995
By September 1995 there were 41 proposals including the subsequent expansion programmes for setting up new steel units. The proposals which have been cleared by the financial institutions account for a capacity addition of 8.175 MT of crude steel and an investment of US $ 4.172 billion. The second category of proposals are those where the promoters have shown actual interest and have approached the financial institutions but are awaiting clearance.

The Changes In the International Background for Steel Technology Transfer

Steel production in industrially developed countries has fluctuated over the last two decades. It has shown a steady decline over successive years in the mid 1970's and mid 1980's. This was mainly due to the saturation of domestic steel demand (discussed in detail in Chapter 4). In the period after 1989, the decline has been largely due to economic recession in advanced capitalist countries and developments in the former socialist countries and the USSR. The recurring difficulties in the steel industries of the developed countries were themselves the symptoms of a deeper economic crisis, which is caused wide spread decline in industrial activity.

The western world curtailed its steel capacity and modernized the industry to conserve energy and materials, reduce cost, and improve competitiveness and profitability during the last two decades. There has also been a geographical redistribution of the global pattern of steel production, with most of the incremental productive capacity coming up in the developing countries.
Technology Director, Steel Authority of India Ltd., Dr. A.K. Sengupta identified three major reasons for this geographical redistribution of the steel industry worldwide.

i) **Capacity Shedding**: Capacity shedding by developed countries because of saturation of their domestic demand. The steel industries were being sold off to major steel producing countries mostly in the third world. Because of the reduced domestic demand, the economies of scale did not make the functioning of large scale industries entirely profitable. Over and above this, the steel industry is one of the most labour intensive industries. High labour cost also tend to reduce the profitable functioning of steel plants. A fall in supply from inefficient plants is leading to their being physically demolished in the west.

The excess capacity which resulted on account of a fall in the effective demand seriously affected prospect of investment in new capacities in the west. The steel technology and capital goods industries of the western world thus found outlets in developing countries which have been expanding their steel capacity. Countries like South Korea could take full advantage of the recessionary conditions while negotiating prices of capital goods with western equipment suppliers (at the time of construction of the Pohany steel plant). TISCO in India similarly has taken advantage of the restriction limiting steel capacity in Portugal. (as a part of the conditionality for Portugal's entry into European Commission) in procuring a very low

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20 Personal Interview
cost equipment for Blast Furnace and basic oxygen converters for their third phase of modernisation.\textsuperscript{21}

\textbf{ii) Environmental Considerations:} Globally steel industry is one of the largest pollutants as mentioned earlier. On this account the companies have to spent a large fortune to control the pollution levels for which there are strict legislations in the west. Environmental conditions however are playing a major role in generating further relocation of steel making capacities away from the developed world. Interestingly stringent standards in the developed world is making the functioning of the steel plants a major source of controversy. To meet the levels of controlled pollution permitted by the stringent clause it is gradually leading to levels of capital and operating cost which are far too high for profitable and competitive operations. Developing countries like India on the other hand offered the opportunities of lower operating expenses by way of lower labour costs and cost savings in respect of many raw materials which can perhaps offset to some extent the greater pollution control expenses. Further given the lower levels of industrial development, the ecological burden is also lower than the more intensely industrialised areas of the west and Japan.\textsuperscript{22} Also it is a fact that in countries which are not so advanced the awareness of the environmental issue is not as widespread. Consequently environmental pollution is not a very volatile issue.

\textbf{iii) Product Advancements:} There have been changes in the quality composition in the steel outputs and shifts in preferences with regard to the

\textsuperscript{22} ibid. p 38.
choice of the base material in the developed countries. Unlike the developing world in the industrialised countries there has been a switch during the last few decades from ordinary grade steel to hi-tech steel with enhanced strength, light weight and other superior quality.\(^{23}\)

The development of the steel industry in the developing world during the last two decades has been partly facilitated by the crisis in the western world. One of the major instruments of technology acquisition in this industry has been the role of environmental diplomacy. The west is using this issue as a leverage for profitably exporting their industrial crisis into the third world.

Any significant growth in steel industry in the developing world, which takes advantage of the changes in the structure of the global competitiveness may result in gradual fall in indirect steel import in to these countries in the form of machinery, vehicles and other products.

In his study, R.P. Sengupta points out that:

i) While the nationalist policy of developing countries may induce state authorities to promote investment in steel, the forces of global integration in today's unipolar world would at the same time make the import of steel and capital goods and the entry of foreign capital through multinationals into these countries increasingly easier.

ii) The declining markets for metallurgical equipments in the developed world, is likely to make competition among steel technology/ equipments/ machinery/ investment suppliers even more intense. Thereby it eventually

\(^{23}\) R.P. Sengupta, *ICRA Part I*, pp 33-34
further dilutes the pre-ponderant role of steel producers in the developed countries.

iii) Easier accessibility to steel technology and increased competition among the suppliers of technology has the potential to create an environment increasingly influenced by factors of relative competitiveness and efficiency. Consequently this can work out to the advantage of developing countries like India, which has chosen to go in for steel production on a larger scale.

In a liberalised regime of trade and technology and an exchange rate conducive to competitiveness of domestic manufacturer Indian steel industry is all geared up to reach successful horizons. Above mentioned factors have opened up new vistas which are being actively utilised for acquiring the latest technology into the steel sector of the country.

SECTION VI: LATEST STEEL TECHNOLOGY ACQUISITION BY INDIA

India has entered into a new era of technology acquisition with the withdrawal of the state from the core areas of Indian industry. For the steel industry the technology transfer negotiations are now being initiated by private sector entrepreneurs who have come into the picture in a massive way.

Jindal is one of India's leading industrial group with an impressive track record of growth oriented success in the high technology area of Ferro alloys, mild steel and stainless steel. It is one of the few companies in the world with integrated steel making facilities, manufacturing plates hot rolled coils, cold rolled sheets,
steel tubes and pipes. Jindal has import substitute product to offer in the form of SAW Steel pipes. With a turnover of Rs. 1000 crore, Jindal Steel Group is setting up new plants, acquiring new mills and is working over time to make a mark not only in Indian steel industry but also in the international world of steel.

The Group is all set to buy several mills in foreign countries and is making plans for the construction of several more. The most important of its newly acquired treasures is the purchase of a large diameter pipe mill from US steel. The plant situated near Houston, Texas, is expected to produce around half a-million tonnes of a large diameter, double submerged arc-welded pipe.25

This is a new endeavour of an Indian entrepreneur make inroads into developed country's industrial networks. Thus there are new channels of technology acquisition, development and upgradation of the Indian steel industry.

Besides, the group has also formed a US subsidiary which is expected to produce about 70,000 tonnes of a large diameter, double submerged arc-welded pipe. The Jindal group is also interested in buying a pipe mill at Indonesia with the capacity of about 300,000 tonnes per year and establishing a cold rolling mill in Bangladesh.

Apart from Jindals, there are other private sector enterprises who have brought in the much needed technological change into Indian steel industry. The MESCO group of companies close Daitri in Orissa for an integrated steel plant for while they have negotiated with China for a special sized blast furnace, better suited to the Indian conditions.26 The plant is envisaged as an entirely export

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25 Brijender Singh Pawar, Private Sector Investment in Iron and Steel Industry, Link, New Delhi, Feb 1994 p 4
26 Personal Interview with B.D Jhamb
oriented venture. The emphasis on the export oriented growth in the steel sector is making way for a lot more foreign collaboration in the industry. The import substitution strategy for development was posing its own restriction. The steel industry in the country is seeing an entirely new horizon of growth and the avenues of technology transfer can now be seen clearly. The opening up of the steel industry to the private enterprises has brought in major technical changes in the industry.

Now along with private sector people taking the initiative, the global leaders in the areas of steel technology are also taking keen interest in the Indian steel sector. The Voest-Alpine Industries the Austrian engineering and plant building company of the VA TECHNOLOGIE AG group, has to its credit over 550 major industrial projects successfully realized in some 80 countries. They have to their credit the development of several new sophisticated technologies. The 1993 saw yet another revolution in iron making with the development of low cost and costless iron making - the. COREX developed by the VAI group. The Corex process differs from the conventional blast furnace route. In the Corex: a) non coking coal can be directly used in the process as a reducing agent and energy source, and b) iron ore can be directly and feasibly changed to the process as lump ore, thus dispensing with the need for citering and pelletizing plants.

Jindal Steel took the initiative to order the first Corex plant to be set-up. This way India can be proud to be one of the first countries in the world to have such sophisticated plant. The first Corex plant is coming up in the state of Karnataka in Vijayanagar.
The VAI has established its engineering office in India which is known as VAI India Pvt. Ltd. with capabilities of mechanical and electrical design. Their main project management services, including complete turnkey projects in conjunction with the company Headquarters in Austria.\textsuperscript{27}

VAI Linz is engaged in installing a 2 machine 4 strand continuous slab caster in Bokaro's modernisation programme. Detailed engineering and inspection for the section of the plant is being undertaken by VAI INDIA.

Jindal Vijaynagar Steel Ltd. is being provided with design engineering and constancy services by VAI India.

On the similar lines we can see the entry of Cegelac India into the steel industry of India. They are involved in setting up of the ESSAR steel plant in Gujrat.

Like the VAI another world leader in technology development that has established its Indian subsidiary in LURGI AG, Frankfurt, Germany. Lurgi is a pioneer in the process technology for industries. Steel industry has benefited from various advancements, innovations and inventions developed by Lurgi. Lurgi India has ensured a new channel of technology transfer and sophistication in India's steel industry. In 1964 Lurgi India was only a sales office, but with the dramatic changes, in the Indian economic scene along with fast industrial growth of the nation, Lurgi India undertook a rapid expansion programme in 1990. Today it is an organization that has total project execution capability with a highly knowledgeable and experienced manpower.

\textsuperscript{27} Information from the books and company profile materials acquired from the VSAI INDIA Steel during the international seminar on Metallurgy held in New Delhi in the first week of November 1996.
An important asset of Lurgi India as a plant builder in the huge reservoir of over 200 Lurgi hi-tech processes. To successfully convert Lurgi's vast data base and software into hardware, many Lurgi India engineers have been rigorously trained in Germany in the major technologies of Lurgi Metallurgy. The Indian steel industry will greatly benefit from: -

1. Beneficiation
2. Agglomeration
3. Coal or gas based direct reduction to produce sponge iron.
4. Residue recycle

SAIL, at Kothagundam and Ranchi are collaborating with Lurgi also.

Indian steel industry can benefit from these frontier technological giants as they are making vital headway into environment friendly options, for the steel industry.\(^\text{28}\)

When steel expansion was strictly reserved for the public sector some private sector entrepreneur of India like the Ispat group put up large integrated steel plants outside in the South East Asian region like Indonesia. In 1976 Ispat Group set up a multi-crore integrated steel plant in Indonesia, which emerged as one of the fastest growing corporations in the world which now has an aggregate manufacturing capacity of 4.5 MT of steel. The group's products vary from $20 per tonne of iron ore to $1000 per tonne for special cold coiled sheets, alloys and other value added items. As much as 60% of the group's sales are through exports. Ispat Group has collaborated extensively with leading Japanese companies like,

\(^{28}\) Information received from Lurgi Steel at the International Seminar on Metallurgy in New Delhi, Nov. 1996
NKK, Hitachi, Nippon Denro. Other collaborators with Ispat Group have been Danieli and Co, Italy, Elken of Norway, Gontermann Peipus Gambh - Germany, Midsrex - USA etc.\textsuperscript{29}

With extensive economic reforms in the Indian industrial sector Ispat Group is setting up steel plants in the country as well. With this we can identify yet another channel of technology transfer in India. As with Ispat Group, India will be benefited with the many technological collaboration that have taken place. Currently Nippon Denro Ispat is coming up in Raigad, Maharashtra.

Table 5.2 giving a lists of all the new steel plants coming up in the post liberalization era is shown on the next page.

Another leading technological consultant for the steel industry has come into India, namely the Mannesman Deurag of Germany. It is interesting to note that during the proposals for the public sector industries in the South during 1970s, this company was very keen to participate in the Paradeep project and later in the Vijayanagar Steel in Karnataka. But the deals couldn't materialize. Today Indo-Mag, its Indian subsidiary, has become an important channel of introducing modern and competitive technology into our steel ventures.

**Modernization of Steel industry in the public sector**

The steel authority of India has taken up modernisation of its three integrated steel plants at Durgapur, Rourkela and Bokaro with the Durgapur project being implemented through 16 turnkey projects out of which six are global.

\textsuperscript{29} ibid. Link 1994, pp 5-6
### Table 5.2

**LIST OF NEW STEEL PLANTS (NSPs) IN POST LIBERALISATION ERA**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Unit</th>
<th>Capacity M Tonnes</th>
<th>Investment Rs. Crores</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>A. PLANTS SANCTIONED BY FINANCIAL INSTITUTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>NOVA UDYOG LIMITES (Nainital, U.P.) B&amp;R</td>
<td>2.40</td>
<td>101.40</td>
<td>Commissioned in Dec. 1993</td>
</tr>
<tr>
<td>2</td>
<td>INDIAN SEAMLESS S&amp;A LTD (Pune, Maharashtra) B&amp;R Sealmess Bar</td>
<td>1.50</td>
<td>175.00</td>
<td>Commissioned in Dec. 1994</td>
</tr>
<tr>
<td></td>
<td><strong>B. PLANTS SANCTIONED BY OTHER INSTITUTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RAJENDER STEEL LTD (Raipur, M.P.) HRC</td>
<td>1.75</td>
<td>175.00</td>
<td>Commissioned in Jan. 1996</td>
</tr>
<tr>
<td>5</td>
<td>ESSAR STEEL LTD (Hazira, Gujarat) HRC</td>
<td>20.00</td>
<td>3525.00</td>
<td>Commissioned in Mar. 1996</td>
</tr>
<tr>
<td>6</td>
<td>JINDAL STRIPS LTD (Raigarh, MP) Slab/billets</td>
<td>5.00</td>
<td>421.00</td>
<td>Partly Commissioned Under impln</td>
</tr>
<tr>
<td>7</td>
<td>KUMAR MET. CORPN. LTD (Nalgonda, AP) WR</td>
<td>1.25</td>
<td>127.00</td>
<td>Under Impln. Apr. 1996</td>
</tr>
<tr>
<td>8</td>
<td>ISIBARS LIMITED (Khopoli, Mah) Billets/LP</td>
<td>1.30</td>
<td>117.00</td>
<td>Under Impln. June 1996</td>
</tr>
<tr>
<td></td>
<td>NOVA STEELS (I) LTD. (Bilaspur, MP) WR/B&amp;R</td>
<td>2.00</td>
<td>140.00</td>
<td>Under Impln. June 1996</td>
</tr>
<tr>
<td>10</td>
<td>KALYANI STEELS LTD. (Raichur, Karnataka) Blooms/LP</td>
<td>2.15</td>
<td>231.00</td>
<td>Under Impln. Sept. 1996</td>
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<tr>
<td>11</td>
<td>MALVIKA STEEL LTD. (Jagdishpur, UP) WR/B&amp;R (1st BF Commissioned)</td>
<td>2.15</td>
<td>231.00</td>
<td>Under Impln. Jan. 1997</td>
</tr>
<tr>
<td>12</td>
<td>SOUTHERN I&amp;S CO. LTD. (Salem, Tamil Nadu) B&amp;R, WR</td>
<td>5.75</td>
<td>1364.00</td>
<td>Under Impln. Mar. 1997</td>
</tr>
<tr>
<td>13</td>
<td>SJK STEEL CORP. LTD. (Anantpur, AP) Billets</td>
<td>2.63</td>
<td>405.00</td>
<td>Under Impln. Apr. 1997</td>
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<td>14</td>
<td>TRIDENT STEELS LTD. (Dahej, Gujarat) LP</td>
<td>1.00</td>
<td>99.00</td>
<td>Under impln Apr. 1997</td>
</tr>
<tr>
<td>15</td>
<td>NIPPON DENRO ISPAT LTD (Raigad, Maharashtra) HRC (Expn)</td>
<td>12.00</td>
<td>2200.00</td>
<td>Under impln June, 1997 July, 1998</td>
</tr>
<tr>
<td>16</td>
<td>JINDAL VIJAYANAGAR (Bellary, Karnataka) HRC</td>
<td>18.00</td>
<td>2770.00</td>
<td>Under impln Apr. 1998</td>
</tr>
<tr>
<td>17</td>
<td>GRAND FOUNDRY LTD. (Pune, Maharashtra) B&amp;R</td>
<td>12.50</td>
<td>3300.00</td>
<td>Under impln Apr. 1998</td>
</tr>
<tr>
<td>18</td>
<td>USHA ISPAT LIMITED (Satarda, Maharashtra) LP</td>
<td>6.00</td>
<td>1400.00</td>
<td>Under impln Sept. 1998</td>
</tr>
<tr>
<td>19</td>
<td>BELLARY S&amp;A LTD (Bellary, Karnataka) LP</td>
<td>4.14</td>
<td>819.00</td>
<td>Under impln Sept. 1998</td>
</tr>
</tbody>
</table>
and 10 indigenous. This shows that we have come a long way since the 1950s and 1960s when we initiated our first set of technology collaborations for steel plants in the public sector. By the end of the century we can see that the tradition of technology transfer has entered into a new phase altogether. The entire ethos of public sector has changed. The technology upgradation & modernization is taken up by collaborations of foreign consultants and the indigenous concerns.

The technology profile for SAIL today is a tribute to the overall technology transfer exercise of the nation. As a result of bold diplomatic initiatives taken towards technology acquisition three and half decades ago, we have learnt to adapt & assimilate technology indigenously. Inspite of all its drawbacks our R&D efforts have proved extremely successful and have done us proud. The report in The Statesman highlights that today we command indigenous capability which competes at par with the global tenders received for the SAIL modernization endeavour. Out of the sixteen turnkey projects, the indigenous companies have won ten contracts while only six have gone to the foreign consultants.

The changes in the Indian perspective of industrialization have stimulated more emphasis in this era of global integration of economies. In this changed scenario the SAIL case study is one excellent example. The state protected politically motivated bargaining strategies have been put aside. Now the state is supporting bargaining through the economic channels. Economic goals are mainly decided by the need to stay ahead in the race of modernization efficiency and the winning edge. Now the nation is going all out to get the required technology to

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30 The Statesman, New Delhi, December 4, 1996
meet these national goals. Whether we are able to procure the technology through FDI, joint venture or equity participation is now not important. What is important here is to go ahead to compete successfully. The economic forces are playing the overriding role. However steel diplomacy today forms part of economic development of the nation more vigorously.

CONCLUSIONS

It can thus be concluded that these wide ranges of technology coming into India will change the picture of the steel sector entirely. We are at the threshold of a new successful phase. Because of these activities in the private sector the technological profile of the public sector will also get improved. After many years of operating in a stagnant framework, SAIL has suddenly been thrust into a dynamic environment. Today the technological bottlenecks have been broken and international negotiations are proceeding more because of economic incentives rather than political compulsions. The growth and development of the steel sector will side by side help the major goal of nation building.

A strong industrial base with a competitive economic system will aid the ambitions of India to be one of the leading powers in the global political scene. The immense size of India both in terms of area as well as population led to this perception of India as a potential independent centre of power. From much before this independence the leader of the Indian national movement were systematically building up then foundation on which this potential for power could be realized.