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Mineral Policy Issues in the Context of Export and Domestic Use of Iron Ore in India

A. S. Firoz
Consultant

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Foreword

The global commodities super cycle is not showing any sign of coming to an end in the near future. This is no different for the steel and the raw materials to this industry. Iron ore demand has been increasingly rapidly and the deepening supply constraints have led to phenomenal increases in its price across the globe. India has significant reserves of iron ore and has emerged a major exporter taking advantage of the burgeoning Chinese demand. The high levels of exports attained in the past few years and the possibility of the same growing further have also raised some concerns about the supply constraints hitting the domestic steel industry which is expanding rapidly. This necessitates that a balance be achieved between export and domestic requirements. Whether iron ore should be conserved for the domestic steel industry through active policy intervention, or, whether the market forces be allowed to play freely for optimum allocation of resources between domestic use and exports, has emerged as a major policy issue. At the same time, the government as well as the industry recognize the urgency for reforms in the mineral industry to draw investment and modern technology into it to raise output to raise output, generate employment and create wealth in the society. This study examines these critical issues from the perspective of mining as well as user industries and arrives at some definite conclusions backed by examination of the facts regarding resource availability, demand forecasts and other related issues pertaining to the iron ore industry in India. The study throws an independent perspective on some of the complex issues with conflicting views. It is hoped that the study by Dr. A.S. Firoz will help clarify the analytical issues related to iron ore experts.

Rajiv Kumar
Director & CE

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Abstract

This study examines the utilization of iron ore in India. It takes into account the significant reserves of iron ore in India and allays fears that the country's steel industry will run out of iron ore resources if exports continue at the current level. On the contrary, it says that exports are necessary to maintain a structural balance in the market between production and consumption of lumps and fines as nearly 80% of exported ores are fines which are not adequately used in India. This study also highlights the specific problems of the Goa/Radi region. It examines the bilateral agreements with countries like Japan and Korea as well.

The study says that the size of mineral resources is a dynamic concept and depends on exploratory efforts, which have not been enough in India due to lack of investments. It recommends on the basis of international experience that increased investment in the mineral sector, especially in exploration, will lead to new reserves and resources.

Key words**:** Export of Iron Ore, Mineral Policy, Domestic Consumption, Steel Industry.
JEL classification**:** JEL Q31, Q34, Q 38

Executive Summary

The huge surge in demand for metals worldwide has led to a corresponding rise in the demand for and consequent increase in the prices of the respective minerals. This has also given rise to a fear of minerals shortages hitting the growth of the mineral based industries. This has been so particularly for iron ore.

Chapter – 1: Resources and Reserves of Iron Ore in India

- In the context of external trade in iron ore, the current policy debate is largely centered around the issue whether there are sufficient iron ore resources in the country to feed the estimated growing demand of the domestic iron and steel industries and also to maintain exports at the current or a 'reasonable' level.
- Total resources of iron ore in the country has been estimated at a little over 25 billion tonnes. This consists of 14.63 billion tonnes of haematite ores. Of the total haematite resources, 7 billion tonnes fall in the category of reserves. Reserves of magnetite ores are only 207 million tonnes with the rest 10.4 billion tonnes being classified as remaining resources.
- There is no exact or final estimate for iron ore reserves/resources in India (or globally, for that matter).While the knowledge about total resources and their absolute supply potential may improve with increased exploratory efforts, the categorization of the deposits and their mineability depend on several techno-economic factors.
- In India, the resources of iron ore have increased in total over the years despite continuous extraction for domestic consumption and export. There has also been an increase in the ratio of reserves to resources for haematite ores. However, there was an absolute decline in the size of the magnetite reserves.
- The resources and reserves of iron ore have been under-estimated as the methods followed do not provide for an exhaustive estimation of the same.
- Geo-physical and geo-chemical mapping done so far in India have not been adequate.
- It is possible, therefore, that greater exploratory efforts will lead to increase in the total resources as also in the reserves base of iron ore.
- The reserves and resources of iron ore have been mostly estimated considering a depth of only 50-60 meters or so. In practice, deposits can be found and economically mined even up to 200 meters or more. The economic viability of mining at such depths will nevertheless depend on specific conditions and vary from mine to mine. However, at current prices of iron ore worldwide, it will certainly be economical to reach higher depths or undertake mining under more difficult conditions.
- Haematite ores with less than 55 per cent Fe (Iron) have not been included in the category of reserves or resources. Current technology of beneficiation and iron ore prices provide sufficient economic value to process iron ore with much lesser Fe (iron) content. If the same is considered, the estimates of reserves and resources of iron ore will rise further.

- While talking about availability of iron ore, it is important and relevant to take note of the global resources rather than remain confined to the possible supplies from the domestic sources only.
- The global iron ore resources have been estimated at over 800 billion tonnes containing more than 230 billion tonnes of iron. More resources have been discovered which will take the figure far beyond that.
- India produces 9.13 per cent of the global iron ore output. In terms of pure iron in it, India's share is 10.86 per cent as in 2005.
- Therefore, there is no immediate concern about iron ore resources turning out to be a constraint to the growth of the steel industry.

Chapter – 2: Iron Ore Production and Trends of Investment in India

- India is the fifth largest producer of iron ore in the world with production at 181 million tonnes in 2006-07. The figure seems to have been under-estimated. This could be due to well known statistical errors on account of under-coverage. Production growth has been continuous and has largely been driven by export opportunities.
- There has been a slowdown in iron ore production – with the annual growth rate falling from 18.9 per cent in 2004-05 to 13.2per cent in 2005-06 to 9.48per cent in 2006-07.
- The share of lumps in total iron ore production has been about 40per cent with the rest being accounted for by fines and concentrates. The share of lumps in total iron ore varies across the states depending on the quality of the deposits, operating practices followed and the commercial judgment of the miners.
- The iron ore quality varies in production according to its Fe content based grade – with 83.7per cent of the total production having Fe content of 62per cent and above.
- Orissa, Chhattisgarh, Karnataka, Jharkhand and Goa are the major iron ore producing states in India.
- About 22.7per cent of the total production was from captively held mines with rest coming from merchant mines.
- Production increases have come almost entirely from the existing mines and more so from those in the private non-captive sector. Increase in iron ore production from captive mines was small. Captive mines recorded only 21.6 per cent growth in output during 2002-03 – 2006-07 compared to 109 per cent in the case of non-captive mines.
- Iron ore production growth has been lower in the public sector at 39 per cent in the last six years compared to 223 per cent recorded in the private sector.
- Iron ore production has increased mainly driven by export demand and consequent increases in the prices of the same in the international market.
- The mineral sector in India has not drawn all the necessary investments. The sector accounts for only 2.8 per cent of the country's GDP. This is fairly small compared to several other mineral rich countries in the world. Investment in the

sector has been extremely low and whatever little increase has been recorded in the past few years has been largely due to global demand.

- Low prices and very low returns to investment in the past and that too in a volatile and uncertain world of business discouraged investment in mining in the past. This has constrained exploration efforts and proper extraction of the deposits. It is only in the recent past that investments have moved into the sector at the sight of attractive returns.

Chapter – 3: Domestic Consumption of Iron Ore

- Domestic consumption of iron ore has been reported at about 58 million tonnes by the government in 2005-06. However, the ICRIER estimates are higher at 77 million tonnes for that year (and 98 million tonnes for 2007-08). Of that, about 37 million tonnes were lumps with the rest being fines and concentrates.
- The figure for estimated consumption of iron ore does not fully take into account the possible under-coverage of steel and sponge iron production.
- Iron ore consumption in the country falls far short of production. In the absence of adequate domestic demand, fines generated in the process of production are being largely exported.
- Technologies for direct use of fines have not come to India. These are to be used in iron making by adequate agglomeration to the form of pellets or sinters.
- Blast furnaces in India normally use sinter and lumps as iron ore feed. The proportion of sinter (and also pellets) used in blast furnaces in India has been increasing due to favourable economics. There is strong potential for that to rise further considering the global experiences. The gas based sponge iron units can take both lumps and DRI grade pellets. Pellets are not preferred alternatives for the relatively inefficient coal based DRI units.
- Apart from the fact that there is not adequate sintering or pelletising capacities in India to take care of the surplus of fines, utilization of capacity in the sintering and pelletising plants has been lower compared to the iron making facilities in the country. The actual production of sinter and pellets in the country and the iron ore fines needed for that fall short of the current production level of iron ore fines in the country.
- There is a regional imbalance also in respect of production of fines and the total agglomeration (sintering and pelletisation) capacities. This is prominent in the East and the South Western part of the country. This leaves no other option but to export these fines.

Chapter – 4: Export of Iron ore

- India exported about 89 million tonnes of iron ore in 2005-06 and 93 million tonnes in 2006-07. The same is expected to drop to about 88 million tonnes in 2007-08.
- There has been a slowdown in exports of iron ore. The annual growth rate has fallen from 29.1per cent in 2003-04 to 4.2 per cent in 2006-07.

- About **80 per cent** of the ores exported are fines. China accounts for more than **80** per cent of the total iron ore exports. Most of the iron ore is sold on the global spot market.
- Exports have risen by 114 per cent during 2001-02 and 2005-06.
- India's prospect of being a significant exporter of iron ore would vary depending upon a number of critical factors namely, the ability of the Indian mining industry to raise mining capacity, the rate of growth of domestic demand, willingness to buy Indian iron ore at prices which are not competitive in relative terms by the Chinese steel makers, etc.
- Many expert agencies have expressed their doubt if the iron ore exports to China can be increased continuously. Although demand for iron ore is increasing due to the strong growth of steel production in the country, consolidation within the Chinese industry and their long term supply concerns are already making them dependent on long term contracts as against spot purchases. Given the fragmentation and regulation in the mining sector in India, it is unlikely that the Indian miners will get engaged in long-term contracts. The India-centric spot market will thus become considerably unattractive.
- Massive investment plans by companies like CVRD and BHP Billiton in mining as also in shipping to reduce costs will reduce sharply the space available for Indian exporters in the Chinese market especially if the exports tax is to continue in the long run.
- Iron ore mining costs of stand-alone mining companies are set to rise more than proportionately given the fact that to raise mining capacity from now on will involve significantly higher investment and at the current costs of capital those will be substantially higher even on per tonne of iron ore mined.
- Profitability in iron ore exports varies across regions depending on the state of infrastructure in and around the mines, transport logistics, quality of the ores and local factors, etc.. Profitability is significantly lower for exports from the eastern India compared to those from the south. Actual profits coming to the miners are fairly high on an average, yet, significantly lower than those in the popular perception.
- The profitability of the exporters will be sharply hit if the export tax is to be raised. Such a measure will hit the merchant mining companies in the private sector the most, a segment that has accounted for the bulk of the growth in the industry.
- Such a measure may discourage flow of investment further leading to capacity constraint in the industry.
- Any stoppage to exports will necessarily mean closure of significant mining capacity as the volumes cannot be diverted to domestic use under any circumstances. Closure of mines will involve naturally expected consequences in terms of loss of economic activities including jobs.
- At a macro level, in general, trade restrictions lead to inefficiency in resource allocation. An artificial trade barrier may lead to price distortion, failure to price discovery for prospective investors and subsidization of an inefficient industry at the cost of an efficient industry.

- Profits from iron ore export business are ploughed back into the economy which derives from them the well expected gains in terms of employment, revenue to the government and the rise in the level of investible capital.
- The issue of conservation of iron ore for domestic industry may be reviewed, if there is need for it, as recommended by the Hoda Committee after 10 years or so.

Chapter – 5: Demand for Iron Ore in India

- Iron ore demand depends on the production of iron and steel which in turn depends largely on the domestic demand for the same. According the 11th Plan Working Group on Steel, demand for iron ore would rise to 130 million tonnes by 2011-12.
- Our demand forecasts for iron ore up to 2015 under different scenarios indicate that even in the best case scenario, the cumulative consumption of iron ore in the country between 2007-2015 will be around 5 per cent of the total estimated iron ore resources in the country today.
- Although demand for steel in the country is expected to rise at a reasonable pace, a substantial part of the steel market is likely to be covered by imports. If this happens, steel production potential will not be realized in the medium term and as a result the iron ore demand will also be proportionately lower.
- The very long term forecast of iron and steel production and the consequent demand for iron ore made on optimistic assumptions also show that the steel industry can remain comfortable with domestic iron ore supplies even with an annual iron ore exports of 100 million tonnes till about 2070 *at the current estimates of resources in the country.*
- If the steel industry plans are considered, the projection of demand for iron ore in terms of fines and lumps will create a structural imbalance in the market which will compel export of lumps and import fines if the current ratio of fines to lumps continues in total production. Freer market conditions and fuller access to the global market with exports as the key element can take care of such imbalances.

Chapter – 6: Iron Ore in Steel Industry Perspective

- The steel industry sees iron ore as the most important competitive advantage in global comparison making up for the disadvantages arising out of other factors such as high costs of coking coal, high internal freight and poor infrastructure. The industry seeks the advantages of captive mining to support its future growth.
- For plants with captive iron ore, iron ore accounts for not more than 10 per cent of the finished steel costs. For some, it is as low as 4 per cent in India. For those without captive iron ore and largely dependent on iron ore lumps or pellets, the costs do go up sharply. Part of this cost rise is accounted for by freight costs. Against this coking coal constitutes as high as 20 per cent of the total costs of finished steel.

- Demand for additional cost advantages through captive mining and discouragement to exports presupposes that the iron ore business will always remain attractive with scarcity keeping prices up. Current research conducted globally on the subject does not hold such a view. Additional new capacities in iron ore and slowdown in their demand from the steel industry are expected to pull prices down latest by 2011 from their peaks.
- Today, scrap constitutes a significant percentage of the total metallic requirement for the steel industry globally. Over a period of time, steel scrap use in the steel industry has risen substantially and more and more steel is now being produced using scrap rather than going through the virgin iron ore route. Recycled scrap is estimated to have contributed to about 330 million tonnes of the crude steel produced globally in 2005 out of a total estimated production of 1240 million tonnes.
- Given the supply potential of domestic iron ore, none of the iron and steel projects currently planned is expected to face shortage of iron ore in the life time of its plants and machinery.
- According to the steel makers, magnetite ores involve high costs in use, but, there are no technological barriers to their use in steel making. The costs of production of steel will still remain competitive even if local magnetite ores are used in India.
- The rapid increase of coal based DRI industry that uses the high quality haematite ores but for insignificant value addition also leads to proportionately higher production of fines which are being exported currently. The steel industry is concerned about excessive growth of this technology route. However, choice of technology is best left to the market.
- Steel makers have expressed their concern over security of iron ore supplies to the industry in Karnataka. The export ratio for the state is the highest and given the environmental concerns holding supplies down, they have sought restrictions in their export.
- The steel industry needs to plan their projects out carefully, fully appreciating the specific area based constraints that may come about in future.
- The steel makers and the government agencies have argued that instead of exporting iron ore, there should be efforts to export steel or any other value added products derived from iron ore. However, for that, the steel industry should be able to find a profitable market for steel. Further, the value addition argument does not hold as strongly as one sees it in a general (rather simplistic) macro-economic framework.
- The steel industry as also the government are looking at the means of using the fines currently produced in excess in the country through necessary agglomeration, especially concerting them to pellets. While this is a sound economic proposition currently, one will also have to take into account the volatility in the pellets market, high investment requirement to set up a pellet plant and the price differential between pellets and iron ores in other forms.

Chapter -7: Policy Issues

- The main policy issue whether iron ore should be freely exported or is to be conserved for domestic steel industry depends on whether there is sufficient ore ores resources in the country to meet the growing demand form the steel industry. From the estimates made, it is clear that there is no ground to believe that the steel industry even on its strong growth path will run short of domestic iron ore any time in several decades from now. There is no threat to iron ore security for the steel projects currently under different stages of conception and implementation.
- No shortage of iron ore is expected globally even in the most optimistic scenarios about steel production growth.
- Exports of iron ore from India are taking place due to product and grade based mismatch between domestic production and consumption with high volumes of fines naturally produced having no corresponding domestic demand.
- Implication of any policy measure that seeks to restrict exports of iron ore from the country will have to be seen from several angles. India's iron ore exports were valued at US$3860.3 million in 2005. This constituted 3.76 per cent of the total value of exports from India that year. About 86.4 per cent of the total value of iron or exported were accounted for by China. This also amounts to 49.6 per cent of the total value of all exports to that country. If exports of iron ore are restricted, it will disturb the trade balance between the two countries.
- At a macro level, trade restriction leads to inefficiency in resource allocation. An artificial trade barrier may lead to price distortion and subsidization of an inefficient industry at the cost of an efficient one competing for the same factor resources like raw materials, capital or land.
- Given the estimated level of iron ore security for the domestic steel industry, there is no need to rush into a conservationist and protectionist policy framework to the larger detriment of the national economy and especially the mining industry.
- The steel industry has sought captive mining leases which have been opposed by the mining industry. The concerned government agencies are following a system of preference to captive mining whereas globally the mining industry has been developed independently in the private sector. Captive mining rights given out on terms having no relationship with the value of the mining assets (mines) can bring in inefficiency in terms of non-optimal utilization of resources, inefficient operational practices and sub-optimal technology choice.
- If priorities are assigned to captive mining, the domestic merchant iron ore market will not grow and if at the same time exports are stopped or regulated, the merchant iron ore output will have to be brought down significantly.
- The iron ore industry in India remains highly fragmented with very few large players operating in it. Whereas there was potential in many such mines to grow to global size and technology levels, the captive mining has come on the way. There is a need to scale up the mining operations and, therefore, to allot mining leases to large players with significant financial strength to be able to capitalize on the economies of scale as also to bring in modern technology and infrastructure. This is being recommended also by the Hoda Committee.

- The recent policy adopted by the state governments to recommend mining leases only to those setting up steel plants within the states needs thorough review. This will create exclusivity of mining rights only to steel mills in a significant way. Captive mines and stand-alone mines should be allowed to co-exist. Existing untapped mines (already explored and prospected) should be given for mining to the highest bidder, irrespective of whether there is plan for value addition or not..
- Absence of an open market will slowdown investment in the iron ore mining in the absence of price discovery. Since most of the large steel plants under conception are to be based on captive mines and the plants that will be dependent on merchant iron ore sourcing will be relatively small, the iron ore merchant market will face hurdles in attaining economies of scale for efficient operation. This will reduce investment flow into the industry.
- There is a significant competition policy issue related to the captive mining. In fact, there are three different kinds of costs/prices the user industries are faced with in respect of iron ore. First, the cost of iron ore for those who have captive mines fall in the range of Rs.300-600 per tonne at plant. Then the iron ore sold by the government owned companies to large customers on a longer term basis is at about Rs. 2000-2500 per tonne on comparable basis. The last, the iron ore sold by the merchant iron ore companies to small and medium companies – falling in the range of Rs. 3500-4000 per tonne. While the latter category price differentiation is market driven, the captive ownership cost advantage comes from the discriminatory government action.
- There are also no clear cut economy wide efficiency gains from integrating mining and steel making businesses. If opportunities are restricted for the Indian mining companies, they will be deprived of the economies of scale and remain inefficient forever in global comparison.
- Since there has been a gradual increase in the consumption of pellets in India, as also globally, in order to make use of the fines, a common view, right or wrong, is that the mining industry should engage itself in the production of pellets.
- If iron ore exports are restricted or banned and the same is not applied on pellets (considering it as a value added product), there may be a natural movement to pellets production and their exports. This will tantamount to efficiency loss considering the risk, investment and pricing volatility in the pellets market and continued export of iron ore, albeit in a different form.
- The environmental issues have come out as a big concern to the policy makers. Since a large chunk of minerals may remain untapped because of possible environmental hazards, new technologies need to be brought in to minimize the relevant damage and help raise production of iron ore.
- There is a view that the government may consider imposition of an environmental and social cess on mining to be used fully in rehabilitation and resettlement of the displaced or those affected by mining in the neighbourhood and in specific programmes to mitigate the adversity arising out of the environmental damage. Credible NGOs may be engaged to monitor or even run such programmes. However, since the government is bringing in a rehabilitation and resettlement policy in a larger policy framework which will encampus the mining sector as well and that the mines are bound by specific closure plans, another cess may lead

to confusion and procedural hassles on account of multiplicity of compliance. It is recommended that the specific issues related to mining are paid due attention in the central government policies on various related subjects.

- The current National Mineral Policy has been unfavourable to the large stand alone mines. Most of the mines are allotted to the small mining enterprises (SME). Such mining entities operate within a small area and are incapable of setting up their own infrastructure. This leads to excessive pressure on the existing infrastructure resulting in their damage and high transportation costs. The policy framework for investment in mining should be designed to support large scale integrated mining with required infrastructure.
- In the context of the review of the National Mineral Policy, one has to note that a lot of investments are needed over a short period of time not only to meet the rising domestic demand for the same but also to tap the global market opportunities. If private capital is to be encouraged and drawn into this sector, the entry barriers currently faced are to be removed first. Also, necessary operational and ownership based freedom have to be provided to ensure safety of investment and profitability to the entrepreneurs. Since these industries are no longer considered critical from any strategic or national security point of view, continuous government involvement in these businesses is not required.
- Security of tenure must be immediately guaranteed to investments in exploration at every stage – from reconnaissance to prospecting to mining, especially to attract foreign investment into this sector.

Introduction

World economy, and especially the commodity sector, has been on an upswing in the recent years – with the magnitude of the upswing surprising many analysts on the upside. The massive economic expansion in China, and of late in India, has increased the demand for various commodities, resulting in multi-year high levels of prices of several commodities, including oil and metals and alloys like iron and steel, zinc, copper, nickel, aluminium, etc. The factors pushing up prices of these commodities also appear to be far more durable in nature, resulting in even medium-term price expectations being pushed into a higher trajectory.

The mineral industry, that had undergone a protracted period of recession globally till the onset of the metals boom since the early years of this decade, has also benefited significantly in the recent expansion phase in terms of prices. In fact, in many industries, the upstream segments of the value chain are perceived to be the biggest beneficiaries of the recent boom, generating a lot of investor interest in these segments. Correspondingly, both profitability and investments in mining industry have gone up considerably.

With improved valuation of natural resources in this phase, it is also somewhat natural that the issues related to distribution of the benefits arising from endowment of natural resources have gained in significance. Issues related to control of natural resources, policies for their utilization, pricing, etc. are being contested upon by various interested parties, such as national and sub-national governments, mining industries, user industries, traders, etc. The on-going debate in India with regard to the minerals sector in general, and iron ore in particular, has to be viewed against this broader context.

India is one of the countries endowed with some of the richest iron ore deposits in the world. Currently, at 155 million tonnes of production estimated for the year 2005-06, the country ranks 5th in the production of iron ore in the world accounting for about 8per cent of the global output.

The plans of the Indian mineral industry, especially the iron ore industry, have been somewhat overshadowed by the uncertainty caused within the country by concerns raised by the user industries as also certain segments of the civil society about the sufficiency of our mineral resources to support the growth plans of the user industries. It is in this context that questions have been raised concurrently on the viability of continuation of exports at the current growth trends and volumes. There have also been issues raised over environmental and social implications of further growth in the mineral sector. There are widely dispersed and strongly contested views on many of the related issues of enormous significance to the overall development of the metal and mineral sector as also to the macro economy. Most such issues have strong bearing on the relevant government policy.

The present study is concerned with the issues related to iron ore and the iron and steel industry. Specifically, the study examines the resource sufficiency issue – whether there is enough iron ore available in the country to meet the growing requirement of the

domestic industry, simultaneously maintaining a decent and competitive level of exports. In this context, attempts have also been made to assess the desirability of bringing in restrictions on exports of iron ore and the impact of some of the measures which are already in place. The current mineral policy has been extensively discussed by expert committees, individual researchers within and outside the government. The recommendations of two high level committees set up by the government of India recently have also been examined in this study in the context of iron ore export and captive mining issues. The study assesses the issues from the perspective of the overall macroeconomic considerations as well as the mining and iron and steel industries.

Chapter - 1

1. Resources and Reserves of Iron Ore in India

1.1 Estimates of Reserves and Resources of Iron Ore

1.1.1 Since much of the policy issues have a strong bearing on the actual resource position of iron ore in the country, it will be useful to look at the **Tables-1** to see the current and past estimates of reserves and resources of iron ore in the country.

Table 1: Iron ore resources and production between 1980, 1990, 2000 and 2005

Qty.: Million tonnes

Grade	Resources as on 1.1.1980	Production between 1980-1990	Resources as on 1.4.1990	Production between 1990-2000	Resource as on 1.4.2000*	Production between 2000-05	Resource as on 1.4.2005*
Haematite	11469		12197 (+728)		11426 (-771)		14630 (+3204)
Magnetite	6095		10590 (+4495)		10682 (+92)		10619 (-63)
TOTAL	**17564**	**470**	**22787 (+5223)**	**656**	**22108 (-679)**	**532**	**25249 (+3141)**

Figures in parenthesis indicate decrease (-)/increase (+) in resources

***Notes**: (1) These resources do not include around 1000 million tones of haematite iron ore recently discovered by DMG, Chattisgarh in Kabirdham district.*

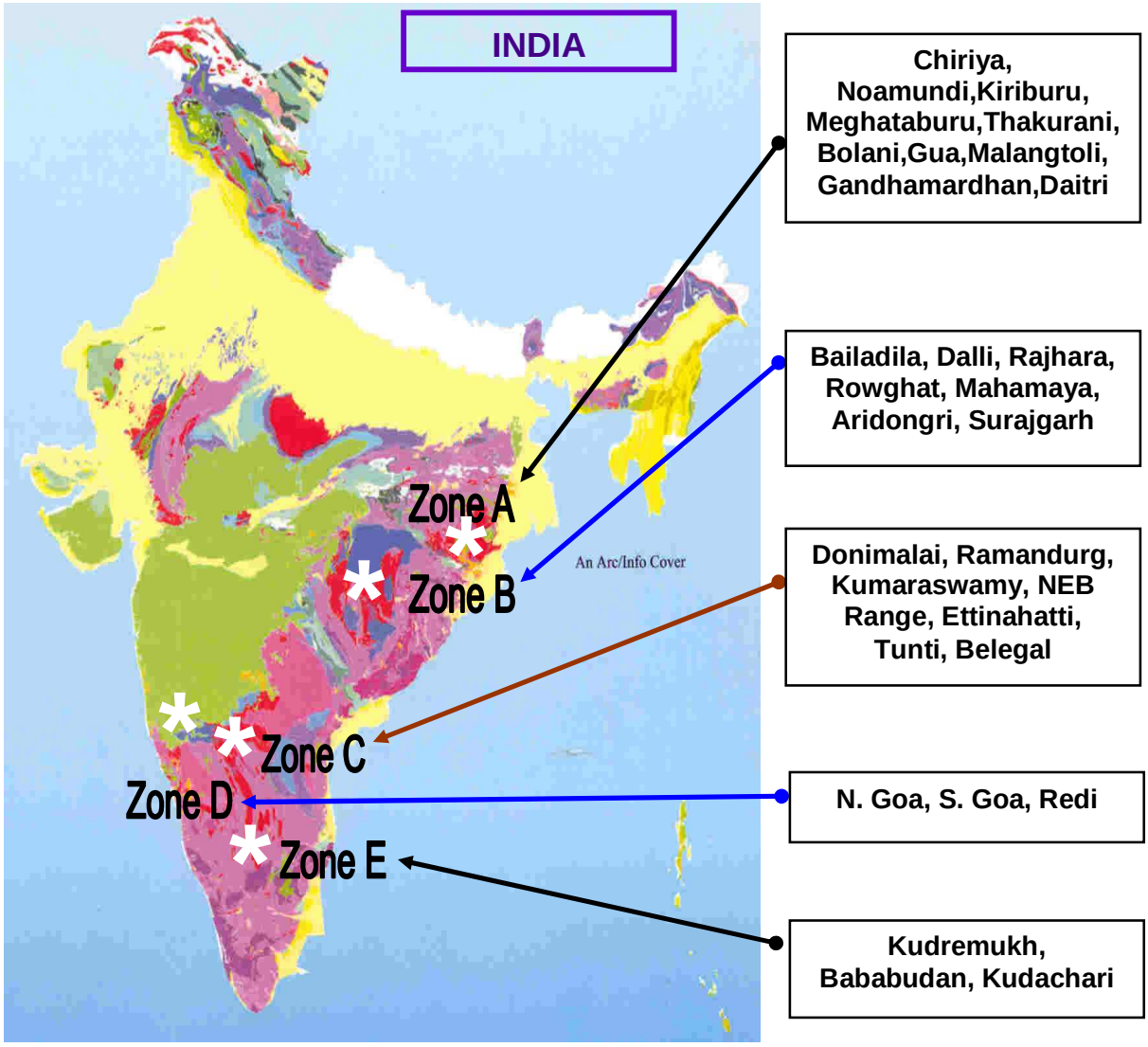
(2) Above resources are with a cut-off grade +55per cent Fe and roughly upto 50 metre depth estimated with sparce and far-between drilling.

Source: Indian Bureau of Mines, Nagpur

1.1.2 It is interesting to note that the iron ore resources in total have increased from 17.564 billion tonnes in 1980 to 25.249 billion tonnes over the period 1980-2005 despite continuous extraction for domestic consumption and exports**.** While the average annual iron ore production during 1980-2005 was 66 million tonnes, the total resources increased by an average of 307 million tonnes per year.

1.1.3 However, reserves, defined as economically mineable portion of the total resources, are only at 7 billion tonnes in the case of haematite ores and 0.207 billion tonnes for magnetite. A large chunk of the proven deposits did not find place in the reserves category on environmental considerations. Of the total reserves, 18.6per cent belong to the high grade category (65per cent Fe and above), 50.6per cent to the medium grade (62-65 per cent) and 28.4 per cent to the low grade (62 per cent and lower). The remaining 2.4 per cent have not been classified.

Zonal Distribution of Iron Ore in India



Source: National Mineral Development Corporation

1.2 Technical and Commercial Issues Related to Estimation of Reserves and Resources of Iron Ore

1.2.1 While talking about reserves and resources of iron ore, it is necessary to take note of a few methodological issues.

1.2.2 The estimates of resources or reserves do not capture the entire iron ore deposits of the country, which are virtually impossible to estimate in a definitive manner. The available numbers are based on assessment carried out by the concerned agencies from time to time, subject to specific methods engaged for the estimation which have also

changed over time.[1] The current estimates for India have been released by the Indian Bureau of Mines (IBM) and are based on globally accepted United Nations Framework of Classification (UNFC) guidelines. While the UNFC guidelines are good parameters for global comparison, they do not necessarily capture the country specific or regional situations.

1.2.3 The classification adopted as per UNFC guidelines seems to be unclear in respect of reserves. [2]The main basis of differentiation, economic and commercial viability, is not a static concept. At different price and cost configurations, there will be different figures of reserves.[3] At a given point of time, certain mining operations may not be commercially or economically viable due to specific conditions of the market. Some mining operations may be economically unviable on specific techno-economic considerations such as the forest cover, depth of the mines, significant population on the mining areas that cannot be moved, etc. Some others may be outright prohibited by environment related laws, in which case, unless the laws are changed, those mines cannot be opened up. It is obvious that changing economic conditions or national policies related to mining and development of technology may completely alter the economic viability of mining in a particular case with the changes in the relevant variables such as the price of the mineral, costs of mining, changes in laws of the land, etc. This suggests that for any long term policy perspective, the distinction currently maintained between reserves and resources should not be rigidly followed and the dynamic nature of reserves estimates should be factored in.

1.2.4 The official estimates of reserves and resources of iron ore in India are constrained by inadequate exploration so far. Knowledge about total resources may improve with greater exploratory efforts. Even the Ministry of Mines has accepted that the level of exploration carried out so far falls hugely short of the potential one sees from the geological data available.[4] The concerned state governments in the iron ore rich states such as Karnataka, Orissa, Jharkhand and Chhattisgarh have categorically stated that the actual resources may be more than estimated so far in each of their respective states.[5] Exploration coverage in terms of geographical area has been very low as investment in mining, especially in exploration or exploration related activities, has been low due to a variety of policy constraints. This has been noted categorically in the recently published

[1] Geological Survey of India and Mineral Exploration Corporation Ltd. (MECL) are the main two organizations responsible for exploration and survey activities.

[2] UNFC guidelines were meant to provide a standard guidance to international investors about resource position in the mineral sector. These not geared to provide an assessment of geological resource position of a mineral. The estimation procedures adopted by various agencies within the UNFC framework may itself vary from one another. There is a need for further work on the exact estimation procedure adopted by the concerned agencies within the broad UNFC guidelines. The mining industry, in discussions with them, have expressed concern over 'definite' underestimation of the reserves due simply to procedural problems.

[3] The UNFC puts the total resources into categories based on three criteria : (1) economic and commercial viability, (2) status of the field projects and feasibility and (3) geological knowledge.

[4] Noted from the presentations made by senior officials including Secretary (Mines) and Additional Secretary (Mines), of the Ministry of Mines, Government of India at various conferences in the recent period.

[5] Internet Sources, www.steelguru.com

report of the High Level Committee on Minerals set up by the Government of India under the chairmanship of Anwarul Hoda.

1.2.5 It is also worth taking note of the observation made in this context by the Working Group on Minerals set up by the Planning Commission for the 11th Five Year Plan. [6]

"India has a total land area of 3.28 million sq. km. of which 2.42 million sq.km, comprises hard rock terrain ……In view of the geological possibilities, only 20-25 per cent of the hard rock area (approximately 571000 sq.km) holds potential for solid fuel and non-fuel schedule mineral resources. ….At present about 8000 sq. km is under mineral lease, which forms about 50 per cent of the total area of the known mineral prospects and deposits. Out of the leased area only a small part is under active exploitation and large areas under lease are still awaiting exploration. Thus, there is still a large area left for exploration covering the known mineralized areas and bulk of unknown areas having favourable geological conditions for localization of mineral prospects. However, considerable areas have been given for regional reconnaissance under RP mainly to private agencies, in some states, but these also pertain to traditionally known potential domains."

1.2.6 Given the inadequate nature of exploration efforts so far, it is difficult to consider the current assessment of resources as final. In fact, one can always expect the resource assessment to change with time, based on exploration efforts. In this regard, one may note the following observations from one of the government websites of Australia[7]:

> "An assessment of a region's potential mineral resources combines knowledge of its geology, geophysics, geochemistry, mineral deposits and occurrences with current theories of mineral deposit genesis and results of mineral exploration. The assessment uses available geoscientific data to determine the history of geologic processes and environments. …. As geological knowledge of an area can never be complete, it is not possible to have a "final" assessment of potential mineral resources at any given time. Mineral resource potential needs to be monitored and periodically reassessed to take account of new data and advances in geological understanding, including new mineral discoveries. Advances in mineral exploration and mining technologies and market changes may also change the mineral resource potential of an area."
>
> It further goes to say,
>
> "It is important to note that no area can ever be classified as unprospective and no assessment of potential mineral resources can ever be considered `final'. New information, new concepts and better understanding of geological processes continually change the perceived prospectivity of a region and the availability, usefulness and implications of these can change over time. There are also dynamic aspects to market information that will affect perceptions of a region's

[6] Report of the Working Group on Minerals, Planning Commission, 2006. p2
[7] http://www.daff.gov.au/__data/assets/word_doc/0005/50954/wa_res_rfatest.doc

prospectivity; for example, mineral prices and extraction costs may change substantially over time."

1.2.7 It also interesting to note the experiences in Australia with respect to the mineral adequacy issue. Australia, like most others, followed a conservationist policy in respect of minerals. The basic mineral policy of the country is reflected in the quote below:

A 1951 report stated:

"We have been utilizing several of our basic metals at an ever-increasing rate and, with The development of many of the so-called backward nations, it appears likely that that rate will not diminish in the future; demand is likely to increase. We have not an unlimited supply of these metals available to us by economic processes as known today, nor is there any indication that sources other than the kind of ore-deposits worked today will become available to us. The capacity for production of some metals cannot be increased indefinitely…Periods of shortage such as we have experienced will recur more frequently." [Australian Bureau of Mineral Resources, Geology and Geophysics (1951)]

1.2.8 But, with the change of policy in the 1960s, with the removal of most of the restrictions on exploration of minerals and with general encouragement to mining, new discoveries raised the level of iron ore resources estimated to over 40 billion tonnes in the course of merely a decade. This was 100 times the level estimated prior to the policy changes.

1.2.9 While Australia's resource base expansion is quite spectacular, resource base has increased with time in several other countries too. The total iron ore resources of the world have been estimated at over 800 billion tonnes. [8]The global reserves base has shot up from 230 billion tonnes in 1994 to 370 billion tonnes 2006/7.[9] The reserves base does not cover the entire resources. A lot more resources have been found worldwide during this period. Only a few days ago, a Canadian company has announced investment in a Brazilian newly discovered deposit that has 159 billion tonnes – six times the total resources in India! [10] Jindal Steel and Power (JSPL), an Indian steel making company, has recently signed an agreement with the Bolivian government to buy 50 per cent of a mine that has a total deposit of 40 billion tonnes. [11] Interestingly, while reporting global country wise reserves position of iron ore, Bolivia did not even appear in the list of the US Geological Survey summary whereas countries even with deposits of 1.5 billion tonnes prominently appeared. These global experiences point out that India's current resource position has scope to increase significantly in future with greater exploration efforts.

[8] US Geological Survey 2006

[9] Estimated by US Geological Survey. Assumed in the report to be 385 billion tonnes considering the official total resource figure for India, which is higher by about 15 billion tonnes.

[10] Steel Business Briefings May 5, 2007.

[11] Widely reported. JSPL web site.

1.2.10 Depth of exploration is a key dimension of the resource estimation. According to industry experts, the assessments made on the potential reserves of iron ore seem to be based on mining depth of 50 meters with a grid interval of more than 500 meters or so. But iron ore can be available to far greater depths as has been experienced by several mines in India itself. (**Table 2**) For example, in Karnataka, it has been contended that the reserves are based on a 40 meters depth only whereas mining has been carried out to a depth of up to 200 meters. [12] The mining industry contends that in other countries the mining depth has reached more than 200 meters. Mining depth depends on the specific conditions and there are no uniform geophysical conditions prevailing across the world. But from the experience so far, there seems to be a good potential for Indian miners to find more resources by digging deeper. At current prices of iron ore, mining to such depth is viable.

Table 2: Mining Experience in India: Depths Attained

Sector	**Depths (from top RL)**
Goa sector	+80 mtrs, few mines have gone even gone (-) 50 mtrs below the sea level.
NMDC	+150 mtrs
Commercial miners in Eastern sector	+60 mtrs
Commercial miners in Bellary sector	+ 70 mtrs
Captive miners in Eastern Sector	+80 mtrs

Source: Industry

1.2.11 National Mineral Development Corporation (NMDC) has noted that reserves were augmented by a whopping 132 million tonnes in 2005 in its mine Bailadila – Deposit 14 which would increase the life of the mine by over 45 years at the current capacity. [13] Similarly, in the case of Bailadila Deposit 5 too, greater exploratory efforts led to increase in the reserves by 187 million tonnes in 2005 to raise the life of the mine by another 43 years at the current level of capacity. [14] Discussions with the officials of the mining companies in the eastern sector have also revealed that the mineral deposits in their mines have been far greater than those estimated when the mines were taken up for development. It has been so with Sesa Goa reserves. The current estimates of reserves assessed, post buyout of the company by Vedanta, lie at about 207 million tonnes whereas the same were assessed to be only 150 million tonnes sometime ago.[15] Case studies of few mines in Eastern India have shown that there are iron ore reserves below the shale band at the depth of 35-40 meters which had been ruled out by a general

[12] Iron Ore Exports At a Crossroad, Steelworld, March 2007.
[13] Presentation made by CMD, NMDC at Metal Bulletin- Metal Junction Conference in New Delhi on 14-15 the February 2007.
[14] ibid
[15] Information informally obtained from Macquarie Research.

perception. [16] It has also been seen that due to small mine holdings, the areas between the mines have not been explored properly. This has been widely noted in Keonjhar – Bonai areas. It has been further observed that out of 505 mining leases granted so far, only 261 are operational. While some of them are being held back on environmental grounds, many others are either stuck in the process of renewal or the lease holders have not worked upon those. As more and more mining leases are operationalised, not only that the production of iron ore in the country will rise, but also that estimates of ore deposits will go up as has been witnessed almost in all cases. It has been reported in Steel Business Briefings recently that a Brazilian company has decided to open up a closed mine and to run that for another four years at an annual production of 6 million tonnes! [17]

1.2.12 The mining industry has also contended that the current assessment of iron ore resources are based on an Fe cut off of 55 per cent, that is, the deposits with iron content of less than 55 per cent have not been included for assessment of reserves or resources. This seems to be the case with haematite ores only as the bulk of the magnetite ores have low Fe – in the range of about 40 per cent.[18]

1.2.13 While estimating resources, it appears that the deposits below 50 meters or those with Fe content below 55 per cent (for haematite ores) have not been considered. The rationale for such exclusion could be correct when the iron ore prices were low and mining was carried out largely on captive basis. But continuation of the same criteria in a market driven economy where not only that the iron ore prices are higher today but also costs of mining relatively lower, may not be appropriate. [19]It is worthwhile to note that China's average Fe content in their ores is only 33 per cent and they are now planning to beneficiate ores with Fe as low as 10 per cent. Even if one considers the additional cost of Rs. 1,000 or so to make concentrates and another Rs. 800 to make pellets, the total costs of pellets will come to only about Rs. 2,000 per tonne (considering Rs. 200 towards mining costs) , that is about $50 at the current exchange rate. The 2007 international contract price of DR grade pellets was in the order of $110-120 tonne. This, in fact, was low in the pellets price cycle with the high ends touching $125-130 per tonne only recently. [20] The 2008 prices are expected to be higher by at least 35-50 per cent. [21] The price for BF grade pellets will be somewhat lower. This shows that even the low grade magnetite ores can potentially have high economic and commercial value in certain market conditions, including the current conditions.[22]

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[16] Reported by the mining industry officials during discussions with them.

[17] Steel Business Briefings, May, 2007.

[18] The Fe content of the ores of KIOCL has been told to be in the range of 38-40per cent which are beneficiated at a cost of about Rs.1,000 per tonne to make concentrates of Fe content in the range of 67-68 per cent.

[19] In Australia, 25-30 per cent Fe bearing ores are defined as low grades.

[20] Iron Ore manual 2006, Tex Reports Ltd.

[21] Credit Suisse, Goldman Sachs and Macquarie assessment, published in a series of occasional reports in 2007.

[22] Data published by the Indian Bureau of Mines do not show the Fe levels of ores in the case of magnetite, whereas the same is published in detail in the case of haematite. This made the assessment in regards to the effective resource position of iron ore difficult. It is learnt that most of the magenite ores have iron content in the range of 38-40per cent.

1.2.14 Further, since fines had no takers, exploration was halted as and when the exploration holes touched any soft or friable ore bed. There is scope to believe that size of resources can be enhanced with the possibility of exploration beyond these depths when marketability of fines improves. [23]

1.2.15 The steel industry has contended that of the 22.11 billion tonnes of total iron ore resources estimated by the IBM in 2000, only 11.425 billion tonnes are of haematite grade which are suitable for competitive steel production in the country. According to the industry, magnetite ores involve higher costs of production of steel and the areas where most of these ores are available, that is, near the western coastal areas, are ecologically sensitive. Given this characterization of the region, the Hon. Supreme Court of India has already passed strictures against mining in such areas without appropriate government clearance and in violation of the existing environmental and forest laws. Therefore, according to them, the actual resources that will be available to the steel makers in the country will be those of haematite ores mainly. Further, even for the haematite ores, the industry has contended that there are areas where environmental and other societal issues may prevent exploitation of the minerals.

1.2.16 From the technical point of view, one does not see a major problem in using magnetite ores for steel making. These are easier to beneficiate when compared to haematite ores of similar Fe content. But, given a choice between the low grade magnetite ores and high grade haematite, the preference has always been for haematite ores at the prevailing prices where the haematite grade quality premium is not reflected in the price differential. According to the mining industry, magnetite ores are being used extensively in many places and several magnetite mines are being developed in Australia with the Chinese steel industry being partners to the projects. [24] Most of the US iron ore mines have magnetite ores.[25] Thus, the issue of haematite vs. magnetite ores needs to be considered in the context of the overall domestic availability and price situation. While currently, haematite ores are used on a preferable basis, resources of magnetite ores could also prove important for future.

1.2.17 The concern about the possibility of the magnetite ores getting locked up on environmental grounds and in the process remaining inaccessible to the steel makers is a serious one. This concern can be addressed by deploying technologies that can minimize or prevent environmental damage while mining.[26] This issue is, in fact, applicable in

[23] There is a difference of opinion between the steel and the mining industries on this issue. While the steel industry contends that mining has been abandoned on techno-commercial grounds, the mining industry feels that the steel producers using captive mines and the government mining companies often have sub-optimal practices to maximize their current earnings through selective mining.

[24] Steelguru.com

[25] US Geological Survey 2007.

[26] None of such technologies have so far been engaged in India. These are to be clearly demonstrated and their costs are to be clearly ascertained to be assured that they are economical too. Mining technology in India has remained outdated by global standards due to inadequate investment in the sector. The mining industry has, however, claimed that there has been significant improvement in these technologies given the imperatives for economies of scale and cost efficiency.

other mining locations globally too. Many mines all over the world in Australia as also in Brazil are facing similar problems.

1.3 Iron Ore in the Global Context

1.3.1 As stated earlier, the global iron ore reserves stand at about 386 billion tonnes while the total resources have been estimated at over 800 billion tonnes. (**Table-3**) The longevity of these reserves/resources will depend on the growth of demand for iron ore, which in turn will be shaped by the production of iron and steel and the technology used in making steel.

1.3.2 The country-wise resource estimates reveal that the countries that apparently do not have any immediate plans for large scale steel industry development, such as Australia, various small nations in Africa and South America and even to some extent Brazil, have substantial reserves. In fact, the real resource position in case of Africa is highly underestimated as the level of exploration carried out so far is miniscule due to obvious socio-political problems there. Further, if current policies are any indication, it is unlikely that the countries rich with these resources will take conservationist postures and halt the supply of iron ore into the international market. Thus, countries that are not endowed with sufficient iron ore could continue to develop their steel industry on the basis of imported iron ore.

1.3.3 In the recent years, we have witnessed increased interest in and further attention to mining as a profitable avenue for investment. This could lead to new finds in various backward and underdeveloped areas of the world including Africa, Asia and South America. Fresh investments into the industry have been planned by large iron ore mining companies like CVRD, BHP Billiton and Rio Tinto not only to raise their production level but also to find new resources through scientific explorations. CVRD, for example, has planned to raise its iron ore mining capacity worldwide from about 300 million tonnes in 2007 to 450 million tonnes in 2011.[27] If production goes up in the same order, this incremental quantity will support additional 94 million tonnes of steel production. They have announced plans to open a closed mine to extract another 24 million tonnes of iron ore lying there, once considered uneconomical. As mentioned earlier, a Canadian company is to invest on a brand new find that is supposed to have 159 billion tonnes of iron ore. Thus, global iron ore resources position is likely to be on a rising curve and shortages of iron ore at a global level are highly unlikely.

1.3.4 Thus, there is hardly any possibility of iron ore availability becoming a constraint to further development of steel industry at the global level in the foreseeable future. In the Indian context specifically, the current estimate of iron ore resources (25 billion tonnes) could be far on the lower side considering the exploration levels attained so far, the mining practices adopted and the methodology used for estimation. Thus, a more dynamic view of resource availability becomes imperative for discussions on policy alternatives.

[27] Macquarie Research : Commodities, May 2007.

Table 3: Global Resources of Iron Ore

(Million tonnes)

Country	Resources	Fe Content	per cent of Global Resources	Total Estimated Fe in the Iron ore	per cent age share of Fe in Global Total
	Million tonnes	*per cent*	*per cent*	*Million tonnes*	*per cent*
Ukraine	**68,000**	**30**	**17.64**	**20,400**	**10.66**
Brazil	**61,000**	**67**	**15.82**	**40,870**	**21.36**
Russia	**56,000**	**55**	**14.53**	**30,800**	**16.10**
China	**46,000**	**33**	**11.93**	**15,180**	**7.93**
Australia	**40,000**	**63**	**10.38**	**25,200**	**13.17**
India	**25,000**	**55**	**6.49**	**13,750**	**7.19**
Kazakhstan	19,000	39	4.93	7,410	3.87
USA	**15,000**	**31**	**3.89**	**4,650**	**2.43**
Sweden	7,800	64	2.02	4,992	2.61
Venezuela	6,000	60	1.56	3,600	1.88
Canada	**3,900**	**64**	**1.01**	**2,496**	**1.30**
Iran	2,500	60	0.65	1,500	0.78
South Africa	**2,300**	**65**	**0.60**	**1,495**	**0.78**
Mauritania	1,500	67	0.39	1,005	0.53
Mexico	1,500	60	0.39	900	0.47
Others	30,000	57	7.78	17,100	8.94
Total	**385,500**		**100**	191,348	100.00

Source:USGS and IBM (for India)

Note: Resources are described as 'reserve base' by USGS.

Chapter - 2

2. Iron Ore Production and Trends of Investment in India

2.1 Trend and Structure of Production of Iron Ore

2.1.1 In this section, we look at the trends in production of iron ore and its classification in terms of geography, grade, type, etc. According to Indian Bureau of Mines, iron ore production in India stood at 180.9 million tonnes in the year 2006-07 growing by 9.5 per cent over the previous year. (**Table- 4**)[28]

Table 4: Iron Ore Production in India

	Unit	**2003-04**	**2004-05**	**2005-06**	**2006-07**
Lump	MillionTonnes	48.96	58.15	68.3	81.3
Fines	MillionTonnes	67.68	82.54	96.9	99.6
*Concentrates	MillionTonnes	6.20	5.25		
Total	**MillionTonnes**	**122.84**	**145. 94**	**165.23**	**180.9**
Growth Rate over previous Year	**per cent**		**18.9**	**13.2**	**9.5**

*Source: Indian Bureau of Mines and Federation of Indian Minerals Industries (FIMI) *Included in fines for 2004-05, 2005-06 and 2006-07.*

2.1.2 Four states, Chhattisgarh, Jharkhand, Karnataka and Orissa, produce bulk of the iron ore in the country. In 2005-06, Orissa remained the largest iron ore producing State, accounting for 32.2per cent of the total national production, followed by Karnataka (21.8per cent), Chhattisgarh (16per cent), Goa (15.4per cent) and Jharkhand (11.3 per cent). (**Table- 5**) The relative positions have not changed in 2006-07.

Table 5: Production of Iron Ore by States 2005-06

State	**Production of Iron Ore 2005-06 (thousand Tonnes)**	**Percent of the Total (per cent)**
Total	154436	100
Andhra Pradesh	3958	2.6
Chhattisgarh	24750	16
Goa	23744	15.4
Jharkhand	17435	11.3
Karnataka	33669	21.8
Madhya Pradesh	465	0.3
Maharashtra	517	0.3
Orissa	49880	32.3
Rajasthan	18	0.0

Source: Indian Bureau of Mines

[28] Iron ore production is estimated to have risen by about 10 per cent in 2006-07. The official figures are not yet available.

2.1.3 Iron ore mines are held in the private as well as in the public sector. About 66.6 per cent of the total iron ore mined in the country in 2006-07 came from the units in the private sector. **(Table- 6**) the share of the public sector has been falling over the years.

Table 6: Iron Ore Production by Sectors: Public and Private

Qty.: Million tonnes

Year	Public Sector	Private Sector	Total
2000-2001	43.49	37.27	80.76
2001-2002	45.10	41.13	86.23
2002-2003	49.69	49.38	99.07
2003-2004	57.54	65.30	122.84
2004-2005	57.03	88.91	145.94
2005-2006	61.22	9104	165.23
2006-07	60.4	120.5	180.9

Source: Indian Bureau of Mines, Nagpur and FIMI.
Note: p - provisional figures

2.1.4 In India, iron ore is produced by stand alone mining companies as also on a captive basis by iron and steel plants. The share of captive mines in total production of iron ore has been falling over time- from 43.4 per cent in 2002-03 to 22.4 per cent in 2005-06 to have reached 20.16 per cent in 2006-07.

2.1.5 The share of captive mines in respect of the public sector units was 38 per cent in 2005-06 , whereas that for the private sector mines, it was is 12 per cent. (**Table- 7**) What is important to note here is that 54.6 per cent of the total iron ore produced in India came from the merchant (non-captive) mines in the private sector. The figure was 49.2 per cent in the previous year, reflecting relatively faster growth of this segment.

Table 7: Iron Ore Production by Sectors: Captive vs. Non-captive

Qty.: Million tonnes

Sector	2004-05			2005-06(p)		
	Captive	Non-Captive	Total	Captive	Non-Captive	Total
Public Sector	22.53 (39.51)	34.50 (60.49)	57..03 (100)	24.19 (41.13)	34.62 (58.87)	58.81 (100)
Private Sector	12.67 (14.25)	76.24 (85.75)	88.91 (100)	10.89 (11.39)	84.74 (88.61)	95.63 (100)
Total	**35.20 (24.12)**	**110.74 (75.88)**	**145.94 (100)**	**35.08 (22.71)**	**119.36 (77.29)**	**154.44 (100)**

Source: Indian Bureau of Mines, Nagpur
Figures in parenthesis indicate the percentage contribution of captive and non-captive by public and private sectors respectively in the total production
Note: p - provisional figures

2.1.6 As discussed in the earlier Chapter, iron ore, contrary to popular perceptions, is a not a homogeneous mineral, with varying chemistry and physical properties, especially in

the context of its ferrous (Fe) content.[29] Using the detailed production statistics for 2004-05, around 37.5 per cent of iron ore production in India is of a very high Fe content of 65 per cent and above. This category has a lower fines-lumps ratio than that for total iron ore production. Nearly 43 per cent of the production comes from Fe range of 62-65 per cent wherein fines-lumps ratio is higher. (**Table- 8)**

Table 8: Production of Iron Ore by Grade (2004-05)

(Million tonnes)

Grades by Fe Content	Lumps	Fines	Concent-rate	Total	per centage Fines within Fe Grade	per centage Lumps within Fe Grade	Fines within Fe Grade as per centage of total Iron ore	Lumps within Fe Grade as per centage of total Iron ore
>65per cent	31.672	22.007		53.679	41.0	59.0	15.42	22.19
62 – 65 per cent	20.275	41.226		61.501	67.0	32.97	28.89	14.20
60-62 per cent	2.312	--		2.312	--	100.0	--	1.62
Below 62 per cent	--	16.743		16.743	100.0	--	11.73	--
Below 60 per cent	3.331	--		3.331	--	100.0	--	2.33
			5.145	5.145	--	--	--	--
Total	57.59	79.976	5.145	142.711	59.65	43.96	56.04	40.35

Based on Indian Bureau of Mines data
(Grade-wise break-up of revised figure of 145.94mt is not available)

[29] Iron ore of size more than 10 mm and up to 150 mm is being classified as **lump ore** which also includes a sub category called **Calibrated Lump Ore** (CLO) of size more than 10 mm but less than 40 mm or of size more than 6 mm and less than 30 mm. CLO is produced either by simple screening of iron ore or by adopting special crushing and screening of iron ore in order to produce CLO in bulk. Lump ores are used mainly in blast furnaces and sponge iron plants. The sponge iron plants prefer CLO with high Fe (usually above 65per cent).

Iron ore of size less than 10 mm is classified as **fines**. These are produced either in the mines itself in the mining operations or in handling of lump ores in the plants or in transit. The fines are used either in the production of sinter or pellets. Iron ore of size less than 10 mm and ultra fines (- 100 mesh) in the size range of 0.1 mm to 10 mm are utilized as sinter feeds. The ores of size less than 100 mesh obtained either by grinding of high grade fines to less than 100 mesh or by beneficiating low grade ores/fines followed by grinding to less than 100 mesh are utilized as pellet feed fines. Pellet feed fines of 64 per cent and above Fe are used for making BF grade pellets and those above 67per cent Fe are used to make DR grade pellets.

There is another sub-category of fines called **slimes**, less than 100 mesh in size, produced during washing of iron ores. These are mainly rejects and wastes. They are generally low to medium grade in terms of Fe content and are impounded in the tailing ponds near the mines. These slimes can be used for pelletisation.

2.1.7 Due to variations in the specific quality of ores and also perhaps due to operating practices, the share of lumps in total iron ore varies from state to state and mine to mine. It can be seen from **Table – 9** that while the lumps account for nearly 56-59 per cent of the iron ore produced in Orissa, the same ranges between 17-19 per cent in the case of Goa (concentrates excluded) and 28-34 per cent for Karnataka. This is an important observation in the context of an export policy for iron ore as exportability of fines will vary widely across states and a common national policy may not work well for all the states in the same way.

Table 9: State-Wise Production: Ratio of Lumps, Fines and Concentrates

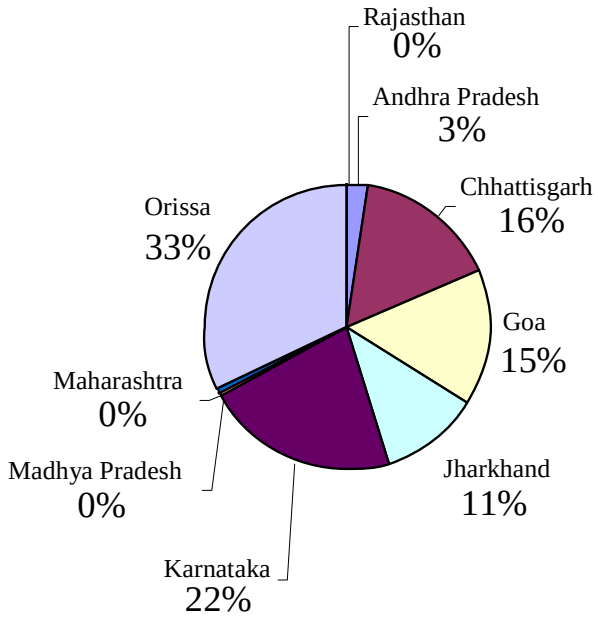
Quantity : '000 tonnes

	2003-04				**2004-05**				**2005-06(p)**			
	Lumps	*Fines*	*Conc.*	***Total***	*Lumps*	*Fines*	*Conc.*	***Total***	*Lumps*	*Fines*	*Conc.*	***Total***
Chhattisgarh	10707 (46)	12654 (54)	----	**23361 (100)**	10342 (45)	12776 (55)	----	**23118 (100)**	12055 (46)	14029 (54)	----	**26084**
Goa	3891 (19)	15246 (75)	1109 (6)	**20246 (100)**	4243 (19)	17526 (77)	903 (4)	**22672 (100)**	4921 (20)	19106 (80)	----	**24027**
Jharkhand	6486 (44)	8196 (56)	----	**14682 (100)**	7538 (45)	9181 (55)	----	**16719 (100)**	7102 (40)	10873 (60)	----	**17975**
Karnataka	8902 (28)	17643 (56)	5090 (16)	**31635 (100)**	12288 (32)	21324 (56)	4350 (12)	**37962 (100)**	14006 (35)	25837 (65)	----	**39843**
Orissa	18573 (59)	12715 (41)	----	**31288 (100)**	22884 (55)	18866 (45)	----	**41750 (100)**	28868 (55)	23283 (45)	----	**52151**
Others	401 (25)	1225 ((75)	----	**1626 (100)**	857 (23)	2864 (77)	----	**3721 (100)**	1360 (26)	3790 (74)	----	**5150**
ALL INDIA TOTAL	48960 (40)	67679 (55)	6199 (5)	**122838 (100)**	58152 (40)	82537 (56)	5253 (4)	**145942 (100)**	68312 (41)	96918 (59)	----	**165230**

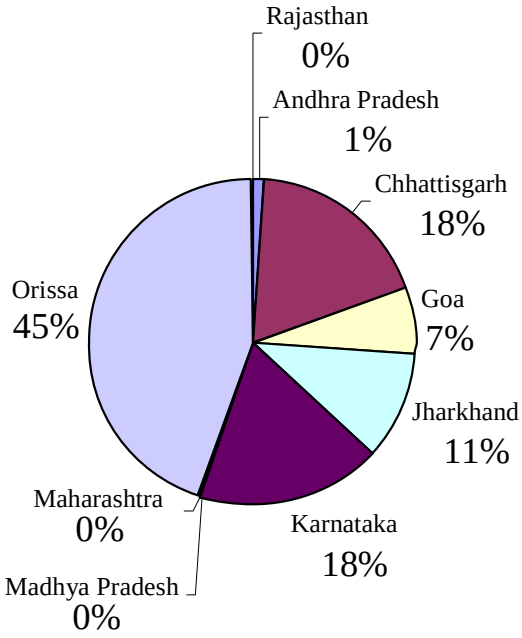
Source: Indian Bureau of Mines, Nagpur and FIMI
Figures in paranthesis indicate the per centage contribution of lumps, fines and concentrates respectively in the total production
Note: p - provisional figures

2.1.8 The geographical distribution of high-grade iron ore is highly concentrated. While 65.5per cent of the total iron ore production is accounted for by four districts only– Keonjhar (Orissa), Bellary (Karnataka), Singbhum West (Jharkhand) and Dantewada (Chhattisgarh), their combined share comes to about 96-97per cent of the total 65 + Fe grade and 60-62 per cent of 62-65 per cent Fe grade. This shows that high quality ores are available only from a few mining areas.

Production of Iron Ore by States

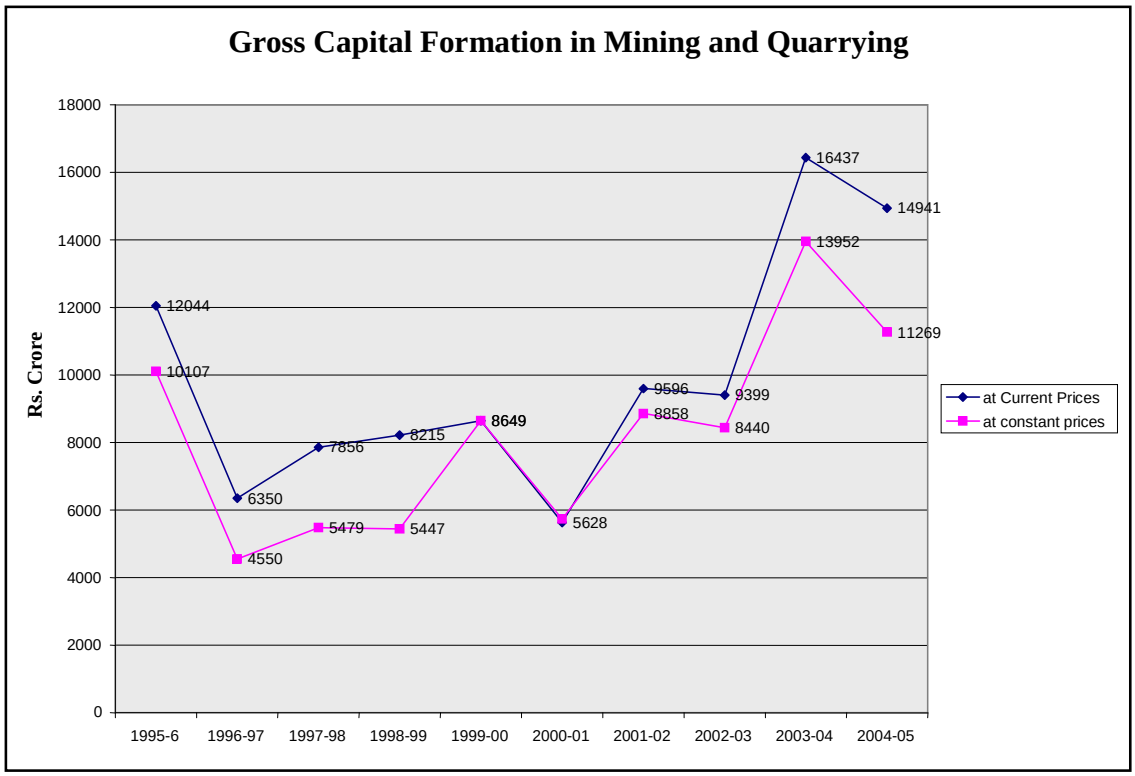


Production of Lumps by States



2.2 Investment in Mining

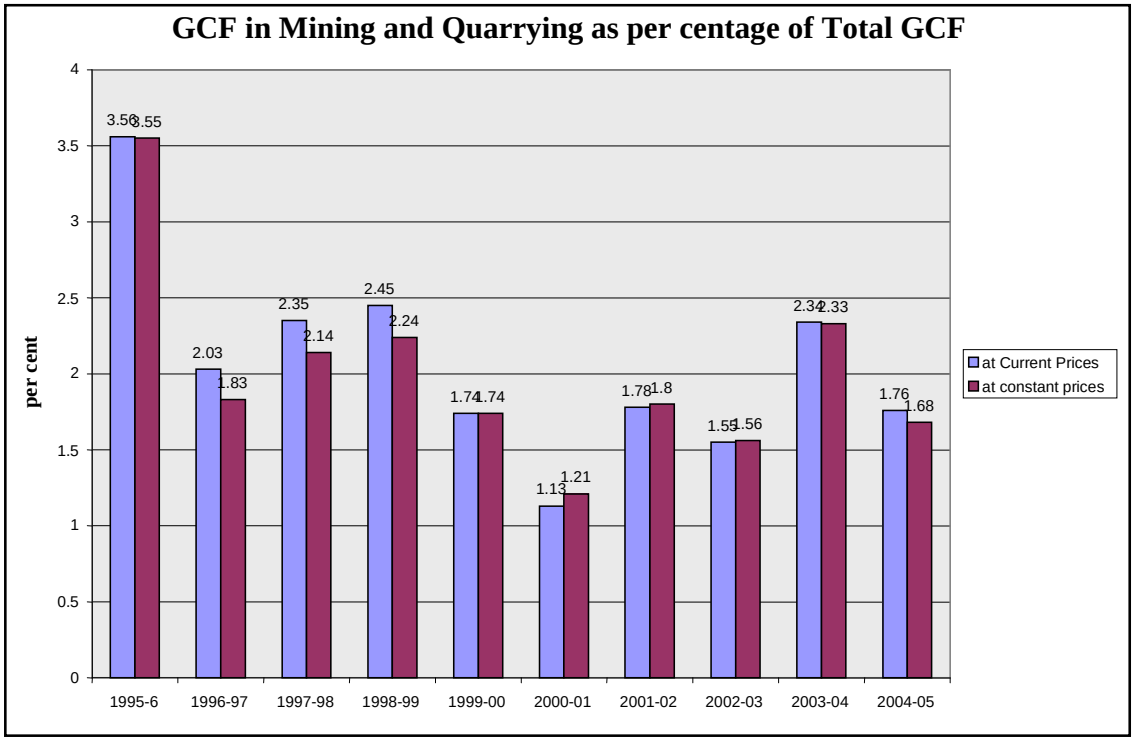
2.2.1 Mining and quarrying has not attracted sufficient investor attention in India so far. In last couple of years, there has been some increase in gross capital formation in the mining sector, which could be linked to the improvement of mineral prices. It may also be noted that the data available is for the mining and quarrying sector as a whole. It is quite likely that the bulk of the capital formation has happened in coal, while iron ore mining has not attracted much investment so far.



Source: CMIE

2.2.2 If one looks at the developmental efforts during all the previous plan periods, iron ore seems to have received very little attention in terms of priority development efforts. [30] Even in the recent period, during 2001-02 and 2005-06, out of the 1,952 total mining leases granted by the government, only 28 were for iron ore. [31] In terms of area, out of 40,944 hactares, iron ore mining leases were granted only for 892 hactares. [32] Bulk of the granted leases came in the year 2005-06 only. In terms of actual execution of the leases, the number for iron ore leases was even lower at 18.

[30] Report of the Working Group on Minerals, op. cit.
[31] Ibid. Annexure-IV-7.
[32] Ibid.



Source: CMIE

2.2.3 Lack of investment in iron ore mining can be attributed partly to a long spell of low iron ore prices worldwide. (**Table- 10** and Chart below) During 1987-2002, i.e. a span of fifteen years, iron ore fines prices increased only 14.63per cent. It was only during 2002-2007 that the prices increased by a huge 184.4per cent in five years. Even the global seaborne trade in iron ore increased only 23per cent during 1996-2002, while the same jumped 35.34 per cent in the next three years.[33] Prospects of iron ore were also under cloud due to stagnation of the steel industry the world over and the low profitability in it due to constant pressure on prices resulting from excess capacity.[34] In India, non-captive iron ore market was small and with export prices not so attractive either, there were little incentives to invest. Most of the mining interests in the country were focused on deposits already well prospected and assessed. The Indian government owned exploration agencies like GSI and MECL were focused more on the coal sector. It has been assessed by the mining industry that a mere investment of only Rs. 500 crore in the last decade in coal exploration led to an increased proven reserves of 50 billion tonnes.

[33] Iron Ore Manual 2006, Tex Report Ltd.

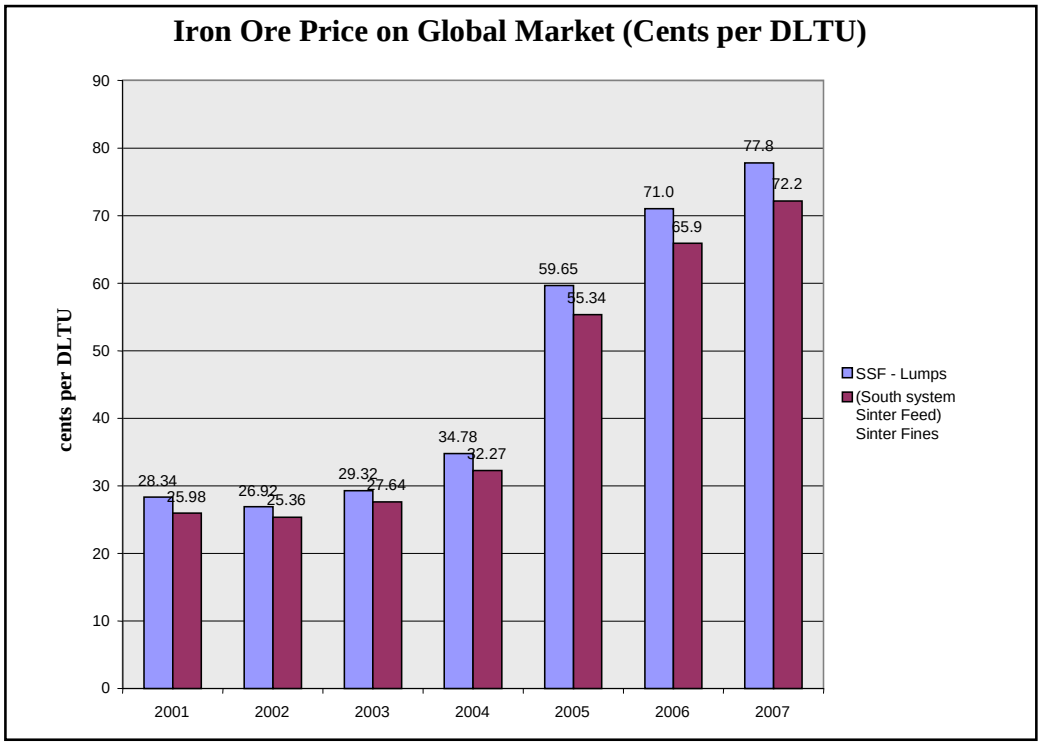
[34] Statistics published by the International Iron and Steel Institute, Brussels, for steel production figures (published on their website www.worldsteel.org. For price trends, Metal Bulletin, various issues or their website www.metalbulletin.com.

Table 10: Global Iron Ore Contract Prices

Unit: Cents\DLTU, FOB

		2001	2002	2003	2004	2005	2006	2007
Brazil	SSF - Lumps	28.34	26.92	29.32	34.78	59.65	71.0	77.8
	(South system Sinter Feed) Sinter Fines	25.98	25.36	27.64	32.27	55.34	65.9	72.2
	SFCJ (Carajas Fines)	26.48	25.86	28.18	32.76	56.18	66.9	73.3
	MBR (Lumps)	28.15	26.74	29.32	34.78	59.65	71.0	77.8
India	Bailadila (Lumps)	36.87	35.03	38.15	45.25	77.6	92.4	101.2
	Bailadila (Fines)	27.82	27.15	29.59	35.1	60.2	71.7	78.5
	Donimalai (Fines)	-	-	-	-	74.9	89.2	97.7
		26.43	25.8	28.12	33.36	60.2	71.7	78.5
	Basic Grade Lumps	34.13	33.15	36.1	42.82	73.44	87.5	95.8
	High Grade Fines	35.9	34.81	37.91	44.97	77.12	91.8	100.6
	Paradeep Lumps	30.51	29.72	33.91	40.22	68.98	82.2	90.0

Source: Iron Ore Manual 2006, Tex Reports



2.2.4 Low world or domestic prices of iron ore also led to abandonment of mines (once the costs of extraction increased due to increases in mining depth or drop in the quality of the ores) and then shifting to new mines. This led to waste of deposits in the working mines.[35]

2.2.5 It is only after the China-triggered boom in global iron ore market that huge opportunities came the way of the Indian merchant miners. This led to some improvement in investment and production. But still, bulk of the additional production came from the existing mines which were running at much lower and rather inefficient levels of capacity utilization earlier.

2.2.6 Investment in such activities as iron ore mining also needs corresponding investment in transport and logistics infrastructure. The mining capacity can be developed at a relatively quick pace, but, infrastructure development takes a lot of time. With infrastructure development remaining largely a government responsibility, effective mining capacity enhancement has been low so far. Given the government's increased focus on developing transport infrastructure, especially in the roads and railways sectors, mining capacity development is expected to gain pace.

2.2.7 The other major constraint seen in raising greenfield iron ore capacity with fresh investment is the fact that many of the major mines are now under legal battles over leasing rights. Some of them pertain also to the disputes arising out of certain State government decisions to transfer the leases to some other parties. Such legal battles in many cases are expected to be long drawn if the prior experiences in India are any indication.

2.2.8 Investment in iron ore exploration and mining is essential to realize the full potential of India's rich iron ore resources. In the past, factors such as infrastructure constraints, depressed prices and delays in clearances had adversely affected the pace of investments in this sector. However, with the global boom in the market and the resultant increase in investor interest, there is a potential to raise the level of investment provided the policy and regulatory environment is considered conducive by investors.

[35] Reported by the mining industry and confirmed by various experts on the subject.

Chapter - 3

3. Domestic Consumption of Iron Ore

3.1 Iron Ore Consumption by User Industries

3.1.1 The iron and steel producers account for about 98 per cent of the iron ore consumed in the country with about 80 per cent going to independent pig iron and integrated steel units and 18 per cent to the sponge iron industry. The nature of specific demand for iron ore is dynamically driven based on technology in steel/iron making. For example, in India, demand for lump ore has grown strongly in the past few years due to a very rapid growth in the sponge iron industry.

3.1.2 The total domestic consumption of iron ore was estimated to be about 35.63 million tonnes in 2000-01. The current position does not seem to be very clear with several numbers being seen. There are in fact more than one figures seen even in the official estimates which vary from source to source. The most commonly cited number is 65 million tonnes. This is based on the balance left after exports at given level of production and stock. However, it appears that the estimates of consumption of iron ore in the country are on the lower side. Even if one leaves aside the almost certain case of under-reporting of steel and sponge iron production in the country, the data collected from various steel producers and the estimates made on the basis of technical norms suggest that iron ore consumption figures should have been much larger than what the IBM or any other official agency puts those to be. It can be seen that as per these estimates, the total iron ore consumption in the country was about 78 million tonnes with 37 million tonnes being accounted for by lumps and 41 million tonnes by fines. **(Table- 11)** If the un-reported sponge iron production figures are to be considered, the actual lump consumption will be even higher. Iron ore used by the sponge iron units, especially in the unorganized sector, are all lumps. Considering the associated fines for this lumps consumption, the actual fines availability in the country should have been even higher. This issue is discussed further subsequently.

Table 11: Consumption of Iron Ore: 2005-06 - Industry Estimates

(Figures in Million tonnes)

Producer/Sector	Lumps	Fines	Total
Consumption : Tata Steel	3.02	5.47	8.49
Consumption : SAIL	7.2	16.8	24
Consumption : Essar	1.34	3.06	4.4
Consumption : Ispat	1.97	1.89	3.86
Consumption : JSW	0.97	3.7	4.67

Producer/Sector	Lumps	Fines	Total
Consumption : DRI	11.52	0	11.52
Consumption : Other Pig iron/MBF	7.552	1.8	9.352
Consumption : RINL	2.18	4.01	6.19
Consumption in Other Areas including pellets for exports	1.5	4	5.5
Total Consumption	**37.252**	40.73	77.982

Source: Report of Economic Research unit, JPC, Ministry of Steel.
Sources : Either taken from the company directly (or estimated from the known production of crude steel and assuming established technical norms of consumption). Pellets have been consumed by the DRI industry as well but in very small quantities. However, since the exact proportion of that was not known, the figure has been not been shown separately and is included in lumps.

3.2 Iron Ore Consumption by its Form

3.2.1 Iron ore is consumed either in the form of lumps directly or as agglomerates. Agglomerates can be either pellets or sinters. There are newer agglomerate products like iron nuggets, which are yet to be ready for commercial usage.

3.2.2 Lumps are consumed in the blast furnaces, sponge iron plants and Corex plants with or without agglomerates. Normally, except for coal based DRI plants in India, in all other operations of iron making, lumps are used along with agglomerates like sinters or pellets.

3.2.3 Fines are used in the making of sinters or pellets. There are now technologies, such as Finex, in the development stages where fines will find direct use. Sinters are used in the blast furnaces only, whereas pellets can be used anywhere.[36]

3.2.4 What is interesting to note from **Table – 11** is the fact that the percentage of lumps in total consumption of iron ore is much larger in India by global standards. As per information available from expert agencies, the percentage of lumps in the total consumption of iron ore are 20 per cent for China, 15 per cent for Europe, 15 per cent for the CIS countries, 10 per cent for North America, 20 per cent for South America with the global average being only 18 per cent.[37] In fact, the figures are projected to fall to 16 per cent in China, 11per cent in Europe, 15per cent in the CIS, 6per cent in North America, 12per cent in South America with the global average of 15per cent to be reached by 2015. The comparative Indian figure at 47per cent plus is fairly high.

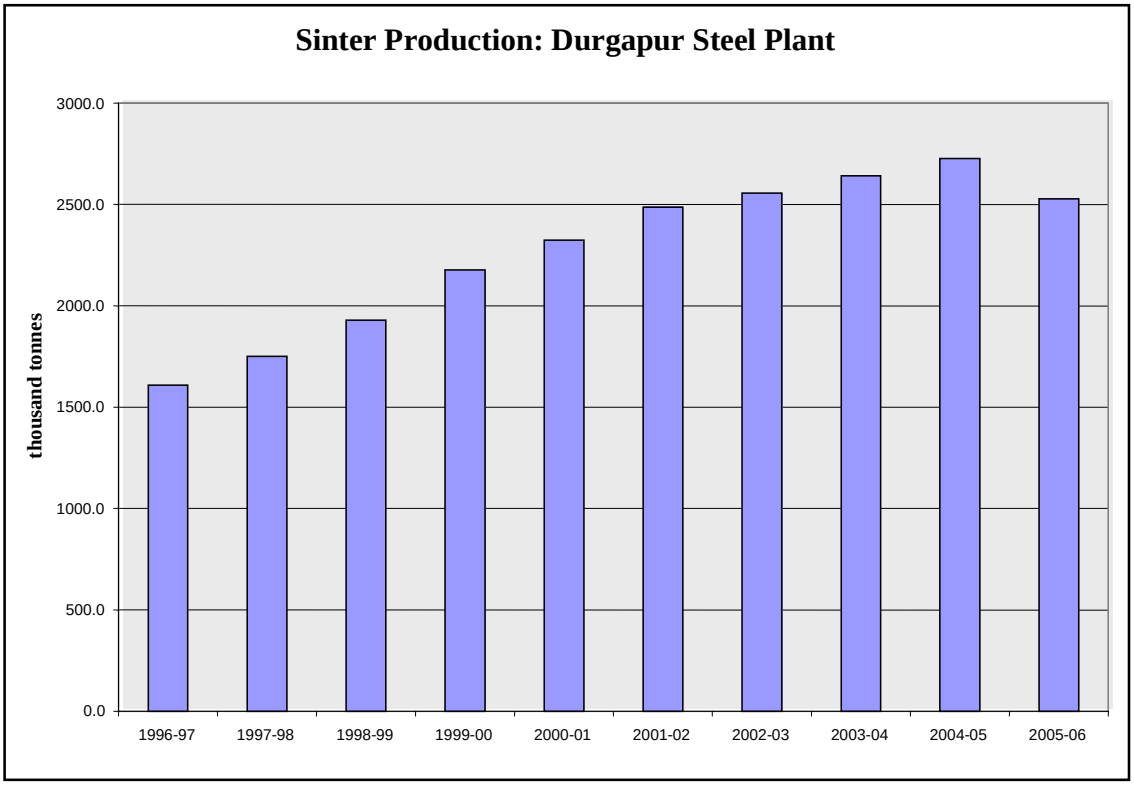
3.2.5 The total sintering capacity in the country is estimated to be about 41 million tonnes. (**Annexure-1**)[38] In addition, the country has about 18 million tonnes of pelletising capacity.[39] Utilisation of capacity in the sintering and pelletising plants has been lower compared to the iron making facilities in the country. In the year 2005-06, the total production of agglomerates (sinter +pellets) remained only at 42.8 million tones, of

[36] The pellets for blast furnaces and sponge iron making are not the same nevertheless.
[37] Tex Report : Iron Ore Manual 2005
[38] Ministry of Steel
[39] Ministry of Steel, based on data collected from the industry.

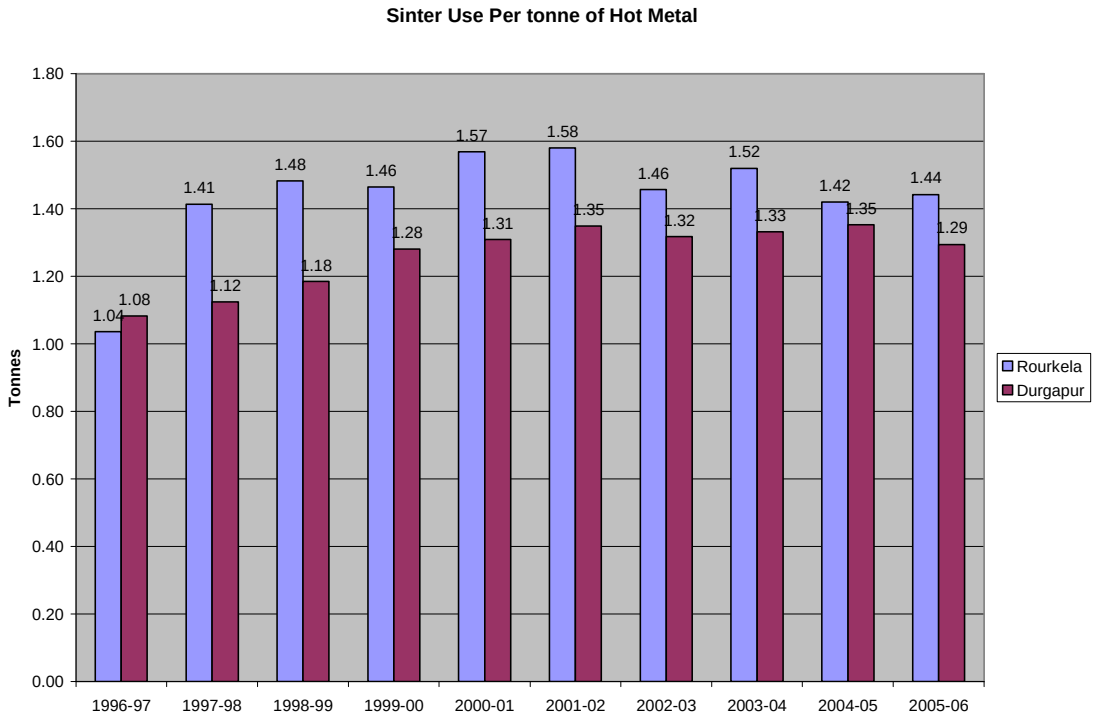
which 31.3 million tonnes were accounted for sinter and the rest by pellets (11.5 million tonnes). Some of these capacities are new and are yet to reach stabilization and full capacity utilization levels. Therefore, the requirement of iron ore fines falls short of the current production level of iron ore fines in the country. In this context, the report of Working Group on Steel Industry for Eleventh Five Year Plan (2007-12) submitted in December, 2006 observes:

> *"Bulk of the export of iron ore is in the form of fines (over 80per cent in 2004-05) for which adequate sintering or pelletisation capacities do not exist in the country. Such capacity has to be built up through appropriate fiscal incentives. The steel makers will also have to take necessary initiatives to reduce lump ore consumption and change the iron ore consumption mix with adequate technological changes by higher utilization of fines through sintering. It will be necessary for the Indian steel producers to make larger use of fines and concentrates instead of remaining over dependent on lumps. The current sinter and pellets usage in the Indian plants is lower than those in the best of the plants abroad. Higher sinter and pellets use will help the industry reduce costs as also make use of the fines generated in mining iron ore."(para 2.3.9 – page 50)*

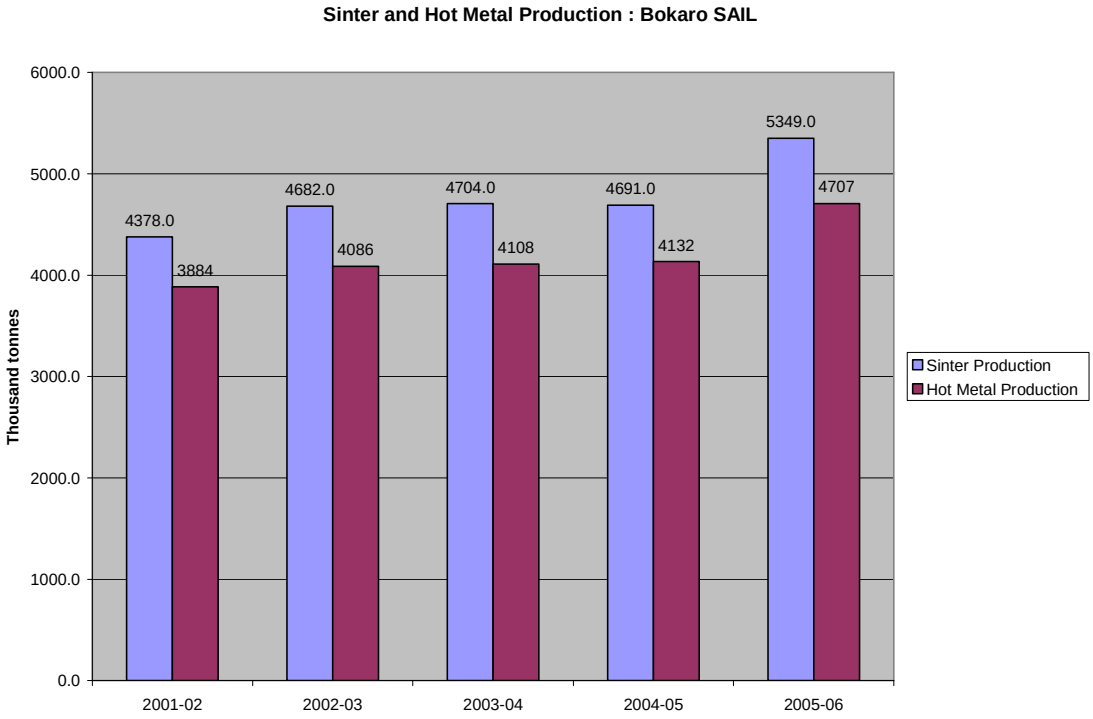
3.2.6 The sinter use in the ore burden is increasing over time, although slowly for the SAIL plants with captive mines, and more changes are expected with the modernization of the plants. The new generation plants have started with technologies that enable higher use of sinter or pellets. Some of the smaller players have also set up smaller sinter plants and more such plants are under construction.



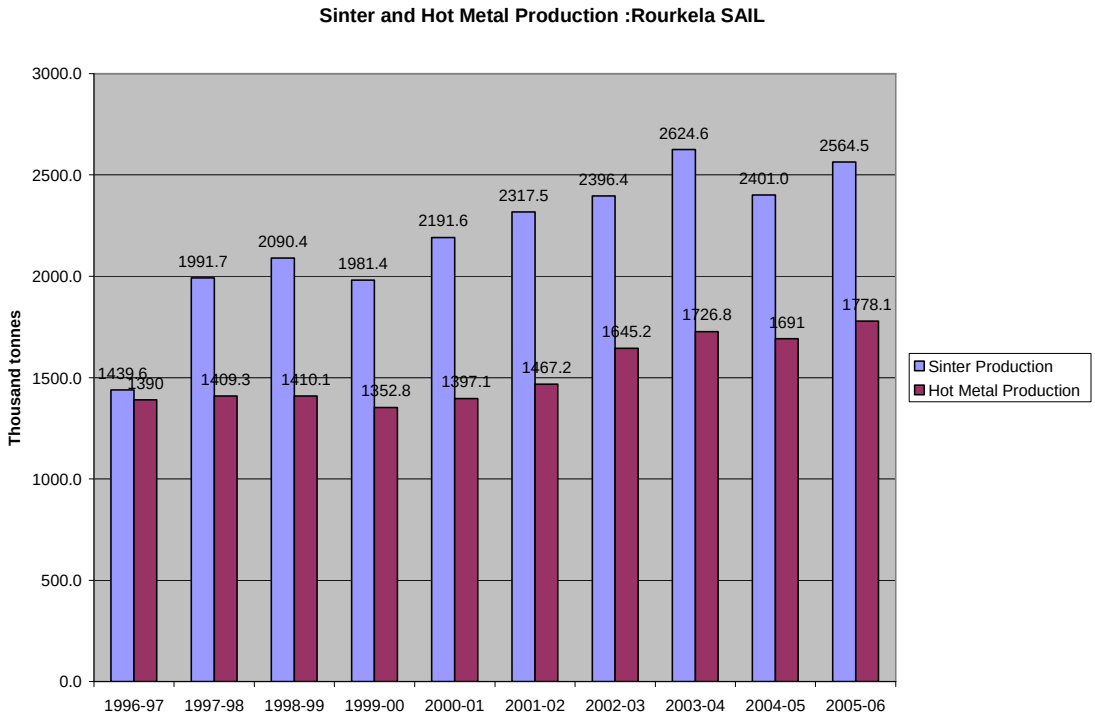
Source: Operational Statisitics, Durgapur Steel Plant, 2005-6



Source: Operational Statistics, 2005-06 of the respective plants.



Source: Operational Statistics, Bokaro Steel Plant.



Source: Operational Statistics: Rourkela Steel Plant, 2005-06

3.2.7 At present, several steel plants are using a mix of pellets and sinter to replace lump ores. Pellet sinter mix at times constitutes nearly 100 per cent of the BF feed in specific cases (only DRI and not integrated steel plants). This choice is based on pure economics of operation that takes into account the price relatives between fines, pellets and lumps and efficiency gains in blast furnace operation. Since the existing price configuration supports higher use of sinter, the steel makers in China, East Asia including Japan, South America and Europe have favoured sinter. In North America, pellets are being used extensively – up to 70 per cent of the BF feed. The same is fairly high in the CIS (45 %) and Europe (30%). By 2015, pellets are expected to take increasing share in the total BF feed with the global average coming to about 30 per cent.[40] The same trend could be expected in India too, due mainly to environmental concerns about sinter plants, availability of fines in surplus and easier transportation of pellets produced at the mine head.

3.2.8 In the small and medium sector, there are many (218 of them are reportedly in operation, with the figure expected to touch 300 soon) coal based sponge iron plant and they are almost totally dependent on lump ore. [41]

3.2.9 As seen from above, the nature of demand for iron ore varies across producers. For example, while the traditional blast furnace based steel plants may need a mix of fines (as

[40] Various Tex Reports and Conference Papers
[41] Joint Plant Committee and Sponge Iron Manufacturers Association

sinter feed or pellets) and lumps, the DRI units depend largely on lumps and to some extent on pellets depending on the specific economics involved. Importantly, the iron ore lumps (as also pellets) required by the DRI units are to be of high grade (preferably with Fe content above 65per cent).

3.2.10 An estimation undertaken from the data available from industry sources suggests that the existing agglomeration capacity (sintering and pelletising) falls short in the South and the East. The estimated production of fines (in 2005-06) in the Eastern region (Orissa and Jharkhand) stood at about 32.86 million tonnes while the total agglomeration capacity was 21 million tonnes. The actual production of agglomerates stood lower at 16.424 million tonnes. This is the region dominated by major plants of SAIL (Bokaro, Durgapur, Rourkela and IISCO) and Tata Steel with captive mines. Similarly, in the other major iron ore exporting region, South-West (Chhattisgarh, Goa and Karnataka only), the total production of fines stood at 55.202 million tonnes, when the agglomeration capacity was only at 30 million tonnes (includes the plants in Andhra Pradesh and Maharashtra). The actual production of pellets and sinter in the year was 25.4 million tones.

3.2.11 One can see from above that there were huge gaps between the production of fines and agglomerates in both the East and the South West regions of the country. The gaps leave no other option but to export fines from these regions for the time being.

3.2.12 A large chunk of the high grade haematite ores is being used by the small sponge iron units, some of which are linked further with captive steel making through induction furnaces. It is being widely held and also pointed out in a recent study conducted by a consultancy firm that the actual production of sponge iron in the country is about 16 million tonnes (as in 2005-06) against the official records of about 11.5 million tonnes.[42] These units not only take away the best of the lump ores but also run inefficiently. Discussions with the industry experts as also the data available from the steel industry have shown that there is significant loss of materials in transit, in- plant storage or operation. For a better utilization of resources, it is imperative that the product be sold at its market value.

[42] IDS study for International Iron and Steel Institute, Brussels. Quoted by a concerned industry expert. Even the Ministry of Steel has now accepted 16 million tonnes as the capacity in the sector.

Chapter – 4

4. Exports of iron ore

4.1 Trends and Structure of Exports of Iron Ore

4.1.1 The policy debate on iron ore has mainly focused on the rising trend of exports of iron ore from India. Exports of iron ore from India have reached 93 million tonnes in 2006-07 rising from about 48 million tonnes in 2001-02.[43] (**Table- 12**)

Table 12: Export of Iron Ore from India

Year	Production (Mill tonnes)	Domestic Consumption (Mill tonnes)	Exports (Mill tonnes)	Exports Ratio (per cent)
2001-02	**86.22**	**41.36**	**41.64**	**48.29**
2002-03	**99.07**	**40.94**	**48.02**	**48.47**
2003-04	**122.83**	**44.97**	**62.57**	**50.94**
2004-05	**145.94**	**48.15**	**78.15**	**53.55**
2005-06	**165.23**	**52.52**	**89.28**	**54**
2006-07	**180.9**	**56.28**	**93**	**51.4**

Source: GMOEA, KIOCL, MMTC, private exporters and IBM

4.1.2 The preliminary reports indicate that exports were at about 93 million tonnes in 2006-07 against an expected 100 million tonnes.[44] The exports are likely to drop by about 5 million tonnes in 2007-08, as per preliminary reports based on the export trends till October 2007 and in view of infrastructure constraints at the ports and lower demand for iron ore from China.

[43] The figure excludes pellets.
[44] Bloomberg news, quoting FIMI.

Table 13: India's Port-Wise Iron Ore Export

(In Lac tons)

Port	2004-05	2005-06	2006-07 (P)
Belekeri	8.0	12.60	41.22
Chennai	95.45	82.60	103.50
Ennore	5.07	5.49	17.19
Goa	314.20	362.71	405.37
Haldia	49.66	79.50	78.49
Hazira	--	-	3.15
Kakinada	8.89	35.10	38.13
Karwar	24.00	16.90	14.90
Krishnapatnam	--	--	5.50
Mumbai Floating	0.40	1.04	--
New Mangalore	93.96	88.53	52.40
Paradeep	90.50	102.70	119.48
Redi Port	4.75	8.10	4.30
Vizag	86.50	97.50	54.27
Total	**781.45**	**892.77**	**937.90**

Source: GMOEA, KIOCL, MMTC and Private exporters. Actual export figures may vary from those cited above to some extent.

4.1.3 Table- **12** shows that the ratio of exports to domestic production rose continuously till 2005-06. A decline was noted in 2006-07 and the trend is likely to continue in 2007-08. India's share in global seaborne trade also increased from 7.44 per cent in 1996 to 13.76 per cent in 2005. This figure dropped in 2006 and is likely to go down further in 2007. These observations remain at the core of the questions raised on the desirability and sustainability of iron ore exports at the current or increased rate.

4.1.4 The above ratios are based on official estimates of domestic iron ore production and consumption. However, as discussed in the previous chapter, the actual iron ore consumption in the country, even on a conservative basis, should be higher than reported. This means, the domestic production is also proportionately higher. If such adjustments are accommodated, the actual export ratios will be found to be lower than those officially reported.

4.1.5 In 2004-05, exports constituted 37.5 per cent of the total high grade iron ore production in the country, high grade being defined as those having Fe content above 65 per cent. [45] For medium grade, the corresponding figure is 56 per cent and for low grades it was 106 per cent. Of the total exports of 78 million tonnes, high grades constituted only

[45] It is important to note that Indian iron ore especially from the Orissa sector has high alumina content and with adverse alumina silica ratio reduce their quality parameters in global comparison. This is one of the reasons for which POSCO has sought exchange of low Fe but low alumina ores from Brazil or other sources with equivalent ores from India.

25.8 per cent, with medium and lower grades making for 43.8 per cent and 30.4 per cent respectively. (**Table- 14**) As per the existing policy, the ores of 64 per cent plus Fe are to be exported through a canalizing agency and, therefore, the entire high grade ores should have been exported by a government owned canalising agency. A good portion of that, about 3.5 million tonnes, was under contractual agreement and was exported directly by the government owned companies. It, therefore, appears that merchant exports involved mainly and largely medium and low grade ores with Fe content below 64 per cent.

Table 14: Production and Exports of Iron Ore by Grades (2004-05)

(Million tonnes)

	Production	**Production**	**Production**	**Export**	**per cent of production exported**
Grade	Lump	Fines	Total		
High Grade (+65%)	31.672 (59%)	22.007 (41%)	53.679	20.15	37.50
Medium Grade (62-65%)	20.275 (32.97%)	41.226 (67%)	61.501	34.23	55.66
Low Grade (-62%)	5.643 (74.79%)	16.743 (25.2%)	22.386	23.77	106.2
Concentrates			5.145		
Total	57.59 (40%)	79.976 (60%)	142.7	78.15	55

Source: Indian Bureau of Mines

4.1.6 About 70 per cent of the total medium grade fines production were exported from the Eastern region (covering mainly the states of Orissa and Jharkhand). From Goa, exports of fines stood at about 157 per cent of the total production. This situation of exports exceeding the total production in the state, was mainly due to exports of mine head stocks of the previous years and exports of ores mixed and enriched with the ores from the state of Karnataka. [46] The corresponding figures for Chhattisgarh/ Bailadila was 3.1 per cent and for Bellary Hospet 56.3 per cent. The figure was 82.2 per cent at the national level.

4.2 Issues Regarding Future Exports of Iron Ore

4.2.1 One key question is whether the rising trend in export of iron ore from India is sustainable. Iron ore exports from India in the future years will depend on a few critical factors. The foremost among them is the quantum of demand from China, which in turn will depend on the country's steel industry growth and the preference accorded to Indian

[46] The steel industry has pointed out that due to the possible mixing of Karnataka origin iron ore with Goa ores, the exports of ores from Karnataka has been underestimated, which in reality is much higher than reported.

iron ore by them. While it appears that iron ore demand from China will continue to be strong and rising in absolute terms for at least some more years, how much of that rising market will be left for the Indian iron ore mining industry will depend on a number of independent as also inter-related factors. One, the ability of Indian mining industry to expand operations to increase access to the country's iron ore reserves. This, in turn, will depend on the profitability in the industry and policy certainty available to the mining industry. Two, the rate of growth of domestic demand for iron ore, which again is a function of the growth of the iron and steel industry in the country. Three, how quickly will the policy scenario (mineral policy) change to draw more investment into the mining industry and infrastructure. Four, willingness as also the compulsions on the part of the Chinese steel makers to buy the relatively high cost Indian ores.[47]

4.2.2 Many expert agencies have remained cautious on the ability of Indian miners to raise exports substantially to China. The Australian Commodities Report (of Australian Bureau of Agricultural and Resource Economics) has noted that with increased consolidation in the Chinese steel industry, the steel makers will gradually move away from the spot to the long term contract market. Currently the Indian iron ore is sold largely on the spot basis for the small and medium size players.[48] With high degree of fragmentation and regulations, Indian miners may find it difficult to enter long term contracts with Chinese buyers. The report goes on to say, "The comparatively fragmented nature of China's steel industry has supported imports of Indian iron ore, despite the cost of the ore being above those sourced from Brazil or Australia. Given that the Chinese steel industry is likely to remain comparatively fragmented into the medium term, and inability or unwillingness of alternate iron ore suppliers to substitute their iron ore for Indian exported iron ore, demand from China for Indian ore is expected to remain strong in the medium term." [49]

4.2.3 The studies conducted by Australian Bureau of Agricultural and Resource Economics (ABARE) have forecast that the iron ore production in India can grow only at about 6.5 per cent annually to reach about 250 million tonnes by 2012. [50]The report says that if Indian government removes or significantly reduces the impediments to greenfield iron ore expansions, the future iron ore production growth in India could rise faster.[51] The report, however, forecasts iron ore exports from India to grow annually only at about 4.6 per cent a year.[52]

4.2.4 India's iron ore export potential to China will also depend on the relative competitiveness of Indian iron ore exporters vis-à-vis suppliers from Australia and Brazil. The country-wise trend of imports of iron ore into China (**Annexure- 2)** shows that iron ore exports to China increased by 13.1 per cent from Australia in 2006 over the previous year. The corresponding figures for Brazil, India and South Africa were 39.6 per cent, 9

[47] When compared with the contract prices with Australia and Brazil.
[48] Australian Commodities, Vol 13, No. 3, September 2006.
[49] Ibid.
[50] Ibid and also Vol. 14, March 2007
[51] Ibid
[52] Ibid

per cent and 19 per cent respectively. There was also a record of a significant fall in the share of Indian origin ores in the total imports of China. It is interesting to see from the data that China has significantly diversified its iron ore sourcing as more and more ores are being imported from relatively smaller source countries like Peru, Kazakhstan, Iran, Venezuela, Philippines, Vietnam, Chile, , Ukraine and even Canada and Russia. Imports from many of these countries are in the agglomerated form (pellets).

4.2.5 It is difficult to predict how exports of iron ore will grow over time from individual major countries like Brazil and Australia, since a lot will depend not only on the market conditions but also on the business plans put in place by the iron ore majors in these countries. Based on a detailed study, ABARE has forecast that iron ore exports from Australia will rise to 410 million tonnes by 2012, rising sharply from 249 million tonnes in 2006. [53] Similarly, Brazil's exports are expected to rise to 354 million tonnes by 2012 rising sharply from 247 million tonnes in 2006. The global iron ore trade is being forecast to grow to from an estimated 780 million tonnes to 1107 million tonnes by 2012. [54] In this trade volume, Brazil and Australia will together have a share of 69 per cent. The forecasts of exports from Brazil may need an upward review, considering the latest plans of the Brazilian iron ore behemoth CVRD. These projections suggest that Indian iron ore companies could find it difficult to retain their current share in a Chinese market that will be more competitive and far less attractive. If all the long term contracts signed and investment proposed by Chinese steel companies in several iron ore rich countries materialize, as planned, there will definitely be a reduction in the share of Indian iron ore in Chinese consumption or imports.

4.2.6 Besides the above industry risks, there is an economic risk of slowdown. China's government has taken several fiscal and monetary measures to ease the country's growth. Possibility of an imminent global economic slowdown can also not be ruled out. If there is a hard landing of the Chinese economy, their industrial production and infrastructure spending could drop sharply, adversely affecting steel consumption growth trends. In response, if capacity expansion plans in the steel industry take a knock, iron ore demand will follow the same trend. Thus, there is no certainty about continuation of the robust trend in iron ore exports to China and one cannot simply extrapolate the current trends in this regard.

4.2.7 Looking at the cost side, there is a strong possibility of iron ore mining costs for stand-alone mining companies rising more than proportionately, given the fact that to raise mining capacity from now on will involve significant investment. Infrastructure in the iron ore bearing states is also far from the desired level of development.[55] Infrastructure development will call for sizeable investments and State governments could pass on a part of the burden to the miners in the form of development cess and duties. The state government of Orissa, for example, has proposed more than one local development tax, which have been challenged by the mining industry. Such burden,

[53] Ibid
[54] Ibid
[55] Report of the Working Group on Minerals for 11th Five Year Plan, 2007

along with the current export tax and appreciating rupee could seriously affect the competitive positioning of the iron ore industry. (See ***Appendix- A*** for a comprehensive list of taxes, duties, levies on iron ore at different stages of its business)

4.2.8 The export tax on iron ore has not been responsible for the near stagnation in exports experienced currently. The current level is not significantly large to upset the businesses between the Chinese buyers and the Indian exporters. However, this can happen if the exports taxes are raised and that too at a time when the global prices do not rise proportionately. The current business levels are also protected by the fact that in the spot market, the Chinese buyers will not immediately find alternative sourcing. They will perhaps be ready to bear part of the tax burden to continue with the supply to the extent possible. However, in the longer term, once the iron ore supplies increase from other countries where mining capacity development is taking pace and the ocean freight market gains stability, the Indian iron ore will could find it difficult to compete burdened with significant export tax. .

4.2.9 It may be noted that the merchant iron ore mining companies are also significant suppliers of iron ore to the domestic market. If the export avenue is closed, the resultant oversupply (or overcapacity) in the domestic market will lead to a price fall, which may seriously hit the overall finances of this industry. Under such a scenario, fresh investment into the sector could also have limited scope.

Chapter- 5

5. Forecast of Demand for Iron Ore in India

5.0 Apart from the extent of iron ore resources, another crucial issue for determining the adequacy of iron ore pertains to the projections of iron ore demand, which in turn depend upon the prospects for the steel industry in India. Demand forecasting is a considerable challenge here since one needs to consider demand outlook over a much longer period of time, spanning decades. Even for a relatively smaller time-frame of 10-15 years, different estimates of steel consumption have been derived by different agencies, based on different considerations and methodologies.

5.1 Short –Period Forecast of Iron Ore Demand in India

5.1.1 Demand for iron ore, fines or lumps, will depend in the first place on the production of iron and steel. Production of steel does not necessarily have a one-to-one correspondence with domestic demand for the same, considering external trade possibilities. However, in the context of the steel industry, the size of the domestic market is important for long term viability of production. Historically speaking, most nations have witnessed their steel industry development being largely dependent on their own market.

5.1.2 In the estimates of the Working Group on Iron and Steel for the 11th Five Year Plan, set up by the Planning Commission, the iron ore demand in the country in total is set to rise to 130 million tonnes by the terminal year of the plan period, that is 2011-12. Consumption of scrap has been forecast at 18 million tonnes. This is based on the assumed production of 80.2 million tonnes of crude steel[56]. Of that, 44.4 million tonnes are to come from the Oxygen route (BF-BOF, Corex BOF and MBF-EOF) and 23.8 million tonnes from the electric route (EAF/IF). Technology route was unspecified for 12 million tonnes of production.

5.1.3 The production estimate is based on estimated demand for finished steel and pig iron in the domestic market as also the export potential. Gross demand for finished steel was forecast to be in the range of 66.5- 70.34 million tonnes.[57] Forecasts have been made using a regression model based on the correlation between steel demand and major macro-economic variables like GDP, GDCF, industrial production etc..[58]

5.1.4 While the above estimates provide some reference for projecting short-term demand, a more detailed work as discussed below has been undertaken for the purpose of assessing short term demand for iron ore in India. The need for a separate analysis was partly also because of the fact that the Working Group restricted its forecasts only up to 2011-12 and in the context of this study, this is very short.

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[56] Report of the working Group on steel for XI Five Year Plan, Ministry of Steel; 2007.

[57] Gross finished steel demand involves multiple counting of products, a problem well known in the context of the statistical system for the steel industry. Consumption of raw materials are derived from the production of crude steel.

[58] Ibid

5.1.5 Demand for iron ore in terms of both lumps and fines, derived from a technical model for a period up to 2015-16, is shown in **Tables- 15, 16 and 17**.

Table 15: Annual Demand for Iron Ore: Up to 2015-16

(Figures in million tonnes)

Scenario -1				
FY ending 31st March	Iron Ore Total	Lump	Fines	Lump as per cent age of total
2007	90.7	32.7	58.00	36.07
2008	104.4	37.2	67.17	35.66
2009	112.0	42.0	70.00	37.48
2010	119.2	43.2	75.95	36.28
2011	**127.1**	44.7	82.47	35.12
2012	133.8	45.9	87.93	34.29
2013	143.0	47.5	95.45	33.24
2014	153.0	49.3	103.69	32.22
2015	163.9	51.2	112.64	31.26

Table 16

Scenario-2				
	Iron Ore Total	Lump	Fines	Lump as per cent age of total
2007	87.2	32.2	55.00	36.92
2008	98.8	36.4	62.41	36.83
2009	103.8	40.7	63.05	39.25
2010	108.3	41.6	66.70	38.42
2011	**111.3**	42.3	69.02	37.99
2012	116.4	43.3	73.15	37.17
2013	121.8	44.3	77.45	36.41
2014	127.4	45.5	81.92	35.68
2015	133.4	46.7	86.72	34.98

Table 17

Scenario-3				
	Iron Ore Total	Lump	Fines	Lump as per cent age of total
2007	92.12	32.93	59.19	35.75
2008	106.68	37.57	69.11	35.21
2009	115.30	42.47	72.83	36.83
2010	123.76	43.93	79.83	35.50
2011	131.34	45.28	86.05	34.48
2012	141.37	47.02	94.35	33.26
2013	152.45	48.94	103.51	32.10
2014	164.57	51.03	113.54	31.01
2015	177.93	53.34	124.59	29.98

5.1.6 The major assumptions on the different scenarios are as under:

	Scenario-I	**Scenario-II**	**Scenario-III**
Crude Steel Production	To grow from 45 million tonnes in 2005-06 to 92 million tonnes in 2015-16	To grow from 45 million tonnes in 2005-06 to 71 million tonnes in 2015-16	To grow from 45 million tonnes in 2005-06 to 101 million tonnes in 2015-16
Steel Scrap Generation in the Economy	To grow from 4.05 million tonnes to 8.35 million tonnes	To grow from 4.05 million tonnes to 6.43 million tonnes	To grow from 4.05 million tonnes to 9.15 million tonnes
Steel Scrap Imports	To grow from 3.5 million tonnes to 9.08 million tonnes	To grow from 3.5 million tonnes to 6.89 million tonnes	To grow from 3.5 million tonnes to 9.08 million tonnes
DRI production	To rise from 11 million tonnes to 20 million tonnes	To rise from 11 million tonnes to 20 million tonnes	To rise from 11 million tonnes to 20 million tonnes
Crude Steel from DRI/Scrap	To rise from 15.77 to 31.81 million tonnes	To rise from 15.77 to 28.32 million tonnes	To rise from 15.77 to 32.5 million tonnes
Crude steel production from BF/BOF route	To rise from 29 million tonnes to 60 million tonnes	To rise from 29 million tonnes to 42 million tonnes	To rise from 29 million tonnes to 68 million tonnes
Crude steel from Corex iron making route	To rise from 1.6 to 5.6 million tonnes	To rise from 1.6 to 5.6 million tonnes	To rise from 1.6 to 5.6 million tonnes
Iron ore consumption per tonne of Hot Metal	1.55 tonne	1.55 tonne	1.55 tonne
Hot Metal Required per tonne of crude steel	1.015 tonnes	1.015 tonnes	1.015 tonnes
Iron Ore required per tonne of DRI	1.6 tonne	1.6 tonne	1.6 tonne
Handling loss of iron ore at plant/in transit/mines	10 %	10 %	10%
Lump ore use percentage in BF	15 %	15%	15%
Lump ore use in DRI	80 %	80%	80%
Merchant Pig Iron Production	To rise from 3.5 million tonnes to 8.6 million tonnes	To rise from 3.5 million tonnes to 8.6 million tonnes	To rise from 3.5 million tonnes to 8.6 million tonnes
Iron Ore Requirement per tonne of Pig iron	1.6 tonne	1.6 tonne	1.6 tonne

5.1.7 The production levels of crude steel and pig iron are based on a detailed study conducted on the future of finished steel demand and the pattern of trade.[59]

[59] A.S. Firoz : Indian Steel: Critical Details, Evolving Structure and Strategic Options, A Multi-Client Study, Steel Business Briefings, London, 2007

5.1.8 One reason for taking 2015-16 as the terminal point in the projections here is that the Hoda Committee has made a specific recommendation that the issue of sufficiency of iron ore can be revisited after ten years, that is, after 2015-16. By then, it could become far more clear as to how the steel industry will have developed and what will be the iron ore supply and security position then.

5.1.9 Going by the best case scenario (Scenario-III), the cumulative iron ore consumption between the years 2007 and 2015, will be 1.37 billion tonnes, out of which 0.46 billion tonnes will be lumps and the rest fines. In the second best case (Scenario-I), the corresponding numbers for total iron ore and lumps are 1.31 billion tonnes and 0.45 billion tonnes respectively. The same drops to 1.17 and 0.43 billion tonnes respectively in the worst case scenario (Scenario-II). These numbers suggest that the cumulative iron ore consumption for domestic use in the next ten years is likely to be around 5 per cent of the current estimate of iron ore resources in India.

5.2 Long Term Demand for Iron Ore

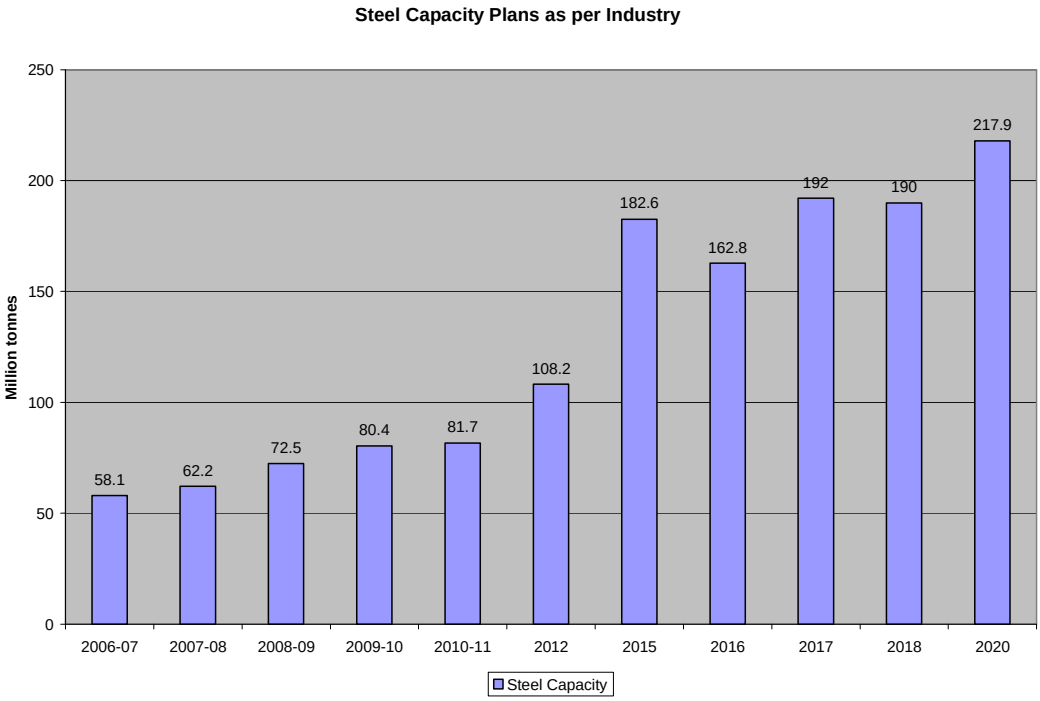
5.2.1 In the context of iron ore sufficiency, the scenario till around 2020 is not adequate for any conclusion. The steel consumption and production scenarios will have to be looked at for a much longer period, say, up to 2080 or so. A forecast till that period will be excessively speculative if the current trend is assumed to continue till then. To arrive at any kind of an idea of future growth, the best alternative will be to see the nature of growth in steel consumption in the developed nations in the first place and then assume specific conditions for the growth scenario for India considering also the techno-economic conditions of making steel and the substitution possibilities.

5.2.2 The estimation of demand for iron ore can be on the basis of the following.

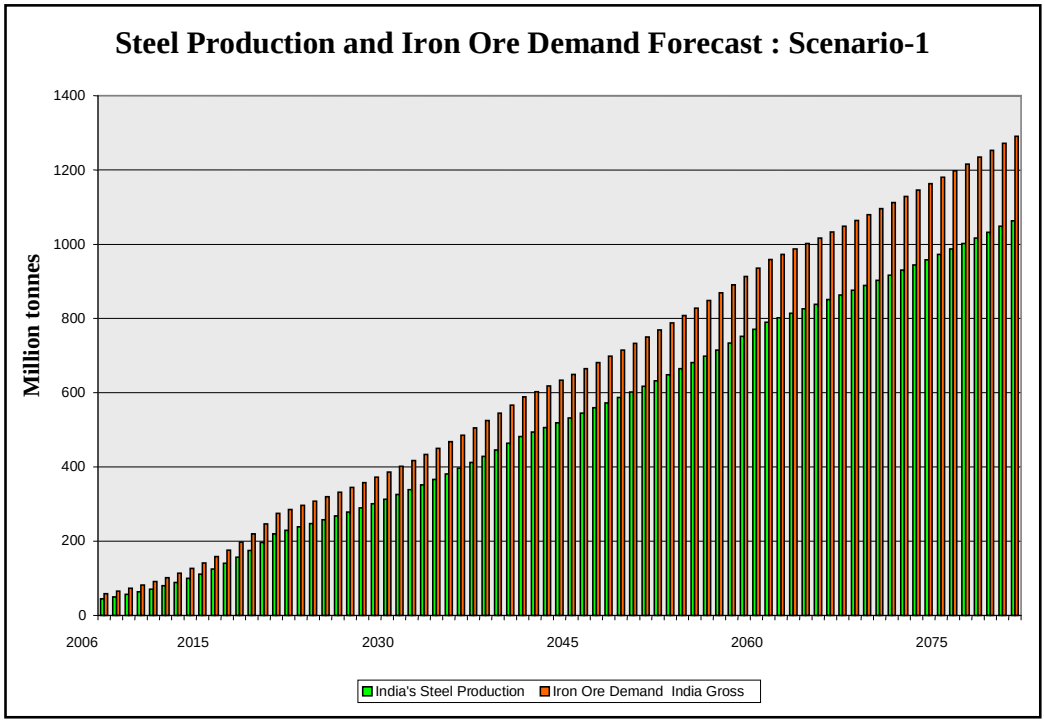
A. As per **steel industry expansion plans**, annual growth rate could be 12 per cent till 2020.[60] This will, however, take one to only 2020, beyond which the industry has no firm plans. After that, one can assume a production growth rate of about 4 per cent till 2040, 2.5 per cent between 2041-2060 and 1.5 per cent thereafter till 2080. These assumptions are based on the observed trend in steel consumption in the developed nations since 1950 till 2000. (The relevant observations have been made for a few representative developed nations only in **Appendix- A**1).

The future capacity planning, as per announcement of projects made by the industry and their schedule of completion, however, remain tentative beyond 2011. The figures in this case have been accepted as they are till 2020 without applying any value judgment on them. (The future capacity planning in the industry can be seen from **Annexure- 3**.) The projection of steel industry growth has been based on the perception of growth in the steel consumption demand in the country and the emerging export opportunities.

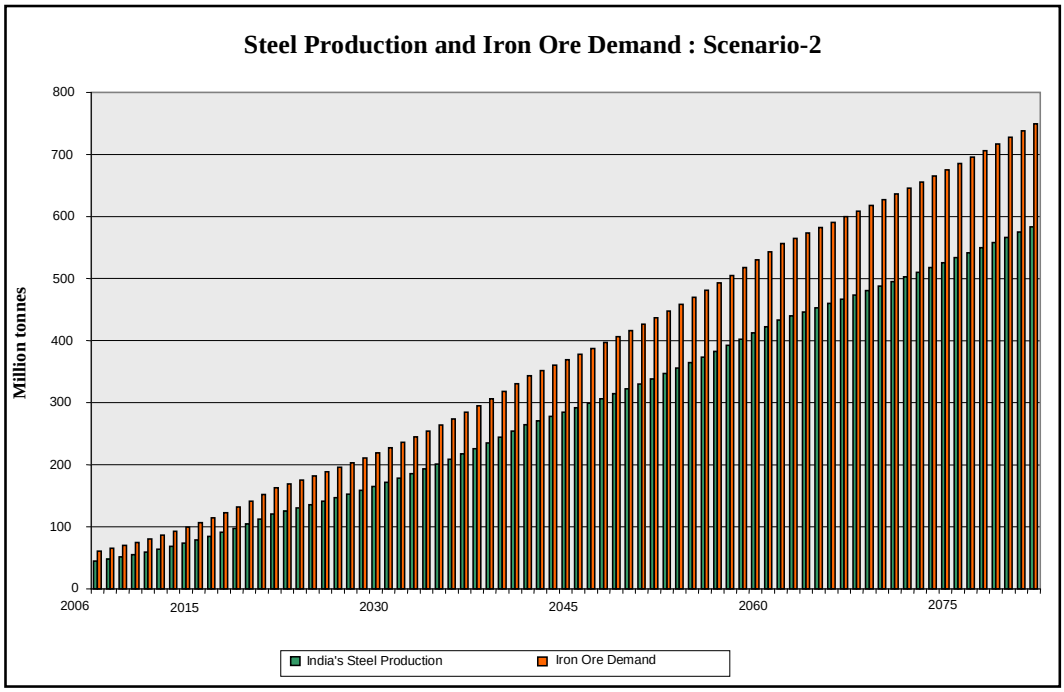
[60] Capacity expansion plans and the potential of realization of these plans are to be seen dynamically and the same have changed over the last few months. However, these changes do not alter the basic scenario forecast and hence the arguments derived out of those remain valid.



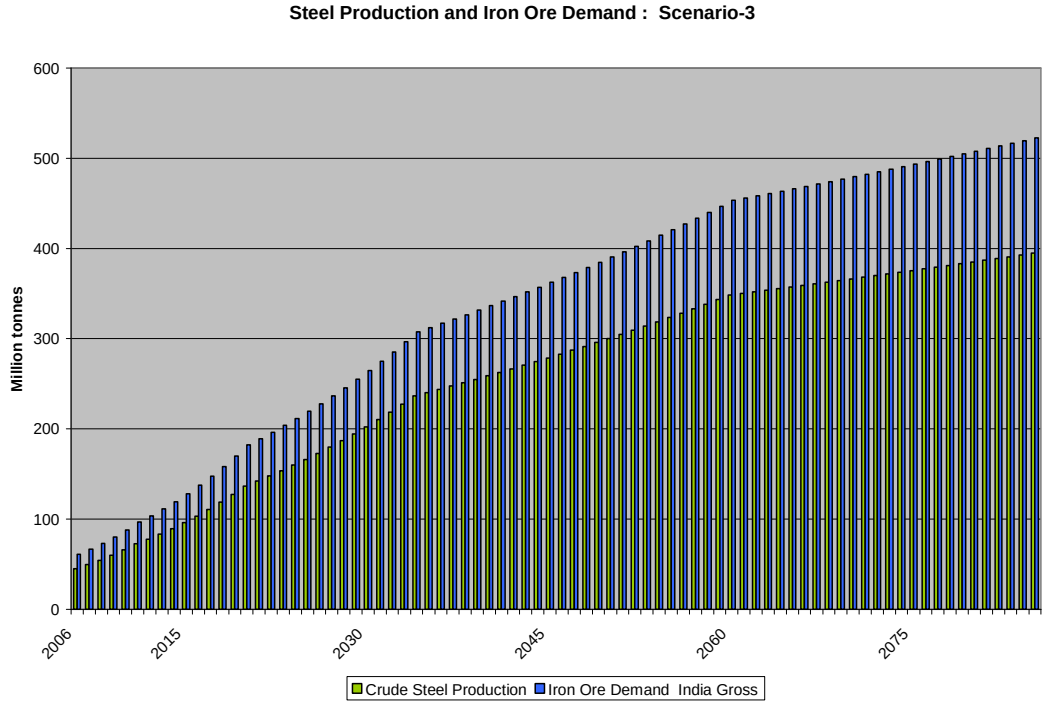
Source: Ministry of Steel



B. An alternate approach could be based on the **National Steel Policy**, which assumes a 7.3 per cent growth rate of steel production till 2020. Assumptions on the period beyond can be held same as in the first approach.



C. In the third scenario, steel production growth rate has been assumed at 10 per cent till 2020 (a scenario which lies somewhere in-between the first two scenarios), 4 per cent after that till 2035, 1.5 per cent after that till 2060 and 0.5 per cent afterwards till 2080.



5.2.3 The scenarios of steel production and iron ore consumption discussed above are based on standard technical norms. The estimates also assume that the current technology mix in steel production in India will not undergo any drastic change over the years. This is somewhat a difficult assumption to make, but, in the absence of any credible technology alternative at present, it may be safer to assume the well tested parameters for this exercise. However, one may keep in mind that the increase in global reservoir of steel scrap (also iron scrap) will increasingly make scrap based steel production more attractive. It is also possible that scrap dependence in India may rise since much of the iron ore fines are not quite good for sinterisation and sintering will involve higher costs. With this, the assumption made in the model that scrap will continue to account for 29 per cent of the steel production globally may turn out to be fairly on the lower side. If this happens, the global as also the domestic demand for iron ore will proportionately shrink. On the other hand, iron ore consumption will critically depend on the quality and the ferrous content of the ore. One believes that there will be a gradual decline in the ferrous content of the ore as the better of the ores are getting used up faster. In our estimation above, this factor has been somewhat taken care of by assuming the average Fe content of the ore at 55 per cent globally and 60 per cent in India.

5.2.4 The results from all the scenarios discussed above can be seen from the **Table -18.**

Table 18 : Cumulative Iron Ore Demand for Future Years Under Different Scenarios

(Billion tonnes)

Year	Scenario-1	Scenario-2	Scenario-3
2040	10.86	6.49	7.08
2045	14.13	8.33	8.84
2050	17.83	10.41	10.74
2055	22.01	12.77	12.78
2060	26.73	15.42	14.98
2065	31.91	18.33	17.29
2070	37.49	21.46	19.66
2075	43.5	24.84	22.1
2080	50	28.48	24.61

5.2.5 Under these growth assumptions related to the steel industry, cumulative iron ore consumption in the country will rise to 26.73 billion tonnes by 2060 in Scenario-1. This means, the existing estimated resources of iron ore will be all exhausted by then. In Scenario-2, the industry will find the currently estimated domestic iron ore backing them up till about 2075 and in Scenario -3, similar comfort will be available till 2080.

5.2.6 If exports are to be included, the life of the existing reserves will be proportionately shortened. In the previous chapter on export of iron ore, the factors determining India's export potential have been discussed and it appears that continuation of exports of iron ore at high levels is difficult to be sustained for a long time.

5.2.7 Currently, India exports about 90-100 million tonnes of iron ore. Assuming that the exports are retained at 100 million tonnes (as also considered by the government in the National Steel Policy), which itself is a fairly ambitious assumption over a longer time-frame, the cumulative demand for iron ore looks as shown in **Table- 19**.

Table 19 **: Cumulative Iron Ore Demand for Future Years Under Different Scenarios with 100 million tonnes of Exports**

(Billion tonnes)

Year	Scenario-1	Scenario-2	Scenario-3
2040	14.36	9.99	10.58
2045	18.1	12.33	12.84
2050	22.3	14.92	15.24
2055	**27.0**	17.8	17.8
2060	32.2	20.9	20.48
2065	37.9	24.3	23.3
2070	43.99	**27.96**	**26.16**
2075	50.5	31.84	29.1
2080	57.5	35.98	32.7

5.2.8 It may be seen from the Table above that the iron ore resources as per current estimates will be exhausted by 2055 if the industry expansion plans are considered and by 2070 or so if other projections as per Scenarios-2 and 3 are taken into account with 100 million tonnes of exports every year during the entire period.

5.2.9 Thus, 100 million tonnes of annual exports of iron ore is not shortening the life of the iron ore reserves for the domestic steel industry significantly. Further, in the best possible conditions for growth of the Indian steel industry, the iron ore resources, if are safely stored up for all the announced ventures of credible nature, the same will last till 2070 if exports of 100 million tonnes are allowed simultaneously and till 2085 if exports are not considered. It may be noted here that the steel industry has sought iron ore security for 50 years, which seems to be certainly available under any scenario.

5.2.10 In all the exercises in this chapter, the current resource position of iron ore has been considered as given and constant. As discussed in an earlier chapter, this view is static, which does not seem to be valid given the global experiences in mining.

CHAPTER -6

6. Iron Ore Issues in Steel Industry Perspectives

6.1 Raw Materials and Costs

6.1.1 There is a strong perception that steel demand in India as also worldwide is slated for a massive increase. This view has encouraged investment into the industry for capacity growth worldwide, including announcement of aggressive plans in India. The viability of these plans needs to be examined by considering, inter -alia, factors influencing competitiveness of steel production. While China is adding capacity with the advantage of a large captive market and low costs of local coking coal and low capital costs, the Middle East capacity additions have been driven by very competitively available energy. Brazil's ambitions have been shaped by its iron ore and the strong markets in the neighbourhood, including in the US. The Indian steel makers look at iron ore as the most dominant factor for competitive steel production. India also has the advantages of chromite, manganese ore, ferro-alloys etc.

6.1.2 In general, steel industry's competitive advantages are prominently seen in the areas of raw materials and energy; and then in other factors such as labour and managerial costs, infrastructure and capital costs. The mother raw material for the industry is iron ore, which is converted into iron of different forms through various technological processes using energy and reductant inputs like coking coal, non-coking coal, natural gas, etc. Steel is also produced by recycling scrap of steel through the process of melting in electric furnaces. Today, scrap constitutes a significant percentage of the total metallics requirement of the industry globally. Production of steel through electric steel making process accounts for about 31 per cent of the total global production. In fact, the proportion used to be much higher in the past years. With China's blast furnace based steel growing at phenomenal pace, the share of electric steel making has fallen, despite the fact that about 100 million tonnes of crude steel production has been added globally in the last ten years. With only about 50 million tonnes of sponge iron (DRI/HBI) being produced globally, the bulk of the steel made through this process route is accounted for by scrap. Scrap is also used in the Basic Oxygen Furnaces (BOF) although not so extensively. The in-house (return) scrap is generally used for recycling as also to act as a coolant. Therefore, scrap supply and its price hold an important position in the competitive growth of the steel industry as a whole.

6.1.3 To understand the importance of raw materials in the costs of production of steel, one may see the percentage share of each major input in the total cost. For plants with captive iron ore mines, iron ore accounts for not more than 10 per cent of the finished steel costs. For some, it is as low as 4 per cent in India.[61] For those without captive iron ore and largely dependent on iron ore lumps or pellets, the costs are higher compared to

[61] A.S. Firoz, op. cit. 2007

captive source of iron ore. Part of this cost rise is accounted for by freight costs.[62] Against this, coking coal constitutes as high as 20 per cent of the total costs of finished steel. [63]

6.1.4 In the recent times, the prices of both coking coal and iron ore have risen sharply on the back of strong steel demand and rise in prices of steel. Although the coking coal prices have dropped in the last two annual contracts from about $125 per tonne in 2005 to about $95 per tonne in 2007 on fob export basis, the iron ore prices have continued to increase, although at a reduced pace.[64]

6.1.5 If one assumes that local scrap generation will be limited, the steel industry growth will be based on the primary iron ore route – either in the BF/Corex etc. or DRI, with predominance of the BF. The Indian steel industry views that the country has no coking coal to support the future capacity additions and will have to depend on expensive imports in an uncertain world where the bargaining power will remain with the mining companies. There is, therefore, a feeling that this disadvantage along with those added by poor infrastructure can be compensated for only if domestic iron ore is available to the industry at low prices and below the global benchmark prices. Further, the industry is looking at 50 years of iron ore security at the minimum and the freedom to operate on mines as per its own specific requirement of iron ore. For that, they have sought long term captive mining rights/leases. The concerned central government ministry has also strongly advocated the idea of captive mining and the state governments have gone to the extent of luring steel industry investment to their respective States by promising recommendation for captive mining leases only to those who set up plans in their respective states.

6.1.6 The above argument hinges on an implicit assumption that iron ore will remain an attractive business worldwide for years and decades to come. However, there can be doubts about the validity of this assumption. According to a Credit Suisse report[65], iron ore prices are expected to remain strong in the medium term till around 2012 after which a decline is expected. Iron ore prices may continue to rise up to a benchmark level of 91.6 US cents per unit of Fe from the current level of about 77.35 cents and then drop gradually to 56.86 cents by 2014. [66] Another report of UNCTAD projects iron ore prices to start sobering in 2009. Further, with the rising volatility in the freight cost with spot rates shooting up to uncomfortable levels very often, an uncertainty looms large over the seaborne iron ore trade business for the Indian miners.

6.1.7 Secondly, the steel makers want iron ore security as a pre-condition for investment. This indicates the possible non-viability of the projects at economic value of iron ore. If so, the competitiveness of India in steel manufacturing does not appear to be based on a

[62] Ibid
[63] Ibid
[64] The iron ore prices in global contracts increased by 71 % in 2005, 19.5 % in 2006 and 9.5 % in 2007. It is expected to rise by another 65% in 2008 contracts. The coking coal prices are also expected to by about 100% in 2008. All these are taking place in the context of unprecendented rise in steel prices.
[65] Credit Suisse Report , 26th February 2007.
[66] Ibid

solid footing. If iron ore is available to Indian steel makers only at the international price, their growth ambitions could be significantly curtailed especially when the import protection on their finished products is being reduced to almost nothing. [67] Competitiveness of the industry vis-à-vis producers like China could then be seriously threatened.

6.1.8 The concern of the steel industry can be seen from the following scenario. If iron ore is to be available at the corresponding fob price of it, that is, about $58 per tonne as on date for fines and $70 per tonne for lumps, assuming a mix of 80 per cent fines and 20 per cent lumps, the cost of iron ore per tonne of crude steel will be about $100. This will be about 20 per cent of the average price of HR coils today.

6.1.9 The grim competitiveness scenario portrayed above need not, however, be entirely true. It may be noted here that steel production was considered globally competitive even when the global iron ore prices were as low as $15-18 a tonne. The steel industry made profits and continued to grow in India despite the iron ore price differential between domestic and international markets being very low.

6.1.10 The rise in both iron ore and coking coal prices can also been seen in the context of inability of these industries to rise quickly to the surge in demand from the rapidly growing steel industry. The mining capacity remained in a limbo due to lack of investment there. The slump in steel prices and stagnation in production for a protracted period from the mid 1990s till the beginning of the current decade had almost brought in a crisis within the mining industry worldwide. The mining industry capacity was significantly raised in the earlier period on the strong forecasts made for steel demand. With the steel market turning away from the expected line, the mining industry developed excess capacity everywhere. The industry, with excess and fragmented capacity, could not be sustained without adequate restructuring. This happened during the period prior to the start of the steel price boom worldwide. Over the period, the industry got restructured with consolidation and precisely at that time came the steel industry boom. The immediate rise in steel demand could be met from the existing surplus capacity in the industry. However, the rise in demand from the steel industry worldwide in particular from China, was so high that the global iron ore and coking coal capacity came under tremendous stress. This was more in the case of iron ore. Apart from pure capacity constraints, the supply of both iron ore and coking coal faced infrastructure bottlenecks, including transportation from the mines to the ports, shortages of ships and port and railway facilities at unloading points. The industry faced some of the most unexpected problems – shortage of machinery and equipment and manpower. In effect, the mining industry was completely unprepared for the huge and sudden economic upsurge. In a sense, what the mining industry is getting in terms of prices is what it was deprived of for years earlier.

6.1.11 While coking coal is extremely critical in the life of the steel industry, the position in the case of iron ore is somewhat different. Substitution possibility lies in the use of

[67] The current import duty rate on steel is 5 per cent and there are talks that the same may drop further in the years to come.

steel scrap. Over a period of time, steel scrap use in the steel industry in India as well as globally, has risen substantially and more and more steel is now being produced using scrap rather than going through the virgin route from iron ore. Recycled scrap is estimated to have contributed to about 330 million tonnes of the crude steel produced globally in 2005 out of a total estimated production of 1240 million tonnes.[68]

6.1.12 The steel industry's concerns and perspective on the issue of iron ore adequacy has been discussed in a recent study conducted by the National Council for Applied Economic Research (NCAER) at the behest of POSCO.[69] The main conclusions of the study have been drawn based on computation of depletion premium of iron ore. The main feature of a depletable resource is that it exists at the start in a finite stock and the stock is reduced along its use. It is assumed that there is no process that increases the stock or that the rate of its use exceeds the rate of replenishment. While estimating depletion premium for iron ore on a standard formula, the NCAER has assumed a given stock at the start which itself is doubtful as the estimates of reserves of iron ore in India as also globally have only been increasing. This makes the period of exhaustion somewhat speculative. The price of substitute at the time of so called complete exhaustion of the resource has been taken as the price of iron ore extrapolated based on the historical pattern of its prices. This could also be misleading since the only substitute of iron ore is steel scrap in the context of steel production. It may be mentioned that about 97 per cent of the scrap can be recycled. [70] It could be difficult to rely on the conclusions of this study, also because of certain other factual and methodological drawbacks, which are discussed in **Appendix - B**.

6.1.13 Our analysis so far suggests that the concerns of steel industry regarding the adequacy of iron ore are not serious, considering the resource position as well as demand forecasts developed in the previous chapters. However, Indian steel industry's concerns about loss of competitiveness at market prices of iron ore may be valid to some extent, especially with regard to profitability of the industry.

6.2 Agglomeration of Fines

6.2.1 The generation of fines in India currently exceeds the domestic demand for the same, resulting in exportable surplus. From this perspective, it needs to examined whether there are adequate options to use the fines which are currently being exported within the country itself for further value addition.

6.2.2 The relative use of iron ore fines, lumps or concentrates will depend on the technology in operation and the price relatives existing among fines, lumps and pellets. It will also depend on the regional balance in demand and supply. Although the choice of technology is not very sensitive to the short-term fluctuations in price relatives, it does depend on the long term prices of these, the cost savings from higher use of sinter, operational convenience, etc.

[68] Estimated from the statistics available from the International Iron and Steel Institute.
[69] Social Cost Benefit Analysis of the POSCO Steel Project in Orissa, October 2006, NCAER.
[70] American Iron and Steel Institute, their web site (www.steel.org)for reference.

6.2.3 In India, the integrated steel plants in the past used more of lumps due to inadequate sintering capacity. Also, with the steel producers like SAIL and Tata Steel being given captive iron ore mines, and the costs of mining for both fines and lumps being the same, there was no incentive to invest in sinter plants as the lumps generated in mining has to be used up in any case. Further, Indian steel plants were set up when investment resources were scarce. The overall economics supported technology choice that reduced immediate capital costs. The long term economics of using the available resources was not on the agenda. Also, when the steel prices were regulated, it mattered little to the plants what the iron ore or steel would actually cost. The typical cost plus method of pricing left no incentive for efficiency gains and therefore the steel producers paid very little attention to the use of fines. Mountains of fines got accumulated and lay without their market value being realized. This also led to environmental hazards and increased maintenance costs.

6.2.4 Tata Steel could control their resource position better by exporting some quantities of fines at times and largely by carefully balancing their facilities with necessary technology processes. Their sinter use percentage as a whole lies at about 65 and they make use of lump ores at their associated pig iron and sponge iron plants such as Tata Metallics Ltd. and Tata Sponge Ltd. SAIL also does not seem to be facing any major imbalance at present as they frequently adjust their feed stock based on the iron ore supply position from their own mines. This, however, does not mean that they do not have accumulated fines with them. The company carries as per market intelligence over 35 million tonnes of fines in their mines.[71] While some of these are being sold occasionally, they still have the tendency to build stock of fines. This is due to the fact that even today their sintering facilities in operation are inadequate in terms of capacity.

6.2.5 Over a period of time, the plants with captive mines will have tight technology leverage if they are prohibited from selling their excess lump/fines in the market. As it is unlikely that such a grant will be given, there is a reason to look at the economics of captive mining and their implications on technology choice in the larger national perspectives.

6.2.6 There is a view that the iron ore fines which are being exported today can instead be used for value addition to make products like pellets which are transportable and are globally traded. This effectively means that the iron ore mining industry may shift to production of pellets to the extent possible and if necessary export the same.

6.2.7 There has been a gradual increase in the consumption of pellets in India as also globally. Traditionally, pellets were seen to be used only in the production of DRI in India and the integrated plants paid no attention to them. Now, the economics of use of pellets along with sinter is well appreciated and even the traditional integrated plants are planning to add pelletisation capacity in their expansion plans. Globally, pellets are extensively used in the blast furnaces, especially so in the USA and Canada. In India, it has not been so, largely because of low cost lumps and fines available in the country

[71] The mining industry has asserted that over 60 million tonnes of fines are lying in SAIL mines.

which have made sintering a better alternative. As the country's pellets capacity is being raised, even the DRI plants will use more pellets than they are doing now. The point to note here is that the Indian steel industry so far has not gone into the relatively high cost options and have been using the best inputs at least costs. The low Fe magnetite ores which require pelletisation have barely been tapped so far. While there is no harm in it in the current context, the future plans should consider the high cost raw materials alternatives as well especially if one is so concerned about supply security.

6.2.8 Currently, Essar Steel (8 million tonne) and JSW (4 million tonnes, being raised to 5 million tonnes) are the only two major pellets plants in the country in the private sector apart from Kudremukh Ltd (KIOCL) in the public sector (3.5 million tonne). Till recently, the Indian integrated steel makers were more focused on only raising the intensity of sinter use. As a result, the concentrates and fines remained more or less dumped at the mine head.

6.2.9 Use of pellets elsewhere was higher by design, characteristics of resources and practices. This was responsible for higher investment in pelletising capacity. This is why the rate of growth of agglomeration capacity world wide has been much faster than in India. Further, most of the countries with significant pelletising capacities were not endowed with high quality iron ore (especially haematite) and beneficiation and pelletisation were considered as necessary to utlilise to the maximum whatever resources were available with them. The global pellets production in 2004 was about 303 million tonnes which was higher by 7.1 per cent from the previous year according to UNCTAD estimates.[72] Estimated production of Pellet for 2006 as reported by UNCTAD is 347.7 million ton. This amounted to more than 21 per cent of the iron ore production worldwide. The Americas (North and South) and the CIS nations are the largest producers of pellets in the world. Except for in Latin America and the Middle East, bulk of the pellets produced are for the Blast Furnace (BF) grade. In India both BF and DRI grades of pellets are produced with the bulk of them being in the DRI grade. BF grade pellets production in the countries/regions mentioned is also a technical necessity considering the poor quality of their ores with Fe content as low as 27 per cent (say for China). In China, capacity is rising very fast as they have strong need to make use of their poor quality iron ore available with them.

6.2.10 In India, pelletisation came to become popular only after the HBI/DRI based plants were set up in the western part of the country. Initially, Kudremukh and Mandovi Pellets were the only two major pellets plants. Mandovi was closed down for some time and currently is in operation with limited capacity. Kudremukh was also developed as an export oriented unit.

6.2.11 On the flip side, however, pelletisation could not grow in the past as a stable business globally due to the inherent uncertainty over pellets prices on the world market vis-à-vis iron ore prices. A drop in the prices of fines lead to increased use in sinter or a drop in lumps prices lead to raised levels of lump use in the blast furnaces, and, in both

[72] Iron Ore Manual 2005, Tex Reports.

cases, it can be at the cost of pellets. Pellets are being seen as a technical requirement in certain processes of production and that is the reason why the prices of pellets remain high in a relatively non-expanding small market. It is a good business proposition in places where the Fe content of the ores is low. Investment potential in pellets is therefore restricted and is fraught with some sort of market risk. One may see from the news item below how and why one of the largest pellets project in Brazil has been dropped.

"MMX shelves pellet plant project in Brazil

Brazilian mining company MMX has given up its project to build a 7m tonnes/ year iron ore pelletizingplant in São João da Barra city in Rio de Janeiro state, which was announced as part of the company's larger Minas-Rio project to produce 26.6m t/y of iron ore from 2008.

…..

The project has been shelved because "a MMX client does not want pellets anymore, but pellet feed," MMX's president Rodolfo Landim as quoted to have said in a local news report. ---- Recently MMX secured a contract to supply an additional 6.5m t/y of pellet feed to that company, as reported.

MMX is also going to ship some 9m t/y of iron ore fines to the Japanese trader Sojitz. Overall, almost all its 26.6m t/y of production is already committed on long term contracts, so there will be no production excess to be used to produce pellets, Landim said.

As previously reported, MMX's project involves mining iron ore in Minas Gerais state in southern Brazil, and transporting it via a new slurry pipeline to the coast of Rio de Janeiro state, where a new shiploading terminal capable of handling Capesize vessels is to be developed.

Works are expected to start by the beginning of the last quarter this year, with total investments estimated in R$2.3bn. Mining group Anglo American has a 49per cent stake in the project." [73]

Although this does not mean that all investments in pellets are unattractive as much of it will depend on the price of pellets, the experiences of the type mentioned above leave a lot to uncertainty.

6.2.12 Recently, in the tight iron ore market, pellets demand shot up sharply and prices rose to extraordinary levels of about $130 per tonne on fob basis compared to the fines prices of about $50 per tonne on fob basis. This premium has fallen subsequently to some extent as pellets prices have weakened. Interestingly, despite this high premium, the pellets capacity has not been growing significantly enough as most of the experts expect this premium to evaporate as availability of iron ore improves in the world market. It is generally held that pellets business is good with self mined ores and not for those who have to buy the ores from others. This is one of the reasons why sintering has been preferred over pelletisation in China as the country imports most of its iron ore.

6.2.13 The other option is to export the iron ore fines in the form of higher value added products such as pig iron, sponge iron (HBI or DRI) or even steel, where specific market issues will come into the picture. It is not necessary that value added products can be automatically sold in the world market with identical profits. Unless there are clear and profitable opportunities for value addition, it may not make sense for the mining industry

[73] Steel Business Briefings, 10, May, 2007

to venture into such value addition. In general, such issues may be best left to the market, instead of pushing them through administrative or regulatory fiats.

6.3 Export of Steel

6.3.1 The steel industry has contended that the country should export value-added products like steel rather than exporting minerals. While it may be relatively possible to forecast steel demand in India (as also in most other economies) due to their strong correlation with the macro-variables like the GDP, industrial production, investment etc., it is not so when it comes to forecasting export of steel.

6.3.2 Steel exports growth has been reasonable till now, rising from about 0.3 million tonnes in the early 1990s to over 5 million tonnes a year now (as in the last three years). The sustainability of such growth in future will depend critically on the emerging competitive strength of the industry in the country and the actual capacity growth that takes place to be able to maintain a competitive surplus production over domestic demand. Competitive strength will have to be seen in terms of own costs as also the prevailing international prices in an industry well known for volatility in prices and raw materials costs.

6.3.3 Based on the emerging trends, it has been estimated that the global steel demand will rise to about 1700-1800 million tonnes in crude equivalent by 2020.[74] The production in 2006 was 1225 million tonnes and it is believed that the capacity worldwide is in the range of 1500 million tonnes.[75] If one goes by the progress made elsewhere such as in China, Middle East, Latin America and the CIS in setting up steel capacities, the Indian steel industry faces a challenging task here. As against the slow pace of execution of the Indian enterprises, investments in China for fresh capacity continue extensively. This brings in the fear that the Indian steel makers may have to take the curse of late entry in a business that remains strongly volatile and unpredictable with periodic downturns encountered so often. While at one level, it has been seen that with the ongoing consolidation in the industry through increased mergers and acquisitions, the steel prices will see some degree of stability, the fear of oversupply cannot be ruled out altogether. Despite the competitive advantage expected from captive mining, the merit of investment in large capacity plants and that too with so many of them coming in such a volatile global market has its own market risk.

6.3.4 It may also be worthwhile to take note of the observations made by certain industry segments within and outside the steel industry that much of the exports today especially of HR coils have been undertaken to see that there is no domestic glut and in the process to maintain a high price of them here.[76] The import price parity in the domestic market can be maintained only when there is no oversupply of the product in the market. To the

[74] Based on several widely varying estimates of institutional and individual studies.
[75] Annual Statistics and other publications : International Iron and Steel Institute, Brussels and World Steel Dynamics, New Jersy.
[76] This point has very often being raised by the Cold Rolled Steel Manufacturers' Association.

extent that this view has any validity, the sustainability of exports growth becomes somewhat suspect.[77]

6.3.5 Further, the full impact of Chinese entry into the global export market has not yet been felt on the Indian market. It is mainly because the Chinese producers have focused more on the markets in the neighbouring South East Asia, US and the EU. However, with the US and EU expressing strong concerns over the rising imports from China, Chinese producers may become more attentive to the Indian market in future. This may completely change the balance in Indian external trade in steel.[78]

6.3.6 Thus, exports of steel out of India are unlikely to move into a substantially higher trajectory than at present. The implication of this for the iron ore policy is that it is difficult to have a strategy based on encouraging exports of steel to leverage India's iron ore resources.

[77] In fact, the export growth has slowed down and India is expected to turn into a net importer of steel in 2007-08.

[78] Imports of steel from China have increased sharply in 2007-08 and the steel industry has expressed its concern through representations to the government. Based on newspaper reports and the data available on imports from the website of the Joint Plant Committee.

CHAPTER- 7

7. Policy Issues

7.1 Export

7.1.1 The most important policy issue today in the context of iron ore is whether there should be a move towards conservation of these resources for the maximum use of the domestic industry as against letting the same go out of the country to feed foreign steel mills whose growth can only be at the cost of potential growth of the industry here in the country. That is, if it is possible or desirable to have any quantitative restrictions on the exports of iron ore. Alternatively, if it is also possible to have a system of fiscal disincentive to be brought in to have the same desired effect.

7.1.2 Iron ore exports are not totally free. The specific provisions of the export policy are as under:

- Free export of iron ore from Goa and Redi sector to all destinations by the iron ore producers; irrespective of the iron content.
- KIOCL is the canalizing agency for its own products (iron ore concentrates and iron ore pellets) since it is a 100 per cent E.O.U. (export oriented unit).
- The export of iron ore with Fe content 64 per cent and above is canalized through MMTC.
- There are quantitative restrictions on certain types of high-grade iron ore (Fe content above 64 per cent) from specific areas like Bailadila in Chattisgarh to meet the domestic demand on priority.
- Present quantitative ceiling of iron ore fixed by the Govt. are as under :-

	AREA	**ANNUAL QUANTITY (in Million Tonnes)**
a)	Bailadila Lumps	Not Exceeding 3.00 MT
b)	Bailadila Fines	Not Exceeding 3.80 MT
c)	High Grade Lumps (Bellary-Hospet Sector)	No limit
d)	High Grade Fines (Bellary-Hospet Sector)	No limit

- An Export Tax of Rs. 300 per tonne has been introduced in the Union Budget 2007-08. Later on, however, the export tax was reduced to Rs 50 per tonne for fines with Fe content below 62 per cent.

7.1.3 While there have been certain regulations on export of iron ore as mentioned above, the latest editions of the Minerals Policy documents in respect of iron ore do not take a

conservationist stance.[79] The rationale for quantitative restrictions on certain grades of iron ore exports was stated to be "that export of such material should take place only to the extent of exportable surplus, retaining thereby quantity required for domestic industry".[80] This, in fact, is not really a conservationist position. It is merely an advocacy to accord priority to domestic users in the case of certain not 'so abundantly available' high grade ores.[81] It is worth noting that the same plan document goes to state, "In principle, for betterment of country's mining industry as well as conservation point of view, there should be no restriction on the export of iron ore since it is a widely occurring commodity and there is plenty of competition internationally."[82]

7.1.4 From the point of view of conservation, it is important to have a clear view on the sufficiency issues. Our analysis shows that even at the current levels of resources and the steel industry capacity growth based on the assumption that the entire domestic demand growth will be met from production within the country, there seems to be no major threat of India's iron ore resources getting totally depleted in another sixty to seventy years. Our findings do not support the contentions of the steel industry that iron ore is available to the industry only for a couple of decades. Therefore, if there is no immediate threat at least to the plants which have been planned now (over 200 million tonnes of annual capacity), there is no need to panic and take a protectionist view on this matter. It is also important to take note of the fact that iron ore exports cannot be maintained at higher levels from now even if one wishes to do so, considering the changing dynamics of the global iron ore market, especially as the global market moves towards long term contract sales, more and more steel scrap is recycled and there is a gradual tapering of the growth of steel consumption. If market forces are allowed to work efficiently within India, higher internal demand and better prices will correspondingly lower attractiveness of exports.

7.1.5 It is important to examine the reserves position carefully before taking view on sufficiency of iron ore. Further, it may also be noted that the distinction brought between reserves and other resources is also dependent on specific policy at a given point of time and one can hope that a lot will change in future along with technological progress in mining. It is not, therefore, recommended that a static view is taken on a subject, which has to be necessarily seen in a dynamic framework. Increased exploratory efforts will, in the first place, raise the position of total resources from the current level of about 25 billion tonnes. The same will also work to shift large chunks from resources to reserves category. Although greater exploration and investment on such activities may make more resources available for the steel industry, there are still questions whether it will be possible to convert the entire resources into reserves due to environmental and social constraints. Much of the resources/reserves are lying in thick forest areas with some of them in declared ecologically sensitive areas. However, a solution to this problem needs

[79] Although conservation of minerals in general has been stated as a part of the objectives in the 2020 vision document of the Ministry of Mines, the position in respect of iron ore has been considered differently in the policy as iron ore has been under the category of abundantly available mineral.

[80] The Report of the Working Group on Minerals Exploration and Development for 10th Five Year Plan, Planning Commission, 2001.

[81] Iron ore, otherwise, is classified as an abundantly available mineral.

[82] Ibid. p.85

to be explored in terms of improvement in methods of mining from an environmental point of view, rather than formulating policies based on an assumption that such issues will permanently block development of certain portion of resources. (Incidentally, despite being highly ecologically fragile and environmentally sensitive, SAIL has been granted lease in Rowghat area. This proves that there are technologies and methods of mining available where the impact on environment and ecology can be minimized.)

7.1.6 As noted earlier, the global iron ore resource base is estimated at about 386 billion tones (as per US geological survey report 2007, estimated deposit of iron ore is more than 800 Billion tonnes). If one assumes the global steel production growth rate to be sustained at the current rate of about 5 per cent annually till 2010, 4 per cent till 2020, 3 per cent till 2030and at 1.5 per cent thereafter, and assume further that 29 per cent of the total Fe (iron) to have come from scrap, the cumulative consumption of iron ore till 2080 will be as shown below. The production growth for merchant pig iron production has been assumed at 1.5 per cent annually.

Table 20 **: Global Iron Ore Consumption Forecast (Billion tonnes)**

Year	**Cumulative Iron Ore Consumption (Billion tonnes)**
2050	158
2055	186
2060	215
2065	247
2070	281
2075	318
2080	357

7.1.7 Thus, at the current rate, the current resources should last beyond 2080. With new finds from more intensive exploration, the resource position would improve even further, lengthening the life of the iron ore resources.

7.1.8 While talking about possible shortages of iron ore, one will have to see if it is only in the domestic national resources or there is a global context to it. As one can see from the estimates above, there seems to be no immediate fear of iron ore getting exhausted very soon to cripple the investments made in the steel industry at a global level. This factor should give a comfort to the steel industry, considering the strengthening of the forces of globalization and the greater integration of the national markets into the global market. Several major steel producing nations in the world, such as Japan, Korea, China and Taiwan, are almost completely dependent on imported iron ore. It may be noted that dependence on imported iron ore has not deterred the development of steel industry in these nations. Japan is fully dependent on imported ores i.e coal and iron ore.

7.1.9 Analysis of the resource position at the national as well as global level suggests that iron ore availability is not likely to be a constraining factor for the growth of steel

industry for several decades to come. Therefore, there is not enough justification for obstructing the market mechanism by imposing restrictions on trade of iron ore. As has been the experience of India and several other countries in various sectors, restrictions on trade can result in loss of efficiency, and can have potentially adverse effect on capital formation and investment into mining technology and exploration. Trade restrictions are also known to distort market mechanism, resulting in rent-seeking by certain segments of the value chain at the cost of the other segments. In this particular case, distortions can affect the economics of steel industry's downstream segments as also the mining segment.

7.1.10 While our analysis so far pertained mostly to the national level resource position of iron ore, the steel industry has also pointed to the emerging imbalance between reserves, production and exports of iron ore from different regions or states of India. For example, it has been pointed out, citing the basic statistics of the Indian Bureau of Mines, that Karnataka will see a depletion of its resources faster than the other states and the steel plants there will face a severe iron ore crunch. (Incidentally, there is no clarity yet on when the development of steel plants in this region would actually materialize since implementation of projects has been tardy on account of various local issues.) This is being argued with the fact that the reserves of haematite ores in the state are only 1148 million tones; and with the iron ore production at 41 million tonnes annually, the state records a mining rate of 3.57 per cent, standing next only to Goa. Although the industry statistics of production do not tally with the IBM numbers, even considering the lower IBM figure of 33.7 million tonnes of annual production, the mining rate at 2.93 retains the same relative position for Karnataka among the states. [83] Export ratio for the state is also among the highest in the country. The steel industry, in particular the plants in Karnataka, have argued that while the state accounts for 10 per cent of the total reserves of haematite ores and 21.8 per cent of the country's production, makes up for nearly 36 per cent of the total exports from the country. Therefore, the industry shows concern over future iron ore security for the plants in the regions in particular. The concern is based on the projection of 34.5 million tonnes of iron and steel capacity in the state by 2015

7.1.11 The mining industry, however, contends that the reserves position in Karnataka could be higher as the estimation of reserves are based on only 40 meters depth, whereas mining is possible up to 200 meters. It further says that with appropriate mining technology, the State can use up its huge magnetite resources paying full respect to the environmental concerns as well. In fact, the issue of exportability of the ores from Karnataka has been seen quite differently by the Working Group on Minerals. The group has expressed concern over poor infrastructure, especially shortage of power and water leading to insufficient domestic consumption locally. [84] While it may be possible to raise the power supply to the region through adequate investment, but, without sufficient water, development of the steel projects will be a challenging task. This is specifically the case with the Bellary Hospet area which accounts for the bulk of the iron ore of Karnataka.

[83] The steel industry production figure for iron ore in Karnataka seems to have taken into account the illegal mining as well.

[84] Report of the Working Group on Minerals for 11th Five Year Plan, 2007.

7.1.12 while the regional demand-supply situation can be sometimes significantly different from the national level situation, formulation of the national trade policy on the basis of such regional issues has severe limitations. The regional concerns are better tackled through policies other than those of international trade.

7.1.13 In fact, one natural way of tackling regional demand-supply imbalances could be inter-regional trade and movement. For example, iron ore can be shipped from the West coast to the East coast, if economic considerations demand. This option of tackling regional imbalances should not be lost sight of, especially when inter-country trade of iron ore is already happening over large distances through the sea route.

7.2 On-Homegeneity of Iron Ore and Supply and Demand Mismatch

7.2.1 Iron ore comes in the form of lumps and fines – distinguished by their size. This heterogeneity needs to be considered explicitly in any policy debates. Relative shares of lumps and fines in production depend on the type of deposit as also on the technology engaged in mining. The miner at the mine head itself needs to further crush or calibrate to bring the final products to a desired mix. As discussed earlier, for years, the experience in India has been that lumps have been in greater demand with fines being in a situation of excess supply. It came to the point that huge deposits (mountains of it, some say) of fines came up, with some of them being exported at the prevailing throwaway prices.[85] The global prices were so low that iron ore exports were never so attractive. This was not a case only with India but with other iron ore producing nations as well. Investments were low globally and mining companies were going bankrupt which in turn facilitated consolidation in the industry. The companies like CVRD, Rio Tinto, BHP Billiton etc., the merged entities, could not have operated in single nation economies. While there was supply side restructuring and consolidation on a global basis, the demand for iron ore shot up with China raising steel output at breakneck speed driven by the country's surging demand for steel. The creation of a global market and the rise in demand for iron ore from China created the unprecedented opportunities for Indian iron ore mining companies.

7.2.2 However, if one looks at the projections of demand for iron ore in terms of fines and lumps, (**Tables 15, 16, 17 and 20)** the relative situation is likely to reverse in future and will leave compulsions to export lumps and import fines if the current ratio of fines to lumps are maintained in total production. For example, in **Model-3** of **Table-17**, if 178 million tonnes of iron ore is to be produced, total lumps generation will be 71.2 million tonnes whereas the demand for it will be a little over 53 million tonnes. In the case of fines, whereas 125 million tonnes will be the demand, production will be 107 million tonnes. It may be noted that fines to lumps ratio has been increasing on an average of one

[85] The mining industry maintains that about 60 million tonnes of fines and concentrates are lying unused in the mines of SAIL alone. While the figure could be an exaggerated one, there is no dispute that huge deposits are present there. Fines are also lying at TISCO mines, claim some industry sources which till recently was selling the surplus production in market. It has been reported by a sponge iron unit in the organized sector that they were selling waste iron ore fines with about 62% iron content at about US$6 per tonne in the late nineties, whereas the product fetched a price of about $135 per tonne recently.

percent each year. Further, as we go deep in mining there is more generation of fines. One possible implication of this trend will be crushing of high value lumps into fines to trade in both fines and lumps in both directions. Alternatively, if the demand for fines is to be met exactly from domestic sources, the total iron ore production will have to be raised to at least 208 million tonnes and the production of lumps in that case will be 83 million tones, leading to a minimum level of export of 30 million tonnes. This is only a hypothetical issue as in a market economy with both State and private players in the market, it will be impossible to manage supply volume exactly equal to the domestic demand. Further, there are already certain long term contractual export commitments as also the fact that exports from Goa/Redi region are not bound by usual quality based restrictions. Given the geographical location of mines and the regional balance in demand and supply of iron ore, it may not be possible to adjust these 30 million tonnes from Goa/Redi or the committed export quantities may have to be produced additionally. This suggests that the actual export compulsions will remain larger than this figure.

7.2.3 Under the above scenario, the requirement of export of iron ore will have to be raised or maintained out of pure market compulsions. Any options to avoid such an outcome have other pitfalls. For instance, a change in technology favouring higher use of lumps will raise the costs of production of steel. Alternatively, if the lumps are crushed to meet the shortage of fines, it will deprive the steel or the iron ore industry a premium that the lumps command on the world market over fines.

7.2.4 Over 84 per cent of the iron ore that is being exported today are fines. Thus, exports are not depriving the local industry of its inputs or leading to higher prices in the home market by creating artificial shortages. Exports have taken place to seize the emerging global opportunities in the recent past and to get rid of the residual surplus that has no domestic takers. Our demand projections suggest that the country may need to export lumps in future due to lack of adequate domestic demand. Thus, any export restrictions based on the perceived scarcity of either fines or lumps actually create further distortions in the other segment that is under the condition of excess supply. This factor again underscores the potential loss of efficiency that trade distortions can cause.

7.3 Trade, Competition and Efficiency Issues

7.3.1 It will be necessary to examine the implications of a forced reduction in exports of iron ore on the rest of the economy especially the balance of payment, trade balance with China, employment, investments already made in mining as also on developing infrastructure to support iron ore mining exports etc.

7.3.2 India’s iron ore exports were valued at US$3860.3 million in 2005. This constituted 3.76 per cent of the total value of exports from India that year. In terms of relative ranking, iron ore was among the top ten exporting items. Bulk of the iron ore was exported to China and exports to that country made for 86.4 per cent of the total value of the iron ore exported. Iron ore exports accounted for 49.6 per cent of the total export value to China.

7.3.3. India's iron ore prospects remain mainly with China. While China has started tying up a lot more supply through long term deals and through investment in mining projects, they have continued to import India's iron ore, which could be on account of a few strategic reasons**.** One, this will give them a bargaining strength for their contract purchases. Two, lower freight costs from India provide them with another advantage. However, as we noted in a previous chapter, China's demand for Indian iron ore is unlikely to be sustained at the current level for a long time due to increased supply from Australia and Brazil.

7.3.4 A phased reduction of iron ore, by administrative fiats or otherwise, may not have any major implication on the overall balance of payment position of the country. However, the implications may be significant in the trade balance between India and China. China ran a trade surplus of over $4 billion in 2005 and if exports of iron ore is restricted this will increase further to raise complicated bilateral issues.

7.3.5 The steel industry has argued that while China imports cheap iron ore from India, it floods the Indian market with steel that is produced from that. This argument is, however, not supported by facts. Firstly, China's imports of iron ore are not at a cheap price. In fact, the quantum of Chinese demand has pushed up iron ore prices quite dramatically. China's own iron ore cost is high too because of high costs of mining and beneficiations due to poor quality of their ores. Secondly, concerns about Chinese steel flooding Indian market are not evident in data yet. India's exports to China in terms of value stood higher than what was imported from the country. A scenario where Chinese steel plants can actually buy iron ore and export back steel despite freight cost and duty protection to steel industry, would indicate a large degree of inefficiency in real terms associated with the Indian steel industry, which is not the case.

7.3.6 At a macro level, trade restriction leads to inefficiency in resource allocation. An artificial trade barrier may lead to price distortion and subsidization of an inefficient industry at the cost of an efficient one competing for the same factor resources like raw materials, capital or land. In fact, the near stagnation of the steel industry in India in the past and complete absence of competitive strength at global level were observed at a time when prices were regulated and raw materials were provided to the industry on captive basis having no regard to their economic or financial costs. The iron ore utilization efficiency in the traditional plants of SAIL has been very low as can be seen from the figures worked out from their annual reports itself - 1.8 tonne, 1.71 tonne and 1.82 tonne of iron ore per tonne of crude steel produced in the years 2004, 2005 and 2006. These figures are much higher not merely in global comparison but also when some of the efficient domestic private mills are considered. This points to the existence of very high degree of inefficiency in resource utilization.[86] The statistics mainly reflect the inefficiency brought in by the complacence generated by captive mines. The situation was no different for Tata Steel. It is only when the steel prices were deregulated and the new efficient players came in buying iron ore resources at market prices that the competitive face of the Indian steel production came to be noticed. Absence of an open

[86] Annual Reports of SAIL for the respective years.

market did not allow for the discovery of the efficient prices for investment to be drawn into iron ore mining. In fact, today, the steel industry paid the most for this through higher prices and resultant current shortages holding down its own growth.

7.3.7 Further, the government's preference for allocation of mines on captive basis, the number of steel producers of significant size dependent on the merchant iron ore market will remain relatively small. This will not only restrict growth opportunities to the merchant iron ore miners, as discussed earlier, but also bring hurdles before them in their efforts to reach economies of scale and upgrade technology for more efficient production and resource utilization. Such conditions will make merchant iron ore mining industry unattractive for new investment.

7.4 Agglomeration and Incentives

7.4.1 In order to take care of the imbalance in fines market at present, there is a suggestion that the government should provide incentives for agglomeration. It is suggested that pellets can be produced at the mine head and transported to the customers. This will also be an environmentally better option.

7.4.2 The issue of economics of pellets projects has already been discussed in an earlier chapter. If merchant pellet plants are to be set up, their iron ore sourcing will have to be from non-captive sources. If one owns a mine, the entrepreneur will have security over supply of iron ore and will also enjoy cost stability. However, buying iron ore fines from the market and making pellets for merchant sales is a risky business. One is also not sure whether there will be enough takers in the DRI sector considering the costs of conversion of about Rs.800-900 per tonne from concentrates to pellets. As far as the integrated plants with blast furnaces are concerned, agglomeration is economically a more attractive proposition and whether there is any incentive or not they will make use of fines to the maximum extent as long as they are merchant buyers of iron ore in any form. The smaller merchant miners will also find it hard to have the economies of scale required for a pellets plant if they have to merely utilize the fines generated in the process.

7.4.3 To encourage mine owners to set up pellets plant, the government may help them with various incentives like higher level of depreciation on plants and equipment, income tax benefits, reduced or zero royalty rate etc. However, the issues related to export of iron ore may not change much by converting iron ore into pellets. If merchant pellet plants are still restricted from exporting (pellets), investment could remain thin despite the incentives. On the other hand, if iron ore exports are restricted or banned and the same is not applied on pellets (considering it as a value added product), there may be a natural movement to pellets production and exports up to the point the world market absorbs. But, incentives may be necessary for merchant miners to ensure economic viability of such projects, considering the uncertainty of the world market and conversion costs. For steel mills with captive mines, the decision should be left to them whether they set up a pellets plant or not. There may not be any need for any incentive for captive mine owners for pellets or sinter plants.

7.5 National Mineral Policy

7.5.1 National Mineral Policy (NMP) of 1993 was introduced with an aim of extending the operational field of private and foreign players and also to enhance technology in order to promote rapid growth in this sector. It has been now over a decade since this new policy has been in practice, but as a matter of fact, neither the growth nor the private-foreign participation in this sector has been satisfactory till now.

7.5.2 The current policy regime has been critically and extensively discussed in various forums. The issues, more specifically those related to the regulatory framework in the sector, have large acceptance and a general consensus is building on the need to bring in the necessary changes. Instead of going afresh into all these matters, the best reference point for any discussion would be the observations made by the recently constituted Hoda Committee on mineral policy. It is relevant to bring out some of the major recommendations and have a critical view on those especially in the context of ownership and leasing relationship of mines and domestic use and export of iron ore.

7.5.3 On the issues related to exploration, the Committee was strongly critical of the existing provisions in the policy and has blamed the regulatory framework for bulk of the problems in the sector. The committee found that the NMP did not provide adequate security of tenure to the Reconnaissance License (RL) and Prospecting License (PL) holders at each stage of the progress. Though it acknowledges that the holder of a PL has a preferential right to obtain a Mining License (ML) over any other party, but it does not provide them with the actual right of obtaining an ML. The existing mineral policy and the law accommodates state organizations to undertake mining and provide them with preferential treatment in prospecting and mining which eventually brings down private investors' confidence level. This, in fact, raises a significant competition policy issue in respect of unfair use of the authority of the state. MCR gives the state government the right to pre-empt a miner's minerals at any time subject to the fair market price being paid to the lessee. This right can be exercised at any stage of the ongoing operation, regardless of miner's marketing commitments. Provision of this kind, eventually increases uncertainty surrounding the project and dissuades private and foreign investors. Rule 27(3) of MCR allows state government to impose some obligations on the applicant which are unknown to them till they get the mining lease. Thus the applicant comes to face unexpected additional obligations, which they may not have been prepared for. To encourage FDI and also private investment to quickly raise iron ore mining capacity in the country, the government will have to provide adequate security to investment and continuity of tenur so that the exploratory investments are raised significantly. There are several other inter-related issues in the same context as discussed below.

7.5.4 The Committee also found the division of power and responsibility between the state and the central government as confusing. The NMP states that the centre and the states will play their regulatory roles in their respective domains. There is a confusion among the investors, relating to the relative role of the state vis-à-vis the centre. There is no transparency in delineating respective functional areas of the state and the centre. NMP, MMDR or MCR - none of these rules contained there or the Acts specify

guidelines for allocation of mines prospected by the public agencies. This vests the state government with an opportunity of arbitrary practice. For both notified and non-notified areas, the state government regulates the process at its own discretion, without paying any attention to the principle of "first-come-first served".

7.5.5 There are a few other technical issues related to size and transfer restrictions. The size of the areas stipulated for exploration activities especially PL, RP is insufficient to undertake the necessary exploratory operations considering the massive initial investments required and the potential risks inherent in such businesses. The Rule 34, MCR, empowers state governments to reduce or exclude any area specified in the license. This again contributes to uncertainty arising out of the arbitrary powers endowed with the state. Also, sometimes transfer of PL and ML becomes necessary for the development of the mining sector. There are some companies which are totally devoted to prospecting and they transfer their interest involving the use of the mining leases to some mining companies for royalty, cash payment etc. Similarly large mining companies very often transfer their rights to some small mining companies (who have qualified all pre-requirements) on sub-leasing basis unable to gain economies of scale from their own fixed costs and the smallness of the operation. Unfortunately, the actual process of transfer of PL and ML is not transparent. Hence the provision of transfer of PL in MMDR Act can not be utilized effectively.

7.5.6 This study fully agrees with the observations made by the Hoda Committee and considers that these should be the basis for further thinking and reforms in the country's mineral sector. The main observations are as follows.

A. Insufficient Exploration:

- Exploration efforts have not been satisfactory and up to the mark. It has been widely believed that the country's mineral potential is far above what has been explored so far. There are both institutional failure and also technological backwardness involved in it.
- Given incompetent and obsolete technology, Geological Survey of India (GSI) is incapable of taking up even a preliminary (regional) exploration activity which in turn inhibits the whole process of development. GSI conducts regional exploration on four phases, namely P1, P2, E1, E2. Each of these phases involves huge cost, long gestation period and therefore high risk[87]. Domestic and foreign investors thus don't want to get involved in such high risk ventures unless there are adequate and appropriate incentives for them for the same.
- Since the work done by GSI is continued to be the main basis for investment in mining, the actual exploration so far, has been unpleasant.

[87] After spending considerable amount in different activity therein, it might well turn out that the area does not bear any commercially exploitable deposit. In that case, the whole endeavors just go in vain.

B. Procedural Delay:

Since the whole procedure of mining operation, right from the beginning of applying for reconnaissance permit to the end of getting mining lease, incorporates a series of unavoidable lengthy bureaucratic procedure. The whole process eventually leads to massive delay to commence mining operation. This acts as a major deterrent to the investors.

C. Lack of Supportive Infrastructure:

There are also some genuine difficulties related to infrastructure, which need to be focused on. The sector still lacks in modern technology, proper transportation facilities etc. which in turn is dissuading private and foreign investment. For example, the possibility of many more large integrated steel plants coming up in the south western region is limited mainly because of inadequate of power and water. The states like Goa and Karnataka have failed to attract steel mills in a significant way due to lack of power, water and other infrastructural bottlenecks.

7.5.7 As far as national mineral policy issues are concerned, the main problem in India is that a lot of investments are needed over a short period of time, not only to meet the rising domestic demand but also to tap the global opportunities in each area. With the kind of developments in these industries globally as also in the industries based on them, continuous government involvement in these businesses does not make sense. These industries are no longer considered critical from any strategic or national security point of view for which the government involvement could be necessary. Iron ore can be an exhaustible resource but not iron. Almost the entire quantity of iron can be recycled. Therefore, leaving aside the so called strategic resource conservation argument, if private capital is to be encouraged and drawn into this sector, not only that the entry barriers are to be removed but also necessary operational and ownership based freedom have to be provided to ensure safety of investment and profitability in the business.

7.5.8 Insufficient exploration in mining sector also has been seen as a consequence of lack of investment in this sector. Since the restrictive mineral policy does not provide full exposure to the private and foreign players to operate and does not provide adequate incentives to initiate the project, the actual progress in exploration has been extremely low. Over reliance on government, so far has been proved expensive viewing at the insignificant exploration and limited public investment in mining by PSUs like GSI and MECL. Moreover, exploration activity involves a long gestation period and risky investment. In the absence of an investment-friendly atmosphere and adequate remuneration, no investment is going to come in this sector.

7.5.9 Poor infrastructure in mining sector is an outcome of low investment. Infrastructural facilities are to be improved in order to draw private investment. Given government's inability to provide adequate infrastructural facilities, it is necessary to attune mineral policy to seek investment in infrastructure through private initiatives.

7.5.10 National Mineral Policy is biased against large stand alone mines. Most of the mines are allotted to the small mining enterprises (SME). SME confines their operation within a small area and are completely dependent on the existing infrastructure built by the government agencies. Due to obvious reasons, the SMEs cannot set up their own infrastructure. This drawback in turn results in over utilization of existing infrastructure leading to higher transportation costs. It also at the same time leads to significant economic costs to the nation as government resources are sucked into continuous maintenance of the infrastructure for them. The iron ore industry in India remains highly fragmented with very few large players operating in it. Further, a very large chunk of the mines and iron ore deposits are lying as captive to the steel makers. Whereas there was potential in many such mines to grow to global size and technology levels, the captive mining has restricted such growth potential. This is, however, not to say that the captive mining has been worse than the highly fragmented small mines. There is also a point raised that since the captive mine owners do not have to haul their materials to a regionally dispersed wide customer base, they do not see sufficient incentive to build their own infrastructure on a wider scale which results in poor infrastructure development in and around the mines under captive allocation. This could be true although this study did not undertake any field survey to establish such a point. There is a need to scale up the mining operations and, therefore, to allot mining leases to large players with significant financial strength to be able to capitalize on the economies of scale as also to bring in modern technology and infrastructure. Mining operations in India should follow the Australian or Brazilian model to remain globally competitive and efficient.[88]

7.5.11 In the previous phase of the commodity cycle, the low world prices of most of the major minerals led to lowering of investor confidence keeping the sector starved of investment funds. Most of the major minerals, especially those related to metals like, coking coal, iron ore, manganese ores etc. gave very little profits to the owners. Unable to run the businesses, the mining companies, one after another, put themselves on the block which led to huge consolidation in the mining industry globally through mergers and acquisitions. The process of consolidation of the mining industry globally was backed strongly by the favourable conditions in the world market following Chinese economic and metals boom which helped longer term stabilization of the metal and minerals prices globally. So strong was the recovery that within a few years the related industries came to be seen as good prospects for further investment. In India too, much of the growth has been achieved in response to this change in the global market. Production improved initially from the existing capacities and then from the incremental capacities added with minimal investments in the existing mines itself. However, large scale projects are yet to take shape. Major problems here are the policy based restrictions.

7.5.12 The motivation of the government in relation to mining sector is to achieve a sustained development through proper utilization of mineral resources to enable social wealth augmentation and employment generation. These objectives are achievable only when there is sufficient investment coming into this sector. Mining was a less profitable business in India, barring a few areas like iron ore recently, due to a number of factors.

[88] CVRD, BHP Billiton, Rio Tinto for instance set up their own infrastructure, utilizing the benefit of economies of scale.

These include high transportation cost, lack of infrastructural facility and modern technology, and the over all huge costs incurred in exploration and prospecting operation. In this light, mining industry has contended that it is essential to provide some fiscal incentives to the investors in the form of creating favourable conditions in respect of dead rent, reduction of income tax liability by allowing for higher level of depreciation of plants and equipment, allowing the costs of reforestation and other restoration costs of the mining areas after mining is over to be adjusted as current costs on a proportionate basis, etc. This will make the business of mining economically attractive and help integrate this sector with the global economy with improved competitive strength.

7.5.13 There have been certain questions over the prevailing system of royalty in the country. The current royalty rates on most minerals especially iron ore in India are low, in comparison to other mineral rich countries. Canada, Chile, South Africa do not levy any royalty. China charges 2.5 per cent to 5 per cent on ad-valorem basis. The royalty rate in India varies in the range of Rs.4 to Rs.27 per tonne. These rates are abysmally low considering the price of iron ore either in domestic merchant sales or for exports. The rates can be increased to about 5 -10 per cent ad valorem of the selling price. The selling price may be defined as the value of the first transaction in the case of domestic merchant sales, fob export value for exports and a constructed price based on the average of the two for captively mined iron ore. In the case of captive mines of the steel makers, since there are not merchant sales involved, a constructed value based on the market price of iron ore, based on the prices announced by a public sector company and the export price, can be taken as a reference. The merits of an ad-valorem royalty rate notwithstanding in terms stability and transparency to the system, with so many different prices, the deciding on the reference price will be an administrative nightmare. This may also bring in unnecessary governmental interventions leading to obvious negative outcomes. The government will have to make effort to build a stable and a transparent system.

7.5.14 Another big constraint to growth in the Indian mineral sector is the long time it takes for procedural clearances due both to inefficiency at the administrative levels and the nature of the procedures itself. The procedures emanate from the policy framework and also a mind set. The government has already seen those to be restrictive and obsolete. It consumes a considerable length of time out of a stipulated time period to commence mining operations. Delays bring in uncertainty into the business and raise intensity of the risk element to hold investment interests down. This whole cumbersome process of attaining mining lease needs to be streamlined to create an investment friendly atmosphere. The forthcoming changes in the Mineral Policy are expected to address many of these issues.

7.5.15 With a few exceptions namely, iron ore, manganese etc. the domestic demand for minerals is not so high. This domestic demand is incapable of grabbing the whole domestic production. The major driving force for such minerals comes from export. Again, the technology usually used by the domestic firms is not good enough to explore and work on joint ores that is found in different forms. Export, therefore, is the unique solution to deal with these problems.

7.5.16 Significant low skill employment that the mining industry generates is also important from a larger policy perspective in the context of the massive socio-economic backwardness in the states (or regions) where mineral deposits are high. Even from this perspective that growth of investment in mining sector and the associated infrastructure should be encouraged. Trade restrictions on mining are at variance to these socio-economic interests.

7.6 Captive Mining

7.6.1 This subject has been discussed in other contexts above. The whole issue of prioritizing allocation of iron ore mines to steel makers is to be seen not only in the context of profitability of and benefits to the steel industry but in the larger perspective of the overall efficiency gains for the economy at large, especially looking at comparatively with the option of running the business of mining independently with vertical linkages with an independent steel industry.

7.6.2 In India, the steel industry development, for a long time remained associated with captive mining. Tata Steel, the erstwhile Indian Iron and Steel Company and SAIL- all of them were provided with required mining licenses in designated mines. This all integrated operation served certain purpose when there were no other independent mining interests and steel prices were controlled by the government on cost basis. While captive mining was not seen as a very significant profitable proposition when the iron ore prices worldwide were low, today, with the same going over the roof, the steel industry perceives significant competitive advantage in owning iron ore mines themselves over those who are dependent on purchased ores.

7.6.3 The steel producers, especially Tata Steel and SAIL, argued citing the recommendations of the Dang Committee, set up by Ministry of Steel in 2005 for framing guidelines on preferential allocation of leases for iron ore mines that iron ore mines should be allotted on captive basis to the steel makers for following reasons:

- Iron ore is a limited resource and hence should be restricted to captive use only.
- Steel mills do not enjoy any comparative advantage in the market because of high freight, high cost of coking coal and energy, poor infrastructure; hence for the sake of viability steel makers should get benefit at the extraction cost of iron ore.
- The “value addition” generated by steel company to the economy is enormous and outweigh the ‘cost favor’ that steel makers enjoy when allowed to have captive mines.
- The countries, other than India, which are rich in iron ore, do not pursue captive mining policy because per capita availability of iron ore is very high in these countries.[89]

[89] This observation is not universally correct. Integration of mining and steel making business depends on specific economic conditions and opportunities available. Most of the efficient steel producers are not backed by captive iron ore.

- Tata Steel, SAIL use modern technology in mining operation and therefore are efficient.
- Currently, several large integrated plants are heavily dependent on NMDC for iron ore supplies. Once these plants expand their capacities as per their ongoing programmes, given the limited resources, NMDC may not be able to meet their growing demands. This will put them in at the mercy of the merchant iron market.
- Stand alone mine owners serve requirement of various steel producers like Sponge, Mini Blast furnance, Sinter and Pellet plants. As different plants need different type of feed, stand alone miner supply their requirement as well utilize the resource optimally. For example one large scale commercial mining company (NMDC) has resulted in large investment in steel sector in various locations in India by players such as Hygrade Pellet, ESSAR Steel, JSW, Ispat Industries, RINL and Vikram Ispat.

7.6.4 Iron ore producers were opposed to preferential access to captive mines for steel owners on the following grounds:

- There is enough iron ore available in the world and is accessible at international price. Again being a part of Gondwanaland, India possesses huge reserves of iron ore which is yet to be explored. Australia, for instance, being a part of Gondwanaland, has been able to increase its resource manifold owing to extensive exploration and excavation.
- With few exceptions, mainly in the US, CIS and China, which use captive mines partly for their operation, stand alone mining model is followed all over the world.
- Allowance of captive mines to the steel makers would have a detrimental effect on the overall growth of the sector. The implicit subsidy that steel makers get through lower price of extraction reduces the scope of the free market and therefore impairs competitive growth of the industry.
- Captive mines owners do not mine efficiently. Since the grade required for steel plants only matters to them, most of the time they extract that grade from easily extractable ore leaving the low ores to go waste.
- Stand alone mining owners, as opposed to captive mine owners, mine efficiently and can potentially undertake value addition activities like beneficiation, pelletisation, calibration, blending etc. they also invest in resource augmentation and create their own infrastructure.
- In captive mining there is no location specificity. Only the linkage between supply and unit is required. This in turn does away with the state's requirement of concession. Since captive mine owners obtain ore at the extraction cost rather that market price, the claim of value addition is not solely justified.

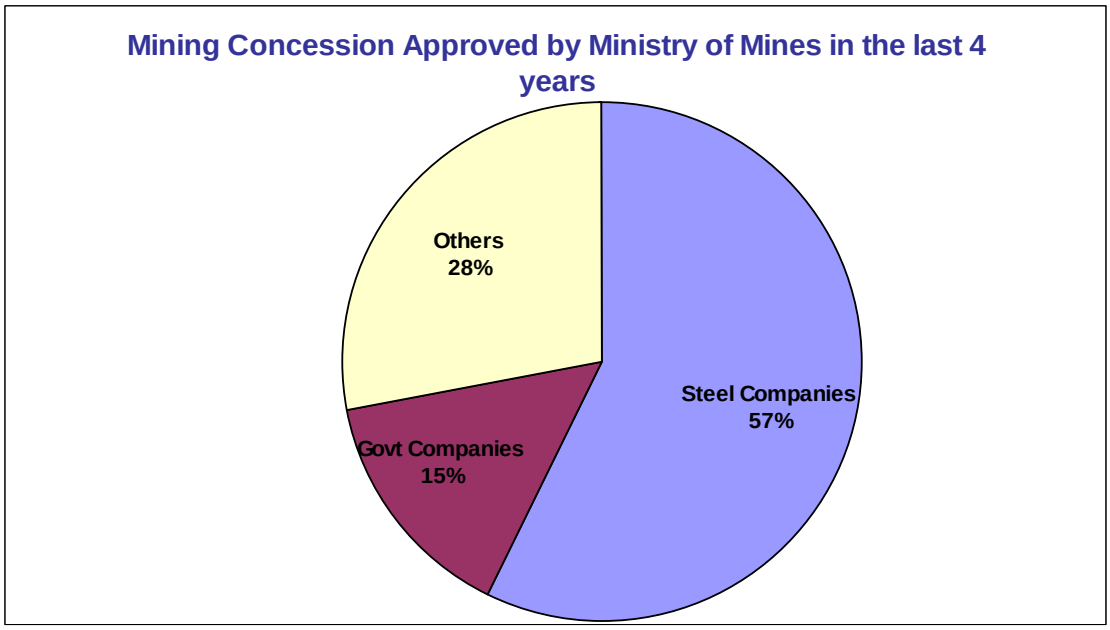
7.6.5 The current trends indicate that the government seems to have, in practice, already been giving a higher priority for captive mining. If all the steel making capacities are to come up in the way planned, iron ore reserves in future will be largely held by steel makers on captive basis. As per the MoUs signed and the steel project profiles announced, by 2012, out of a total national demand of 186.6 million tonnes of iron ore

demand, 120.7 will come from captive sources. By 2020, the corresponding numbers will be 380 and 267 million tonnes respectively. This means the domestic merchant iron ore market may not grow and the share of the merchant producers could drop significantly in the domestic market. The informal preference given in mining leases for captive purposes is also borne out by the data in **Table-21** and the chart below. In fact, more recent information show a further tilt to captive leases or leases to iron and steel companies in allocation of mining leases or in recommending for mining/prospecting leases by the state governments. Since the leases are of larger size on the average, in terms of mining area (naturally leading to larger size of deposits), the control over iron ore resources are coming increasingly under the user industries.

Table 21 **: Details of Mining Concession Approved by Ministry of Mines in the last 4 years**

(since 2002-03)

Steel Companies	**Area in hactares**	**Nos. of leases**	**Average area in Hactares**	**Per cent more than the avg**
Sub - Total ML	3540	23	154	**20.10**
Sub - Total PL	9919	40	248	**93.49**
Total	**13459**	**63**	**214**	**66.70**
Govt. Companies				
Sub - Total ML	325	1	325	**153.59**
Sub - Total PL	3199	10	320	**149.59**
Total	**3524**	**11**	**320**	**149.95**
Others				
Sub - Total ML	4295	77	56	**-56.47**
Sub - Total PL	2047	31	66	**-48.48**
Total	**6342**	**108**	**59**	**-54.18**
Grand Total	**23325**	**182**	**128**	
			Steel Companies	**13459.25**
			Govt Companies	**3523.69**
			Others	**6592.06**



7.6.6 There is a significant competition policy issue related to the captive mining. In fact, there are three different kinds of costs/prices the user industries are faced with in respect of iron ore. First, the cost of iron ore for those who have captive mines fall in the range of Rs.300-600 per tonne at plant. Then the iron ore sold by the government owned companies to large customers on a longer term basis is about Rs. 2000-2500 per tonne on comparable basis. The last, iron ore sold by the merchant iron ore companies to small and medium companies – falling in the range of Rs. 2500-3000 per tonne. While the latter category price differentiation is market driven, the captive ownership cost advantage comes from the discriminatory allocation of captive mines.

7.6.7 Although there seems to be some sort of restrictions on merchant sales of iron ore from those who have been endowed with mining leases for captive purposes only, there are instances of merchant sales, including exports, by companies including SAIL (merchant sales only) and Tata Steel. Without going into the legal and regulatory aspects of this issue, it has serious implications on the entire policy framework that is under discussion currently. If a steel producer with captive mining license can actually work also as a merchant seller of iron ore, the entire basis on which the desirability of providing raw materials security lies falls apart.

7.6.9 The recent policy adopted by the state governments to recommend mining leases only to those setting up steel plants within the states needs thorough review. The policies followed by the state governments may not be in congruence with the larger economic interests of the nation as it tends to distort the nature of competition in the market. This will create exclusivity of mining rights only to steel mills in a significant way. Hoda committee has recommended that captive mines and stand-alone mines should be allowed to co-exist.

7.6.10 From an efficiency and competition policy perspective, preference to steel makers in allocation of captive mines does not have solid economic footing. It may be, therefore, desirable to leave this issue to the market forces. Existing untapped mines (already explored and prospected) should be given for mining to the highest bidder, irrespective of whether there is plan for value addition or not.

Conclusions

The frequently encountered argument that the country's steel industry will run out of iron ore resources within a couple of decades or so does not stand vindicated on scrutiny of the facts. There are strong reasons to expect from international experiences that increased investment in the mineral sector, especially in exploration, will lead to new reserves and resources. Further, the country will still have a lot of haematite iron ore below 55 per cent or iron (Fe), not accounted for currently. These resources may be relatively costly but need not to be written off and ignored. At current prices of iron ore, these assets offer highly attractive conditions for extraction and merchant business involving them. At higher scarcity value, they will gain importance further in future.

At present, fines are being exported because there is no domestic demand for the same. This structural imbalance currently experienced in the Indian iron ore market will perhaps go away if the steel industry plans are to be considered. But plans indicate that we may have a problem exactly of the opposite kind with lumps turning surplus with shortages of fines. Of course, this situation will emerge only if the steel projects shape up as per plans. At present, the progress in almost all the major greenfield projects has been insignificant.

The estimates made in the study even under the most optimistic scenarios do not corroborate the rationality of the threat perception regarding iron ore availability. Exports will also be necessary to maintain a structural balance in the market between production and consumption of lumps and fines. Also, considering the specific problems of Goa/Redi region, exports from there will have to be continued. The bilateral agreements with countries like Japan and Korea would necessitate that such exports at the existing levels may be continued. Exports, thus, cannot be wished away. Exports of iron ore have been undertaken largely by merchant miners in the private sector. Any stoppage to exports could lead to closure of significant mining capacity as the volumes cannot be diverted to domestic use easily.

Closure of mines will involve naturally expected consequences involving loss of economic activities including jobs. A lot of investments made by the mining industry will also get into a jam. Further, at reduced domestic prices, the mining industry will not be able to mobilize enough resources for investment into this sector. This will not only leave the mining capacity constrained but also outdated with modernization backlogs kept unattended. The move to export restrictions and encouragement to captive mining will also lead to several competition issues in the market. The small and medium size steel makers will have to pay higher prices for iron ore compared to those who will reap the

full benefits of low costs and supply security associated with captive mines. It needs to be recognized that captive mining rights are not available at market prices and freely. Also, any benefits from integrating mining and steel making businesses are valid only when the iron ore prices are high in the market. Globally, despite the huge interests of the steel industry to acquire iron ore or coal mines, the mining industry is getting more and more specialized with high degree of technological advances. They have also been able to effectively lower costs of mining with their investments in modernizing mining operations and developing infrastructure. This has provided significant economic efficiency to the system. If opportunities are restricted for the Indian mining companies, they will be deprived of the economies of scale and remain inefficient forever in global comparison.

Annexure – 1

Sinter Plant/Pellet Plant Capacity

	2005-06	2006-07	2007-08	2008-09	2009-10	2012-13
BSP	6.5	6.5	6.5			8.5
BSL	6.2	6.2	6.2			8.5
RSP	3	3	3			4.5
DSP	3	3	3			4.5
IISCO	0	0	0			4
SAIL	18.7	18.7	18.7	24	24	30
RINL	5.2	5.2	5.2	8	8	12
TATA STEEL(Jamshedpur)	6.3	6.3	8.6	8.6	8.6	8.6
Jharkhand						4.5
Orissa						3.5
Chattisgarh						6.5
JSW Steel (Bellary)	4.2	6.5	7.5	10	10	13
JSW Steel (Jharkhand)						6.5
JSW Steel (West Bengal)						3.5
Ispat Industries (Dolvi)	2.24	2.24	2.24	2.24	5.3	5.3
Essar Steels (Vizag)	8	8	8	8	8	8
Essar Steel , Orissa						4
Essar Steel, Jharkhand						4
Essar Steel, Chattisgarh						4
Essar Steel,Hazira			1.2	1.2	1.2	1.2
JSPL		2.3	2.3	6.8	6.8	6.8
Bhusan Steel and Strips Ltd. Orissa		1.6	1.6	1.6	1.6	1.6
Bhusan Steel, Orissa			1.1	1.1	1.1	1.1
NINL	1.7	1.7	1.7	1.7	1.7	1.7
Mesco	0.7	0.7	0.7	0.7	0.7	0.7
KIOCL	3.5	3.5	3.5	3.5	3.5	3.5
Mandovi Pellets Ltd	1.8	1.8	1.8	1.8	1.8	1.8
Chowgule and Company	0.55	0.55	0.55	0.55	0.55	0.55
Stemcore			4	4	4	4
Mittal Steel						
Others	1	1	2	5	5	7.5
TOTAL Sinter+Pellets	53.89	60.09	70.69	88.79	91.85	143.85
TOTAL Sinter	35.84	41.24	45.54	63.64	66.7	79.2
Total pellets	18.05	18.85	25.15	25.15	25.15	64.65
East Total	20.7	20.7	23.5			82.8
South West Total	30.25					61.05

Annexure-2

China's Import of Iron Ore 2005 and 2006

	China's 2006 Iron Ore Imports By Sources						
	Total of Non-Agglomerated and Agglomerated Iron Ore						
		CY2006			*CY 2005*		*per cent change*
	tons	*US$1,000*	*US$/tons*	*tons*	*US$1,000*	*US$/tons*	
Australia	126821366	7220683	56.9	112178506	6114863	54.5	13.1 per cent
Brazil	76421150	5510482	72.1	54743477	3874464	70.8	39.6 per cent
India	74752656	4832191	64.6	68575550	5233802	76.3	9.0 per cent
S.Africa	12558661	818602	65.2	10552910	704625	66.8	19.0 per cent
Peru	4681529	300300	64.1	3360048	297157	88.4	39.3 per cent
Kazakhastan	4411397	319032	72.3	2251757	190718	84.7	95.9 per cent
Canada	3873251	368474	95.1	2785131	332363	119.3	39.1 per cent
Iran	3545270	215544	60.8	2121124	147145	69.4	67.1 per cent
Russia	2725335	212482	78	4282539	416245	97.2	-36.4 per cent
Venezuela	2622323	194454	74.2	2524357	204027	80.8	3.9 per cent
Chile	2351057	173945	74	1608598	135411	84.2	46.2 per cent
Indonesia	1987338	105458	53.1	991578	56233	56.7	100.4 per cent
Ukraine	1898464	154130	81.2	1476921	152461	103.2	28.5 per cent
N.Korea	1592277	76421	48	1290349	65675	50.9	23.4 per cent
Vietnam	1556516	65844	42.3	1150556	46063	40	35.3 per cent
Philippines	1178502	69445	58.9	550973	40322	73.2	113.9 per cent
Myanmar	701021	8800	12.6	322807	5973	18.5	117.2 per cent
Mexico	667513	49265	73.8	1569201	123030	78.4	-57.5 per cent
New Zealand	410427	13427	32.7	862590	26846	31.1	-52.4 per cent
Malaysia	332311	19135	57.6	397154	26485	66.7	-16.3 per cent
Mongol	317766	16615	52.3	162996	8409	51.6	95.0 per cent
USA	298271	25704	86.2	654215	56381	86.2	-54.4 per cent
Mozambique	176233	12808	72.7	309315	22615	73.1	-43.0 per cent
Thailand	170828	11250	65.9	44006	3103	70.5	288.2 per cent
Saudi Arabia	99252	7289	73.4	189300	16362	86.4	-47.6 per cent
Mauritania	75674	5465	72.2	20	0	0	-
Argentina	57692	3490	60.5	-	-	-	-
Libya	32572	2281	70	-	-	83.3	-63.7 per cent
Japan	6650	102	15.3	5456	443	81.2	21.9 per cent
Liberia	0	-	-	180404	13860	76.8	-
T.& Tobago	0	-	-	51490	4154	80.7	-
Bahrain	0	-	-	19832	3366	169.7	-
Others	42	6	142.9	1312	258	196.6	-96.8 per cent
Total	**326,323,344**	**20,813,124**	**63.8**	**275,214,472**	########	**67**	**18.6 per cent**

Annexure-3

Steel Capacity Planned

(million tonnes)

	2006-07	2007-08	2008-09	2009-10	2010-11	2012	2015	2016	2017	2018	2020
SAIL	13.9	14.6	15.5	17.7	19.7	20.7	27.1	24.1	27.1	27.1	27.1
RINL	3.6	3.6	6.3	6.3	6.3	6.3	6.3	9	9	9	9
TATA STEEL (Jharkhand, Brownfield)	5	6.8	6.8	7.5	6.8	7.5	7.5	10	10	10	10
Tata SteelJharkhand (Greenfield)						3	6	6	10	10	20
Tata Steel Orissa						3	6	6	6	6	6
Tata Steel Chattisgarh						0	6	3	5	5	5
JSW Steel (Bellary)	3.8	4.2	7	7	10	10	13	13	16	16	16
JSW Steel (Jharkhand)						3	10	6	10	10	10
JSW Steel (West Bengal)						0	6	6	6	6	6
Ispat Industries (Dolvi)	3.6	3.6	3.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	7.5
Ispat Industries (Paradweep)						0	5	3	5	5	5
Ispat Industries (Karnataka)						0	3	3	3	3	3
Essar Steels (Hazira)	4.6	4.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Essar Steel , Orissa						0	6	3	6	6	6
Essar Steel, Jharkhand						3	6	6	8	6	10
Essar Steel, Chattisgarh						0	3.2	0	3.2	3.2	3.2
JSPL	2	2	2	2	2	2	2	2	2	2	5
JSPL,Orissa		1.2	1.2	1.2	1.2	4.8	4.8	6	6	6	6
JSPL, Chhatisgarh					0		5		0	0	
Bhusan Steel and Strips Ltd.Orissa	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	1.5	1.5	6
Bhusan Steel,Orissa	1	1	1	1	1	1.2	1	2.5	1	1	3
NINL	1	1	1	1	1	1	1	1	1	1	1
Lloyds Steel	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Mittal Steel						3	12	6	12	12	12
Posco				3		6	12	12	12	12	12
Small Players through EAF / IF route	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	20
TOTAL	**58.1**	**62.2**	**72.5**	**80.4**	**81.7**	**108.2**	**182.6**	**162.8**	**192**	**190**	**217.9**

Source: Industry

Annexure-4

Global Iron Ore Reserves and Fe Content Estimates

Country	**Reserve Base**	**Fe Content**	**per cent of Global Reserves**	**Total Estimated Fe in the Iron ore**	**per cent age share of Fe in Global Total**
	Million tonnes	*per cent*	*per cent*	*Million tonnes*	*per cent*
Ukraine	**68,000**	**30**	**17.64**	**20,400**	**10.66**
Brazil	**61,000**	**67**	**15.82**	**40,870**	**21.36**
Russia	**56,000**	**55**	**14.53**	**30,800**	**16.10**
China	**46,000**	**33**	**11.93**	**15,180**	**7.93**
Australia	**40,000**	**63**	**10.38**	**25,200**	**13.17**
India	**25,000**	**55**	**6.49**	**13,750**	**7.19**
Kazakhstan	19,000	39	4.93	7,410	3.87
USA	**15,000**	**31**	**3.89**	**4,650**	**2.43**
Sweden	7,800	64	2.02	4,992	2.61
Venezuela	6,000	60	1.56	3,600	1.88
Canada	**3,900**	**64**	**1.01**	**2,496**	**1.30**
Iran	2,500	60	0.65	1,500	0.78
South Africa	**2,300**	**65**	**0.60**	**1,495**	**0.78**
Mauritania	1,500	67	0.39	1,005	0.53
Mexico	1,500	60	0.39	900	0.47
Others	30,000	57	7.78	17,100	8.94
Total	**385,500**		**100**	191,348	100.00

Annexure-5

Global Iron and Exports and Steel Production

Year	Iron Ore Exports (Million tonnes)	per cent growth	Steel Production (Million tonnes)	Ratio of IO exports to Steel Production (per cent)
1985	375.80	0.91	718.9	52.27
1986	370.00	-1.54	714.0	51.82
1987	367.80	-0.59	735.5	50.01
1988	400.90	9.00	780.1	51.39
1989	424.30	5.84	785.9	53.99
1990	397.10	-6.41	770.1	51.56
1991	398.90	0.45	736.2	54.18
1992	334.00	-16.27	719.6	46.42
1993	354.00	5.99	727.6	48.66
1994	383.00	8.19	725.1	52.82
1995	459.78	20.05	752.3	61.12
1996	455.07	-1.02	750.0	60.67
1997	481.48	5.80	798.9	60.26
1998	461.90	-4.07	777.3	59.42
1999	444.79	-3.70	789.0	56.38
2000	505.06	13.55	847.7	59.58
2001	501.92	-0.62	850.3	59.03
2002	533.49	6.29	903.8	59.03
2003	590.45	10.68	969.1	60.93
2004	646.04	9.41	1058.5	61.03
2005	718.95	11.29	1129.4	63.66

Annexure – 6

Expansion Plans of NMDC

(lakh tonnes)

Project	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Dep-14 & 11C	75.00	80.00	85.00	85.00	90.00
Dep-5	65.00	70.00	70.00	75.00	80.00
Dep-10/11A	45.00	45.00	50.00	55.00	63.00
Dep-11B	10.00	10.00	10.00	15.00	25.00
Dep-3*	-	4.00	10.00	15.00	20.00
Slimes	15.00	16.00	16.00	17.00	18.00
Total - BAILADILA Sector	**210.00**	**225.00**	**241.00**	**262.00**	**296.00**
DNM	55.00	55.00	45.00	36.00	25.00
KMS	10.00	10.00	10.00	20.00	36.00
Total- DONIMALAI Sector	**65.00**	**65.00**	**55.00**	**56.00**	**61.00**
Total - NMDC	**275.00**	**290.00**	**296.00**	**318.00**	**357.00**
Project	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Dep-14 & 11C	90.00	90.00	90.00	90.00	80.00
De-5	80.00	80.00	80.00	80.00	80.00
Dep-10/11A	63.00	63.00	63.00	63.00	63.00
Dep-11B	35.00	45.00	57.00	66.00	66.00
Dep-3	20.00	27.00	27.00	27.00	27.00
Dep-13*	20.00	40.00	63.00	63.00	75.00
Dep - 4*	-	-	0.90	0.90	13.50
Slimes	19.00	21.00	21.00	22.00	20.00
Total - BAILADILA Sector	**327.00**	**366.00**	**401.90**	**411.90**	**424.50**
Donimalai	16.00	-	-	-	-
KMS	45.00	63.00	63.00	63.00	63.00
Total- DONIMALAI Sector	**61.00**	**63.00**	**63.00**	**63.00**	**63.00**
Total - NMDC	**388.00**	**429.00**	**464.90**	**474.90**	**487.50**

** Subject to grant of Mining Lease*

Annexure-7

Reference Price of Iron Ore in China

(DMT/US$)

Date	FOB			CFR		
1/9/2006	50	-	51	66	-	68
1/16/2006	49	-	51	65	-	67
1/23/2006	49	-	50	66	-	67
1/27/2006	48	-	49	65	-	66
2/6/2006	49	-	50	65	-	66
2/13/2006	49	-	50	66	-	67
2/20/2006	52	-	53	68	-	69
2/27/2006	53	-	53	68	-	69
3/6/2006	53	-	54	69	-	70
3/13/2006	53	-	54	70	-	71
3/20/2006	53	-	54	70	-	71
3/27/2006	53	-	54	71	-	72
4/3/2006	53	-	54	71	-	72
4/10/2006	53	-	54	71	-	72
4/17/2006	53	-	54	70	-	71
4/24/2006	52	-	53	69	-	70
5/8/2006	51	-	52	67	-	68
5/15/2006	49	-	50	65	-	66
5/22/2006	50	-	51	66	-	67
5/29/2006	52	-	53	67	-	68
6/5/2006	53	-	54	68	-	69
6/12/2006	54	-	55	69	-	70
6/19/2006	54	-	55	70	-	71
6/26/2006	54	-	55	71	-	72
7/3/2006	54	-	55	71	-	72
7/10/2006	54	-	55	71	-	72
7/17/2006	54	-	55	71	-	72
7/24/2006	53	-	54	69	-	70
7/31/2006	53	-	54	69	-	71
8/7/2006	52	-	53	68	-	70
8/14/2006	52	-	53	68	-	70
8/21/2006	53	-	54	69	-	70
8/28/2006	52	-	54	69	-	71
9/4/2006	53	-	54	71	-	72
9/11/2006	53	-	54	71	-	72
9/18/2006	53	-	54	72	-	73
9/25/2006	53	-	54	71	-	72
10/2/2006	N/A			N/A		

Date	FOB			CFR		
10/9/2006	N/A			N/A		
10/16/2006	52	-	54	71	-	73
10/23/2006	53	-	54	72	-	73
10/30/2006	53	-	55	72	-	73
11/6/2006	53	-	54	72	-	73
11/13/2006	53	-	54	72	-	73
11/20/2006	53	-	54	72	-	73
11/27/2006	53	-	55	72	-	74
12/4/2006	53	-	55	73	-	75
12/11/2006	53	-	55	73	-	75
12/18/2006	54	-	56	74	-	76
12/25/2006	55	-	56	75	-	76
1/1/2007	N/A			N/A		
1/8/2007	56	-	57	76	-	77
1/15/2007	58	-	59	78	-	79
1/22/2007	58	-	59	79	-	80
1/29/2007	59	-	60	80	-	81
2/5/2007	59	-	60	81	-	82
2/12/2007	59	-	60	81	-	82

Annexure- 8

FOB Prices Indian Fines Ore for Fiscal 2006

(per DMT)

Loading Facility		**Barge**		**Transfer Vessel for below 100,000 DWT**		**No. 9 Berth**		**Transfer Vessel for above 100,000 DWT**	
Apr- Mar		2005	2006	2005	2006	2005	2006	2005	2006
Fines	Fe 63/63	$25.54	$30.39	$30.36	$36.13	$30.89	$36.76	$34.08	$40.56
	Fe 62/62	$24.61	$29.29	$29.46	$35.06	$29.98	$35.68	$33.12	$39.41
	Fe 62/60	$24.39	$29.02	$29.26	$34.82	$29.81	$35.47	$32.93	$39.19
	Fe 61/61	$23.74	$28.25	$28.50	$33.92	$29.10	$34.63	$32.16	$38.27
	Fe 60/60	$23.15	$27.55	$28.06	$33.39	$28.50	$33.92	$31.57	$37.57
	Fe 59/59	$21.33	$25.39	$26.03	$30.98	$26.62	$31.68	$29.65	$35.28

Loading Facility		**Barge**		**Transfer Vessel for**		**No. 9 Berth**		**Transfer Vessel for**	
Apr- Mar		2005	2006	2005	2006	2005	2006	2005	2006
Fines	Fe 63/63	$29.84	$35.51	$34.83	$41.45	$35.38	$42.10	$38.60	$45.93
	Fe 62/62	$28.69	$34.14	$33.56	$39.94	$34.13	$40.61	$37.40	$44.51
	Fe 61/61	$27.17	$32.33	$32.02	$38.10	$32.57	$38.76	$35.62	$42.39
	Fe 60/60	$25.93	$30.86	$30.78	$36.63	$31.32	$37.27	$34.40	$40.94
	Fe 60/59	$24.59	$29.26	$29.31	$34.88	$29.84	$35.51	$33.07	$39.35
	Fe 59/58	$23.58	$28.06	$28.30	$33.68	$28.88	$34.37	$31.92	$37.98
	Fe 58/57	$22.60	$26.89	$27.35	$32.55	$27.94	$33.25	$30.94	$36.82

Note: With fines tolerance above 20per cent and max 25per cent below 10mm & 20per cent max below 6mm.
Source: Iron Ore Manual 2006, Tex Report

Annexure- 9

Iron Ore Production and Consumption for Tata Steel

Crude Steel (in '000 tonnes)	4104	4731
Steel Saleable (in 000 tonnes)	4074	4551
Iron ore Consumed (in tonnes)	5986753	8486755
Iron Ore Produced from Captive Mine (Tonnes)	9803000	10834000
Balance Iron ore	3816247	2347245
Sponge Iron produced by		
Tata Sponge Iron	223686	205552
Tata Metaliks Limited	163000	315000
Iron Ore Consumed		
Tata Sponge Iron	345137	320415
Tata Metaliks Limited	260800	504000
Total Iron ore Consumed	605937	824415
Remaining iron ore (After non captive sale and captive transfer)	**3210310**	**1522830**
per cent of the total production	**32.75**	**14.06**

Appendix-A

LEVIES AND TAXES ON MINERALS UNDER VARIOUS ACTS AND RULES

I – Mines and Minerals Development and Regulation (MMDR) Act 1957 : various charges/levies

(a) ***Permit fee*** : This is applicable to reconnaissance permits and is to be paid annually at the rates fixed by the State Government being not less than Rs. 5/- and not more than Rs. 20/- per sq.km. Application for a reconnaissance permit is to be accompanied by a non-refundable fee at the rate of Rs. 5/- per sq.km.

(b) ***Prospecting fee***: This is applicable to prospecting licences and is payable in advance at the rates fixed by the State Government being not less than Re. 0.50 and not more than Rs. 5/- per hectare. Application fee for a prospecting licence is to be paid as per Schedule - II of MMDR Act 1957 and is payable at Rs. 50/- for first square km. and to Rs. 10/- for each additional sq.km.

(c) ***Fees in connection with mining lease***: Application fee for a mining lease is Rs. 500/- . In addition, a deposit of Rs. 1000/- is required to be made to meet preliminary expenses in connection with the grant.

(d) ***Surface rent*** : This is payable at a rate not exceeding the land revenue, as may be specified by the State Government and may vary from state to state. The rate of surface rent in West Bengal is Rs. 45/- per acre per annum whereas it is Rs. 2 per acre in Madhya Pradesh. In Maharastra, the rate varies in villages from 1 paisa to 2 paisa per sq. m. of non-agricultural area (NAA) used for mining and 20 paise per sq. m. in municipal areas.

(e) ***Security deposit*** : This deposit for the observance of terms and conditions is required to be made before execution of the reconnaissance permit/prospecting licence/mining lease at the rate of Rs. 20/- per sq. km for a reconnaissance permit, Rs. 500 per sq.km for a prospecting licence and Rs. 10,000/- for a mining lease.

(f) ***Dead rent***: The rates of dead rent are as specified in the Third Schedule to the MMDR. It varies from nil to Rs. 300 per hectare per annum depending on the area of the lease and the number of years.

(g) ***Royalty:*** Rates of royalty on minerals are specified in the Second Schedule to the MMDR Act. In India, royalty on major minerals is charged on both unit-of-production basis and on ad valorem basis. The unit of production rates are applicable to 30 minerals (excluding coal, lignite and sand for stowing) and ad valorem rates on the rest of the major minerals. At present, the unit of production rates are varying from Rs. 2.50 to Rs. 726 per tonne while the ad velorem rates are varying from 0.7 - 11.0 per cent.

(h) ***Mine Closure Charges: Scheme*** of mine closure was promulgated by the Central Government on 10 April, 2003 under the Mineral Conservation and Development

(Amendment) Rules, 2003. According to this, every mining unit has to submit a progressive mine closure plan and final mine closure plan. The former plan has to be submitted within 180 days from the date of commencement of such rules and the latter one year prior to the proposed closure of the mine. .

Financial assurance has to be furnished by every lease holder as follows:

II. A category mines :Rs. 25000/- per hectare and minimum Rs. 2 lakhs
III. B category mines :Rs. 15000/- per hectare and minimum Rs. 1 lakhs

The financial assurance shall be submitted in one of the following forms to Regional Controller of Mines or the officer authorised by the State Government in this behalf, as the case may be, or any amendment to it:

II. Letter of Credit from any Scheduled Bank;
III. Performance or surety bond;
IV. Trust fund build up through annual contributions from the revenue generated by mine and based on expected amount sum required for abandonment of mine; or
(d) Any other form of security or any other guarantees acceptable to the authority;"

(i) ***Stamp duty: (or transaction fee)*** : The rates of Stamp Duty for mining leases for a period of 20 to 100 years for selected states are given in table below :

Rates of stamp duty on mining leases in selected States in India

State	Period (Years)	Amount (Rs)	Rate (%)
Andhra Pradesh	20-30	First Rs. 1000 Next every Rs. 500 and part thereof	5 % 25 % of amount considered or 3 times of the amount as average annual rent reserved
	30-100	First 1000 Next every Rs. 500 and part thereof	5 % 25% of amount considered or 4 times of the amount as average annual rent reserved
Bihar/ Jharkhand	20-30	Rs. 5000-Rs 50,000 More than 50000 and part thereof	5 % of amount considered or 5 times of the amount as average annual rent received. 7 % of amount considered or 5 times of the amount as average annual rent reserved
	30-100	Rs. 5000- Rs. 50000 More than 50000	5 % of amount of amount considered or 8 times of the amount as average annual rent reserved. 7 % of amount considered or 8 times of

State	Period (Years)	Amount (Rs)	Rate (%)
			the amount as average annual rent reserved
Gujarat	10-30 In perpetuity		8 % for Rs. 100 or part thereof of amount considered or two times of the amount as average annual rent reserved. Same as above for 1/5th of the whole amount of rents which would be paid or delivered in respect of the first 50 years of the lease.
Karnataka	10-30	First Rs. 1000 Next every Rs. 500 and part thereof.	10 % Rs. 50 for every Rs. 500 or 3 times of the amount as average annual rent reserved.
	Indefinite term	First Rs. 1000- Next every Rs. 500 and part thereof	10 % Rs. 50 for every Rs. 500 or 3 times of the amount as average annual rent to be paid for the first 10 years of the lease.
Madhya Pradesh/Chattisgarh	20-30 30-100		7.5 % of amount considered or 5 times of the amount as average annual rent reserved. 7.5 % of amount considered or 8 times of the amount as average annual rent reserved.
Rajast-han	Indefinite term	Rs. 1000 - Rs. 50,000 More than 50000	30 % for Rs. 500 or part thereof amount considered or equal to the amount of every annual rent paid for the first 10 years. 50 % of every 500 or part thereof of amount considered or 1/5th of the whole amount of rent to be paid in respect of the first 50 years of the lease.
	In perpetuity	Rs. 1,000 - Rs. 50,000	30 % for every Rs. 500 or part thereof amount considered or 1/5th of the whole amount of rent to be paid in respect of the first 50 years of the lease
		More than 50000	50 % for every Rs. 500 or part thereof of amount considered or 1/5th of the whole amount of rent to be paid in respect of the first 50 years of the lease.
Uttar Pradesh	20-30	Rs. 900-Rs. 1000 More than Rs. 1000	125 % 62.5 % of amount considered or 6 times of the amount as average annual rent reserved.
	30-100	Rs. 900-Rs. 1000 More than Rs. 1000	125 % 62.5 % of amount considered or 10 times of the amount as average annual rent reserved.

II. Forest (Conservation) Act 1980 and/or Indian Forest Act: various charges/levies under

(a) ***Forest Produce tax and Forest passes/taxes:*** Tax levied on forest produce removed from forest areas and rate of forest passes, varies from State to State. For example, it is generally Rs. 5/- per trip and 8 to 12% of royalty in Dandeli area of Karnataka.

(b) ***Compensatory taxes/levies***: Compensatory afforestation charges differ from State to State and range from Rs. 25,000/- to Rs. 60,000/- per hectare of forest land diverted for mining. In the State of Bihar/Jharkhand, the Bihar Restoration and Improvement of Degraded Forest Land Taxation Ordinance, 1992 is in force. The rates vary with respect to mechanised, non-mechanised and underground mines and range upto Rs. 55 lakh per hectare. Rates also differ on the basis of forest density and range from Rs. 6 lakh to Rs. 125 lakh per hectare.

We mention below the synopsis of Compensatory afforestation and other charges in various states:

State	**Compensatory Afforestation Charges (Rs./per hectare)**	**Other charges**		
Orissa	23450/- **(in addition to CA charges various extra-legal charges in form of driver, jeep and petrol has to be provided by the lessee)**	36255/- per km (Fencing over safety zone)	13170/- (Regeneration of safety zone)	540/- (Protection of safety zone)
Jharkhand/Bihar	19790/- **(the lessee has to make the land available for compensatory afforestation and the cost for availing such land has to be borne by the lessee)**	122680/- per km (Fencing over safety zone)	11528/- (Regeneration of safety zone)	510/- (Protection of safety zone)
Goa	93268/-			
Karnataka	59650/- 1000/- (Lease rentals) 187.50/- (Supervision charges)	66500/- per km (Fencing over safety zone)	54200/- (Regeneration of safety zone)	protection charges for safety zone id one and half times that of regeneration charges

State	Compensatory Afforestation Charges (Rs./per hectare)	Other charges		
Rajasthan	36700/-	26000/- per hectare (penal charges)		
Madhya Pradesh	25000/-	**Cost of forest land in form of "pratyasha shulk" is being charged at the rate of Rs. 900000/- to Rs.1300000/-**		

In other states the rate of Compensatory Afforestation Charges ranges between Rs.35,000/- to Rs. 50,000/- per hectare for forest land diverted for mining

(a) Transit fees Rs. 18.68 per trip in Karnataka (other states also impose similar charges
Rs. 7/- per tonne for transit pass to forest department (Madhya Pradesh)

(b) Clearing of jungle : Rs.100/- per hectare

(c) Land development work: Rs. 500/- per hectare

(d) No of plants to be planted: 400 per hectare (Cost of each plant: Rs. 10/-)

(e) Fire protection works outer line Rs. 250/- per km
inner line Rs. 100/- per km

(f) Other miscellaneous charges: Rs. 300/- per km

(g) Security guard charges for safety zone area: Rs 2000/- per guard for each 60 hectares of safety zone

(h) Payment of extra-legal charges

For diversion of land for mining purposes, there is a provision of paying compensatory afforestation charges which have to be paid to the State Government once the Central Government gives in principle approval or stage-I clearance under Forest (Conservation) Act, 1980. Although these funds are themselves not fully utilised for on raising the forests, even then the State Governments are insisting for payment, apart from compensatory afforestation charges, many extra-legal charges such as provision of jeep, petrol and salary of the driver, etc. by the lessee for the period for which the forest clarance has been granted. Since this will not form part of the Consolidated Fund of the State government, it cannot legally charge for jeep, petrol and salary of the driver etc. Moreover, these extra-legal charges have a

tendency to make mining unviable. It is therefore suggested that these extra-legal charges should not be taken from the lessees.

(k) Net Present Value (NPV)

In its judgment dated 30 October, 2002 the Supreme Court had directed that in addition to the payment of compensatory afforestation charges, "the user agency shall also pay the net present value of forest land diverted for non-forest purposes. The present value is to be recovered at the rate of Rs.5.80 lakhs per hectare to Rs.9.20 lakhs per hectare of forest land depending upon the quantity and density of the land in question converted for non-forest use. This will be subject to upward revision by the Ministry of Environment and Forests in consultation with the Central Empowered Committee as and when necessary.

Subsequent to this decision, the Ministry of Environment and Forests constituted a Committee to propose an institutional framework for the management of Compensatory Afforestation (FCA). Based on the recommendations of this Committee, the Central Government in an affidavit filed on 17 April, 2003 had suggested that "for mining projects, there has to be a difference in approach for mineral of high volume and low value and minerals of high value and low volume. The levying of flat rates of NPV on per hectare basis will therefore not be rational. Therefore, the Committee recommended that in case of mining, NPV should be calculated @10% for the major minerals and 5% for the minor minerals to be levied on the annual royalty. This should be charged and paid in advance for a period of 3 years as royalty is revised after every three years. The calculation for this should be based on annual production, projections on a prevalent rate. This has the added advantage as if the market is buoyant, the state governments will get more. Further, the royalty is revised every three years and therefore the NPV will accordingly increase.

This order of the Supreme Court has been circulated by the Ministry of Environment and Forests to all the State Governments for compliance. The order, if implemented, will result in the payment of, in addition to the compensatory afforestation charges, the net present value ranging from Rs.5.80 lakhs per hectare to Rs.9.20 lakhs per hectare of forest land depending upon the quantity and density of the land in question converted for non-forest use. It may be submitted that the payment of such a huge cost at one time will result in the closure of most of the mining units.

The blanket fixation of NPV of Rs.5.80 lakhs to Rs.9.20 lakhs per hectare is also not reasonable and justifiable because of the fact that deposits of a mineral are not uniform in grade and density (quality and quantity). Further the quality and quantity of a deposit in an area will determine the level of production (which again depends on the market or an outlet). If demand of a mineral is less, there will be less production and a mining unit will have no alternative but to close its operations if the payment of NPV as directed by the Supreme Court is asked. Minerals are low value bulk commodities and therefore one time payment of such a huge amount would simply make their working unviable and uneconomic.

III. Environment (Protection) Act, 1986: various charge/levies

i) The Water (Prevention and Control of Pollution) Act, 1974

ii) The Air (Prevention and Control of Pollution) Act, 1981

State Water/Air Pollution Consent Fee: It is the fee payable for obtaining consent to establish an industry. The fees are 'once off' costs and present minimal expenditure in terms of project costs. However, determination of the fees at prospecting stage poses problems as expenditure on project will increase with the project nearing the mining stage. In Rajasthan the Water Pollution Consent Fee is charged at Rs. 2000 at prospecting stage (Rs. 3000 at mining stage) on a project with investment upto Rs. 65 lakh. The rates increase in stages and projects of Rs. 200 crore and above are levied at Rs. 50,000 at prospecting stage and Rs. 75,000 at mining stage. Similar rates are levied as Air Pollution Consent Fee as well. To start operations, 50% of fees at prospecting stage are charged additionally. In the state of Bihar/Jharkhand, the rates of Water Pollution Consent Fees vary from Rs. 1,500 to 7500 and that of Air Pollution Consent Fee vary from Rs. 1,000 to 10,000.

IV – Labour Welfare Fund Act / Labour Welfare Cess ACT: IRON ore, manganese ore and chrome, limestone, dolomite and mica

The prevailing rates in the respective welfare Cess Acts in respect of the six minerals, namely mica, limestone, dolomite, iron ore, manganese ore and chorme ore are as detailed below:

Mineral		**Mode of collection and rate of cess**
Mica	:	On all exports of mica, the cess is prescribed as customs duty not exceeding 4.5%. At present this rate has been fixed at 3.5%.
Iron ore	:	Duty of customs where iron ore is exported or duty of excise where iron ore is sold/otherwise disposed of to metallurgical industry, etc. from a mine at the rate not exceeding Re. 1 per tonne. The cess collected at Re 1 per tonne.
Manganese:		Duty of customs where manganese ore is exported or duty of excise where ore is sold to metallurgical industry, etc. from a mine at such rate not exceeding Rs. 6 per tonne. The cess is presently collected at Rs. 2 per tonne.
Chromite	:	Duty of customs where chromite is exported or duty of excise where ore is sold from a mine to metallurgical industry at such rate not exceeding Rs. 6 per tonne. The cess is presently collected at Rs. 4 per tonne. Duty of Export where chromium ores and concentrates, of all sorts is exported levied @ Rs. 2000 per tonne.
Limestone :& Dolomite		Duty of excise (i) as is sold or otherwise disposed of, (ii) as is used by the owner of such mine for any purpose for manufacture of cement, iron & steel, ferro-allows, alloy steel, chemicals, sugar, paper, fertilizers, refractories, etc. or other articles or goods, at the rate not exceeding Re. 1per tonne. The cess is at present collected at Re. 0.50 per tonne.

V – Income Tax Act, 1961: various taxes

(a) Direct Taxes

The taxes and incentives under the Income Tax Act applicable to industries in general and to mineral specific sectors are as under:

(a) ***Corporate tax*** : The current rates of corporate income tax are:
   (i) Indian Company : @ 35% of taxable income plus a surchage of 10% of the tax is levied
   (ii) Foreign company: @ 48% of taxable income. Foreign companies are exempt from payment of surcharge.

(b) ***Withholding tax***: The current rate is 20% in respect of dividends and interest while rate is 30% on fees and salaries paid to foreign consultants. The rates agreed upon in the bilateral treaties prevail over those in the Act.

(c) ***Taxes on Capital Gains***: Long term capital gains attract concessional tax liabilities at a flat rate of 20% with indexation or 10% without indexation for Indian companies and 10% for foreign companies. This concessional tax rate does not apply to short term capital gains.

(d) ***Minimum Alternate Tax (MAT):*** Where the total taxable income of a company is less than 30% of its book profits, the company is liable to pay income tax on 7.5% of its book profits.

(e) ***Service tax***: Service tax is leviable on certain taxable services at 5% rate.

(b) Indirect Taxes

(a) ***Customs duty***: Basic customs duty is levied on most minerals at 25%. It is 5% on phosphatic minerals, 35% on natural graphite, granite and marble and magnesite. It is 5% on most ores and concentrates of metals.

Additional Duty of Customs is equal to the excise duty leviable. Special duty is leviable at 5% of the value of goods and is presently exempted. Special Additional Duty is chargeable at 4% ad valorem. The surcharge is levied at 10% of the duty chargeable as specified in the First Schedule and notifications in force. It is in addition to any duties of customs. Capital goods for mining attract a basic duty of 25%, 10% surcharge, 4% special additional duty and 16% countervailing duty.

(b) ***Excise duty***: Excise duty is now replaced with a single rate of Central Value Added Tax (CENVAT) of 16% ad valorem in addition to Special Excise Duty. Minerals are exempted from the whole of the duty of excise leviable thereon, their finished form being excisable items. However, marble slabs and tiles attract

excise duty at the rate of Rs. 30/- per sq. metre subject to a maximum of 16% ad valorem.

Beneficiated/intermediate products are subjected to levying to central excise duty when they are marketed. The intermediate products include mineral concentrates, cement clinkers, etc. The central excise rates for these intermediate products namely concentrates of iron ore, manganese ore(including ferruginous concentrates) , copper ore, nickel ore, cobalt ores, aluminium ores, lead and zinc ores, tin ores, chromium ore, tungsten ores, uranium or thorium ores, niobium, tantalum, vanadium and zirconium ores, and precious metals are replaced by a single rate of CENVAT at 16% .

(c) ***Sales Tax***: The Central sales tax is charged at the rate of 4% for goods covered by declaration in Form 'C'. In other cases General Sales Tax of the State is charged. The State Sales Tax rate varies from 5% to 16% with or without surcharge on sales tax, turnover tax, additional tax etc. The sales tax rates of selected states (as in December 1999) are given in table below. However, Standing Monitoring Committee of Seven State Finance Ministers recently set out that all the states fully implement the uniform minimum floor rate of 4% for minerals and discontinue sales tax based incentives.

(d) ***Export Duty:*** The export duty is being levied on:

1) Iron ores and concentrates Fe content 62% and above fines and lumps (all grades) @ Rs. 300 per tonne.

2) Iron ore fines of Fe content and below @ Rs. 50 per tonne.

3) Chromium ores and concentrates, of all sorts @ Rs. 2000 per tonne.

VI Other Taxes

(a) ***Municipal/Octroi/Toll tax/Entry tax***: The rates vary even within a state.

(b) ***Real Estate Tax***: Rates vary from state to state.

(c) ***Road tax***: This tax varies from State to State. It is generally Rs. 5000/- per year per truck and Rs. 35000 for truck trailor of 35 tonne capacity.

(d) ***Village Panchayat Levies***: The rates vary widely.

(e) ***Taxes on change in land use***: The rates vary from state to state under surface rent.

(f) ***Water rate***: Water rate is charged at the rate as may be specified by the State Government in the lease and varies from state to state.

VII Miscellaneous

Corporate Social Responsibility charges

Recently the State of Orissa has started leveying 5% of the turnover as CSR charges for the development of local areas in addition to what the mining industry has been doing of its own.

Supreme Court Judgment in the State of West Bengal vs. Kesoram Industries Ltd. and others

In the Judgment delivered on 15 January, 2004 the Supreme Court has upheld levying of cess of coal and other minerals in addition to royalty. This will open flood gate to other States to levy such taxes on the minerals. This will again have far-reaching implications.

Total royalty	:	Labour Welfare Cess @ Rs. 1 per tonne: Rs. 1427 lakhs
Total iron ore production	:	142711000 tonnes
Profit per tonne	:	Rs. 600/-
Total profit	:	600x142711000 = Rs. 856266 lakhs
Income tax @ 30% plus 10% surcharge of tax	:	256880 + 25688 = Rs. 282568 lakhs
Excise duty on concentrates	:	Rs. 823200

Revenue earnings from iron ore

Royalty	:	Rs. 25/- per tonne (approximately)
Total royalty	:	25x142711000 = Rs. 3567775000
Labour Welfare Cess	:	Rs. 1/- per tonne
Total cess	:	Rs. 142711000/-
Excise duty on inputs (plants, machineries, etc.)	:	Rs. 10/- per tonne (approximately)
Total duty on inputs	:	Rs. 1427110000/-
Social welfare cess	:	Rs. 40/- per tonne
Total	:	142711000x40 = Rs. 5708440000/-
Railway freight/road freight	:	Rs. 650/- per tonne (approximate)
Total freight earning	:	from exports:650x79312000 = Rs. 51552800000
	:	from domestic sales: 300x45493000 = Rs. 13647900000/-
Sale/purchase (domestic sales tax):		Rs. 100/- per tonne
Total	:	100x45493000=Rs. 4549300000
Forest permit	:	Rs. 18/- per tonne
	:	Rs. 2568798000/-
Profit per tonne	:	Rs. 300/-
Total profit	:	300x142711000 = Rs. 42813300000
Income tax @ 30% plus	:	Rs. 12843990000
10% surcharge of tax	:	Rs. 1284399000
TOTAL	**:**	**Rs. 97293223000/- or Rs 9729 crores**

BELLARY-HOSPET INDUSTRY'S CONTRIBUTION TO THE STATE & CENTRAL GOVERNMENT BY WAY OF TAXES AND OTHER CHARGES

Royalty & dead rent	:	Rs. 67.5 crores (approximately)
Labour Welfare Cess	:	Rs. 5.4 crores
Excise duty on inputs (plants, machineries, etc.)	:	Rs. 27 crores
Social welfare cess	:	Rs. 108 crores
Railway freight/road freight	:	Rs. 650/- per tonne
Total freight earning	:	from exports: 650x20000000=Rs. 1300 crores
	:	from domestic sales: 200x7000000= 140 crores
		Rs. 1440 crores
Sale/purchase (domestic sales tax)	:	Rs. 270 crores
Forest permit	:	Rs. 48.6 crores
Income tax	**:**	Rs. 810 crores
Port Charges	:	Rs. 300 crores
Compensatory afforestation	:	Rs. 25 crores
NPV	:	Rs. 375 crores
TOTAL	**:**	**Rs. 3476.5 crores**

CHITRADURGA – KUDREMUKH INDUSTRY'S CONTRIBUTION TO THE STATE & CENTRAL GOVERNMENT BY WAY OF TAXES AND OTHER CHARGES

Royalty and dead rent	:	Rs. 25 crores(approximately)
Labour Welfare Cess	:	Rs. 2 crores
Excise duty on inputs (plants, machineries, etc.)	:	Rs. 10 crores
Social welfare cess	:	Rs. 40 crores
Railway freight/road freight	:	Rs. 400 crores
Sale/purchase (domestic sales tax)	:	Rs. 100 crores
Forest permit	:	Rs. 18 crores
Income tax	**:**	Rs. 300 crores
Port Charges	:	Rs. 150 crores
Compensatory afforestation	:	Rs. 8 crores
NPV	:	Rs. 125 crores
TOTAL	**:**	**Rs. 1178 crores**

GOAN MINING IINDUSTRY'S CONTRIBUTION TO THE STATE & CENTRAL GOVERNMENT BY WAY OF TAXES AND OTHER CHARGES

Royalty on minerals, dead rent & Surface rent	:	Rs. 21 Crs.
Barge Tax	:	Rs. 3.2 Crs.
Road tax on mining machineries & Trucks	:	Rs. 2.2 Crs.
Sales tax on fuel & lubricants used for Barges, transhippers, excise duty on fuel & lubricants and for mining machineries	:	Rs. 70.80 Crs.
TOTAL DIRECT TAXES (A)	**:**	**Rs. 97,20 Crs**.
Indirect corporate tax on mining industry in Goa (Estimate)	:	Rs. 469 Crs.
TDS	:	Rs. 50 Crs.
Port charges at Mormugao & Panjim	:	Rs. 230 Crs.
Service Tax on port services	:	Rs. 23 Crs.
Compensatory Afforestation charges	:	Rs. 15 Crs.
Net Present Value (estimate) out of which Rs.30 Crs. has already been paid	:	Rs. 175 Crs.
Other taxes i.e., octroi, land revenue, stamp duty etc. where no data is available, however is estimated to be	:	Rs. 7.5 crs.
TOTAL INDIRECT TAXES (B)	**:**	**Rs. 969.5 Crs.**
GRAND TOTAL (A+B)	**:**	**Rs. 1066.7 crs.**

JHARKHAND - ORISSA INDUSTRY'S CONTRIBUTION TO THE STATE & CENTRAL GOVERNMENT BY WAY OF TAXES AND OTHER CHARGES

Royalty and dead rent	:	Rs. 140 crores (approximately)
Labour Welfare Cess	:	Rs. 11.2 crores
Excise duty on inputs (plants, machineries, etc.)	:	Rs. 56 crores
Social welfare cess	:	Rs. 112 crores
Railway freight/road freight	:	Rs. 2400 crores
Sale/purchase (domestic sales tax)	:	Rs. 560 crores
Forest permit	:	Rs. 100.8 crores
Income tax	**:**	Rs. 1680 crores
Port Charges	:	Rs. 225 crores
Compensatory afforestation	:	Rs. 50 crores
NPV	:	Rs. 750 crores
TOTAL	**:**	**Rs. 6085 crores**

CHATTISGARH INDUSTRY'S CONTRIBUTION TO THE STATE & CENTRAL GOVERNMENT BY WAY OF TAXES AND OTHER CHARGES

Royalty& dead rent	:	Rs. 57.5 crores (approximately)
Labour Welfare Cess	:	Rs. 4.6 crores
Excise duty on inputs (plants, machineries, etc.)	:	Rs. 23 crores
Social welfare cess	:	Rs. 92 crores
Railway freight/road freight	:	
Total freight earning	:	from exports:500x8 million=Rs. 400 crores
	:	from domestic sales: 300x 15 million= 450 crores
		Rs. 850 crores
Sale/purchase (domestic sales tax)	:	Rs. 230 crores
Forest permit	:	Rs. 41.4 crores
Income tax	**:**	Rs. 690 crores
Port Charges	:	Rs. 120 crores
Compensatory afforestation	:	Rs. 22 crores
NPV	:	Rs. 300 crores
TOTAL	**:**	**Rs. 2430.5 crores**

Forest (Conservation) Act 1980 and/or
Indian Forest Act: various charges/levies under

(a) ***Forest Produce tax and Forest passes/taxes:*** Tax levied on forest produce removed from forest areas and rate of forest passes, varies from State to State. For example, it is generally Rs. 5/- per trip and 8 to 12% of royalty in Dandeli area of Karnataka.

(b) ***Compensatory taxes/levies***: Compensatory afforestation charges differ from State to State and range from Rs. 25,000/- to Rs. 60,000/- per hectare of forest land diverted for mining. In the State of Bihar/Jharkhand, the Bihar Restoration and Improvement of Degraded Forest Land Taxation Ordinance, 1992 is in force. The rates vary with respect to mechanised, non-mechanised and underground mines and range upto Rs. 55 lakh per hectare. Rates also differ on the basis of forest density and range from Rs. 6 lakh to Rs. 125 lakh per hectare.

We mention below the synopsis of Compensatory afforestation and other charges in various states:

State	**Compensatory Afforestation Charges (Rs./per hectare)**	**Other charges**		
Orissa	23450/- **(in addition to CA charges various extra-legal charges in form of driver, jeep and petrol has to be provided by the lessee)**	36255/- per km (Fencing over safety zone)	13170/- (Regeneration of safety zone)	540/- (Protection of safety zone)
Jharkhand/ Bihar	19790/- **(the lessee has to make the land available for compensatory afforestation and the cost for availing such land has to be borne by the lessee)**	122680/- per km (Fencing over safety zone)	11528/- (Regeneration of safety zone)	510/- (Protection of safety zone)
Goa	44430/-			

State	Compensatory Afforestation Charges (Rs./per hectare)	Other charges		
Karnataka	59650/- 1000/- (Lease rentals) 187.50/- (Supervision charges)	66500/- per km (Fencing over safety zone)	54200/- (Regeneration of safety zone)	protection charges for safety zone id one and half times that of regeneration charges
Rajasthan	36700/-	26000/- per hectare (penal charges)		
Madhya Pradesh	25000/-	**Cost of forest land in form of "pratyasha shulk" is being charged at the rate of Rs. 900000/- to Rs.1300000/-**		

In other states the rate of Compensatory Afforestation Charges ranges between Rs. 35,000/- to Rs. 50,000/- per hectare for forest land diverted for mining

Appendix-A1

Global Steel Production (Consumption) Scenario

The global steel production (consumption) grew at an annual average growth rate of 2.98per cent during 1900-1946. Then came the post war boom till 1994 when the industry maintained a phenomenal 6.16per cent annual average growth rate. The oil crisis brought in a long-term stagnation in the steel industry with the same leading to a growth rate of only 0.28per cent annually till 1986. There was some recovery thereafter and till 2000, the industry maintained a growth rate of about 1.5per cent. The recent boom has once again taken the figure to about 6per cent.

Table 1: Steel Production in USA and Japan Since 1950 (in million tonnes of crude steel)

Years	USA	Japan
1950	87.8	4.8
1955	106.1	9.4
1960	90.1	22.1
1965	119.3	41.2
1973	136.8	119.3
1980	101.4	111.4
1985	80.1	105.2
2000	101.8	106.4
2006	98.48	116.2

Source: American Iron and Steel Institute and International Iron and Steel Institute, Various publications

It may be seen from the **Table above** that the steel production in the USA has fallen from its peaks in 1973, although there have been year to year fluctuations, the overall trend does not seem to indicate the possibility of any significant rise in the same in future. The same is the case with Japan, a country of exemplary development that took the country's production level from a mere 4.8 million tonnes to over 119 million tonnes in 1973, has witnessed a clear stagnation in the industry. While production stagnation in both Japan and the USA can be attributed to many different reasons, consumption of steel there also stagnated, in fact, at levels much lower than their respective peaks.

Table 2: Steel Consumption in the USA and Japan
(million tonnes in crude equivalent)

Years	USA	Japan
1960	90.11	19.46
1970	127.16	71.54
1973	151.03	91.67
1980	117.98	85.88
1985	113.30	84.9

Source: American Iron and Steel Institute and International Iron and Steel Institute

Consumption growth rates have slowed down even in the countries like Republic of Korea, Malaysia, Thailand etc. after having reached certain level of economic prosperity. Considering these trends in steel consumption and production in the developed nations, one cannot expect the same to grow continuously at the current high rates for India. Hence, the long-term scenarios for steel consumption forecasts considered for this study assume tapering of growth rates gradually.

Appendix- B

Comments on NCAER Study

National Council of Applied Economic Research (NCAER) has prepared a report titled **'Social Cost Benefit Analysis of the POSCO Steel Project in Orissa'**. The report concludes "… it would be beneficial for the state economy to offer incentives to lure investments to set up steel plants over the alternative of collecting the depletion premium of US $ 27 per tonne of ore exported from the state for processing elsewhere".

There are, however, **some serious lacunae in the report**, in the form of errors of facts and interpretation, **that affect the validity of the conclusions**. There are also few points where the methodological aspects have been dealt with in a vague manner; and hence need further clarifications.

(1) The report uses the **technique of Input-Output (I-O) Table** to compute output multiplier and employment multiplier. The Central Statistical Organisation (CSO), which computes I-O table for the Indian economy, mentions a rider in its report that, **"… the analysis technique is useful only under the assumption of consistency of technical coefficients"**. In any industry featuring significant technological changes, the technique has to be used with caution. But the complexities of the technique are not reflected in the manner in which it is used in this report for deriving conclusions.

(2) The report uses the I-O technique to make some **overly simplistic statements**. For example, the executive summary notes that: "Every Rs 1 lakh worth of output in the iron ore sector would result in Rs 1.4 lakh of output in the economy. Similarly for each Rs 1 lakh output in the iron and steel sector, the economy would derive an output of Rs 2.36 lakh". **With all its technical limitations, I-O table based multipliers only suggest that a particular level of output in the user industry would generate a particular amount of *requirement* of inputs in the economy.** There is no guarantee that the said amount of requirement of inputs would translate entirely into additional output in the economy. In the particular case of iron and steel sector, the output multiplier simply suggests the need for inputs of raw materials and infrastructural services from various upstream industries. The actual resultant growth in the economy would depend upon its capacity to supply these inputs. If certain inputs were 'imported' either from outside the country or from other States of India, the output and employment multipliers for the local economy would diminish to that extent.

(3) The report's simplistic interpretation of the output multipliers can hardly be used to derive superiority of any particular kind of project. **It may be reasonable to expect that the output multiplier, calculated using the report's methodology, would be even larger for some hypothetical project that uses steel to produce some downstream products, say, automobiles**. Thus, the output mutliplier can then be used to prove that an automobile project is superior to a steel project! Such a process can potentially have no end. If projects were ranked on the basis of

output multipliers then one would prefer only projects that are the most vertically integrated, denying to the economy the benefits of trade and resultant productivity gains.

(4) The report bases its conclusions with regard to output and employment multipliers on the basis of a specially created State-level I-O table for Orissa. The methodology for creation of such a table is not detailed out in the report. There is scope to believe that the **inherent limitations of the I-O technique could be magnified when such tables are constructed for smaller geographies** due to paucity of State-level data, difficulty in capturing inter-State trade flows and wider definitions of industry / sector.

(5) While applying the output multiplier to the iron ore project, the report applies FOB port value of Bailadilla iron ore of $16.32 per tonne. The number is based on a McKinsey study in 2005. This value is much lower than the export realization for Orissa ore (around $55 per tonne). **It is unclear why the report uses a past value for Bailadilla iron ore when it is examining project involving Orissa ore**.

(6) However, when the report talks about computation of depletion premium (page 30), it uses a value of $60.02 for Bailadilla ore corresponding to the year 2006-07, which is then used to derive value of Orissa ore for the POSCO project. **Using two widely different iron ore price numbers for two different purposes in the same report has accentuated the results of the NCAER study**. This is a serious inconsistency in the report.

(7) The report has not stated very clearly its assumptions for computation of the depletion premium. Especially, **there is ambiguity regarding the difference in assumptions that drives the difference in the depletion premium computed in two scenarios** – for steel producer located within the State and for raw material exporter.

(8) It appears that the report has assumed useful life of high and medium-grade iron ore at 19 years for the computation of depletion premium for iron ore. **It is heroic on the part of the report's authors to make an assumption on life of iron ore reserves when the issue is far from settled among experts**. The various estimates of the life of iron ore reserves in India, including the official estimates, are ranging between 50-200 years. It is now also well recognized that iron ore reserves issues needs to be viewed dynamically, by considering the possible new exploration that can be achieved with suitable policy changes. Against this backdrop, an assumption of 19 years of reserves life seems to have inflated the estimates of depletion premium.

(9) The report does not make any computation of depletion premium for coking coal, "as its prices did not exhibit any trend prior to the recent steep price hike". This does not seem to be an adequate explanation for not computing the depletion premium in case of coking coal. **When the report proceeds with computation of depletion premium for iron ore despite the lack of clarity on the life of iron ore reserves, it is surprising that it does not compute depletion premium for coking coal because of lack of any trend in past prices**.

Appendix- C

(Excerpts from Hoda Committee Report: Chapter 8; Conclusions and Recommendations)

Allocation of Captive Mines to Steel Makers

- On the basis of current assumptions of demand and supply of iron ore in the country and of the growth in both, India would have enough resources to last until the end of the twenty-first century and there is no basis for basing policy changes on the exhaustion of these resources in the near future. However, the position would need to be kept under review and adjustments made in it in light of the emerging situation from time to time. The first review should take place after a period of 10 years, i.e. in 2016–17. [7.34]
- Stand alone mining and captive mining should continue to co-exist in the country. The position should be reviewed in 2016–17 in light of the emerging situation of establishment of steel capacity in the country, on the one hand, and accretions to the level of iron ore resources in the country, on the other. A view can be taken at that time on whether the balance of advantage in the grant of LAPL/PL/ML should be changed in favour of steel mills. [7.47]
- Through appropriate changes in Section 11(3) (d) it should be clarified that in a situation of multiple applications for grant of iron ore LAPL/PL/ML, the existing investment in steel plants that have exhausted their current captive mines should be a consideration. However, the applicant must independently qualify under other criteria, including Section 11(3) (a) relating to prior experience. This is necessary to ensure efficient mining. [7.47]
- Existing captive mines should be renewed if they have complied with the conditions of the lease and the life of the steel plant so warrants taking into account existing and planned capacities. In the case of new capacities, the recommendations of Chapter 5 will apply. [7.47]
- Steel making capacities already in existence on 1 July 2006 that do not have captive mines may also be given preferential allocation of adequate iron ore reserves within the state without the need to go through the process of tender/auction, as a one-time measure to provide a level playing field. These existing steel companies would have to enter into tie-ups with experienced mining companies so that they become eligible in terms of Section 11(3) (a) of the MMDR Act. Due regard should be given to the size of the steel making capacity when considering allocation of a specific ore body. [7.47]
- Scientific and vigorous prospecting in the country should be encouraged. LAPLs and PLs for magnetite may be freely given to both stand alone and captive miners, whether Indian or foreign. LAPLs for haematite may be given only after strictly ensuring that GSI or another state agency has not already done the requisite exploration. [7.47]
- Captive iron ore mines allotted to steel makers should use the ore from these mines for their own steel and should not sell the same either in India or abroad. [7.47]

Restrictions on the Export of Iron Ore

- The Committee finds it anomalous that exports are regulated through a dual mechanism of canalisation as well as export licensing. [7.61]
- The export regime for iron ore of higher grade does not make any distinction between fines and lumps although, as noted earlier, fines are particularly in surplus in the country. The rationale for the 64 per cent cut-off of Fe content is also not clear, as the cut-off in IBM classification is 65 per cent. [7.62]
- In light of the assessment regarding availability of iron ore resources in relation to current domestic production, and the appraisal of the impact of export controls on the health of the mining industry and its attractiveness for investment, the Committee has concluded that there is no need to impose any quantitative restrictions on exports but that the position should be revisited after 10 years. However, by way of abundant precaution, the Committee recommends that an export duty may be levied on exports of iron ore in lump form with Fe content above 65 per cent. The system of licensing and canalisation currently in operation should be discontinued. Also captive miners should not be allowed to export either fines or lumps. They should sinter the former and use the latter in their own blast furnaces. [7.63]

Appendix- D

An Overview of the Current Global Iron Ore Market

It may be necessary to have quick overview of the conditions in the global iron ore market to examine the implications of the same on the Indian iron ore business and the impact of any possible withdrawal from it by the Indian iron ore producers.

The iron ore boom continued at full force in 2005 and well into 2006. This year's price negotiations was, unlike in the previous years, a short affair with the Chinese mills leading the show and agreeing to a quick 9.5 per cent rise. Increase in pellets prices has been agreed at 3 per cent in most cases. Iron ore spot prices are still higher than contract prices, in spite of the announced rise. The reference price for Indian origin iron ore fines for China has been pegged at about $58-59 per tonne fob. What is striking here is the way the Chinese steel makers have concluded this year's price negotiations giving a price rise far less than expected. This shows the increasing market power of the Chinese mills.

Iron ore miners continue to upgrade their plans for capacity expansions. In 2005, fewer large projects were brought to completion and taken into operation, but the market was nevertheless supplied by incremental capacity additions from virtually all producers. The total iron ore capacity expansion pipeline has grown during 2005 and contained 340 million tonnes of new projects planned to come on stream between 2006 and 2008. Of this total, around 225 million tonnes fall into the "certain" category, 70 into the "probable" and 95 into the "possible". In the period 2009-2012, another 150 million tonne of capacity are planned and more projects have been planned, although their planned capacities have not yet been announced. In China, iron ore mine capacity has increased much more than thought earlier, since there appears to be considerable iron ore production that has not been included in official statistics. The resourcefulness of miners in China and India has been underestimated in the past and it now seems safe to assume that they will be able to increase production substantially also in years to come. The UNCTAD has viewed that iron ore producers are convinced that the boom will continue and that there will be room for significant additional capacity. With continuously growing demand for iron ore, the pressure for additional capacity increases will continue also in the next few years. However, UNCTAD in its annual report feared if the volume of ore entering the market will not be too large, leading to an oversupply situation beginning in 2008.

Appendix-E

Mineral Resources in India

The following table shows growth rates of some of the major components and their respective shares in India's GDP.

Table -1: Percentage Growth of different Sector and Their Respective Shares in GDP (at constant prices)

	2001-02	2002-03	2003-04	2004-05	2005-06
GDP	5.76	3.77	8.45	7.53	8.43
Export	3.80 (9.16)	22.06 (10.41)	14.98 (10.63)	27.94 (12.02)	21.17 (12.88)
Import	7.40 (10.75)	21.21 (12.13)	20.83 (13.01)	35.18 (15.55)	21.70 (16.73)
Industry	2.74 (25.16)	6.99 (25.94)	7.62 (25.74)	8.62 (26.00)	8.75 (26.08)
Service	7.12 (50.48)	7.30 (52.20)	8.20 (52.08)	9.88 (53.22)	10.5 (54.01)
Mining and Quarrying	1.83 (2.20)	8.71 (2.30)	5.30 (2.23)	5.79 (2.20)	0.94 (2.05)

Source: *Compiled from Economic Intelligence Service (CMIE); National Income Statistics; Oct. 2006. *Figures in the parenthesis represent per cent share in GDP.*

The formidable growth rate of GDP in recent years significantly owes to the tremendous growth in industry and service sectors. Industry and service sectors, being two major economic sectors, are driving the growth of the economy. These sectors grew at the rates of 8.75per cent and 10.5per cent in 2005-06 holding shares of 26.08per cent and 54.01per cent in GDP respectively.

In contrast, the growth rate in Mining and Quarrying sector has been quite low and it is on a declining trend over the past few years. The sector accounts for a very low share in GDP, which is also exhibiting a rather downward trend falling from 2.32per cent in 1999-00 to 2.05 per cent in 2005-06. Given the fact that the mining sector remains the driving force for the metal based industries growth, there are reasons to be concerned over this stagnation in this industry.

The country is endowed with cast mineral resources of diverse kind. However, the sector's growth as shown above has not kept pace with the rest in the industrial sector and is lying far below expected levels. Much of it is due to the restrictive and regulated policy that has been followed till now.

With an increased industrial production, the demand for essential minerals like coal, iron ore, steel etc. will also grow. If mineral resources are available, what is required to raise the capacity of mineral production is investment especially when the mineral sector has been generally known to have hit a capacity barrier. Investments will be required to start with exploration to end with mining and creating infrastructure for transportation of minerals to the end use centres or exports.

Mineral Production in India

India produces as many as 90 minerals[90] from 3,168 working mines including small operational mines. Among them 562 mines belong to coal and lignite minerals, 615 mines to metallic minerals and 1,991 mines to non-metallic minerals. There were 790 mines in the public sector and the remaining 2378 mines in private sectors. **Table-2** shows the current position for the years 2003-04 and 2004-05.

Table 2: Number of Operating Mines (2003-04 and 2004-05)

Sector	**2003-04**	**2004-05**
All minerals	3132	3168
Coal (incld. Lignite)	562	562
Metallic minerals	612	615
Non-metallic minerals	1958	1991

Source: *Indian Bureau of Mines, govt. of India, Ministry of mines.*

Except for a few, most of the mineral have grown only slowly in the past few years. The considerable growth, observed in metallic minerals is largely led by exports and partly by domestic demand owing to the recent spurt in metallic industry like iron and steel. The following table (Table- **3**) exhibits production and growth of some of the major minerals obtained in the year 2004-05.

[90] It includes four fuel mineral, 10 metallic minerals, 50 nonmetallic minerals, 3 atomic minerals, and 23 minor minerals (as of 2004-05).

Table 3 : Production and Growth of Some of the Minerals

Commodity	Production		per cent growth in 2004-05
	2003-04	*2004-05*	
Mineral fuel('000t)			
Coal	361156	382137	5.81
Lignite	27958	30341	8.52
Petroleum (crude)	33373	34015	1.92
Metallic minerals			
Bauxite(tonnes)	10924786	11696773	7.07
Chromite (tonnes)	2904809	3639848	25.30
Iron ore('000t)	122838	142711	16.18
Manganese ore (tonnes)	1776153	2378543	33.92
Metals(tonnes)			
Aluminium	810282	883960	9
Copper(cathode)	395967	406316	2.6
Lead(primary)	24737	15657	-36.7

Source: *Indian Bureau of Mines*

This apparent stagnation in mineral sector has emerged not because of resource paucity but due to lack of adequate initiatives, infrastructure, modern technology, and most importantly a supportive policy framework. The mining industry is bullish on the future growth prospects and is sees even a growth of 12 per cent in the years to come as shown in Table- 4 below in a favourable economic atmosphere.

Table 4 : Mining Industry Turnover Projected Growth (in per cent)

Years	Projected growth (in per cent)
2007-08	8
2008-09	8
2009-10	10
2010-11	10
2011-12	12
2012-13	12
2013-14	12

Source: *Industry Estimates and Federation of Indian Mining Industries (FIMI).*

Interestingly, India continues to maintain a net import status in minerals despite significant improvement in exports of certain minerals like iron ore, manganese ores chromite and granite. However, this trade deficit has to be seen in the context of each mineral separately for a better understanding of the situation more concretely.

Table 5 : Import and Export of Ores and Minerals (in crore)

Years	Export	Import	Trade Balance
2000-01	34411	96522	-62111
2001-02	35136	92797	-57661
2002-03	46618	117294	-70676
2003-04	49926	130060	-80134
2004-05	70468	184758	-114290
2005-06	79790	243839	-164049

Source: *Indian Bureau of Mines*

While India runs a significant net export position in minerals like iron ore, manganese ore, etc, it is a huge net importer of gold, rough diamond, coking coal, copper, lead, zinc, rock phosphate, asbestos etc. which accounts for almost 50per cent of the total value of all merchandise imported.

Table 6 : Degree of Self-Sufficiency in Principal Minerals and Metals

Commodity	Domestic Consumption ('000 tonnes)	Supply\ Domestic Supply ('000 tonnes)	Order of self sufficiency (%)
Minerals			
Asbestos	86	1	1
Barytes	135	723	100
Bauxite	7718	10925	100
Chromite	762	2905	100
Dolomite	3829	4051	100
Fluorspar	62	12	19
Iron ore	41276	122838	100
Llmenite	161	465	100
Kyanite	12	9	75
Manganese ore	815	1776	100
Rock phosphate	2693	1446	54
Sulphur	1500	425	28
Metals			
Aluminium	845	810	96
Copper(refined)	337	396	100
Lead(primary)	191	25	13
Zinc	399	252	63

Source: *Indian Bureau of Mines*

India holds a good prospect in the world mineral market. India's ranking in 2003-04 in the world production was 2nd in barytes and chromite, 3rd in coal and lignite and talc\ steatite\pyrophylite, 4th in Iron ore and kyanite\sillimanite\andalusite, 6th in bauxite and 8th in manganese ore, mica, aluminium and steel (crude). The statistics on world production of principal minerals are given below.

Table 7 : Contribution and Rank of India in World Production of Principal Mineral & Metals, (2003)

Commodity	Contribution per cent	India's rank in order of quantum of production
Mineral fuel		
Coal & lignite	7.65	3rd
Petroleum	0.93	26th
Metallic minerals		
Bauxite	7.04	6th
Chromite	17.71	2nd
Iron ore	9.92	4th
Manganese ore	7.30	8th
Metals		
Aluminium	2.90	8th
Copper	2.60	14th
Steel	3.29	8th
Lead	0.37	26th
Zinc	2.74	9th

Source: *World Mineral Production, 1999-2003, compiled from Indian Bureau of Mines, Govt. of India; Ministry of Mines.*

Looking at the growth rates of mineral and quarrying industry of previous years, it can be easily assessed that the sector is still lagging far behind despite having huge potential. On the other hand, as opposed to the mineral industry, manufacturing is still maintaining a stable growth path. Table below shows a comparative picture of manufacturing and mining and quarrying industry.

Table 8: Percentage growth rate in Manufacturing and Mines and Quarrying sector

	Mining and Quarrying	Manufacturing
	Growth (per cent)	Growth (per cent)
1999-00	-	-
2000-01	2.54	7.75
2001-02	1.83	2.54
2002-03	8.71	6.81
2003-04	5.30	7.11
2004-05	5.79	8.08
2005-06	0.94	8.97

Source: *Compiled from Economic Intelligence Service (CMIE); National Income Statistics; Oct. 2006.*

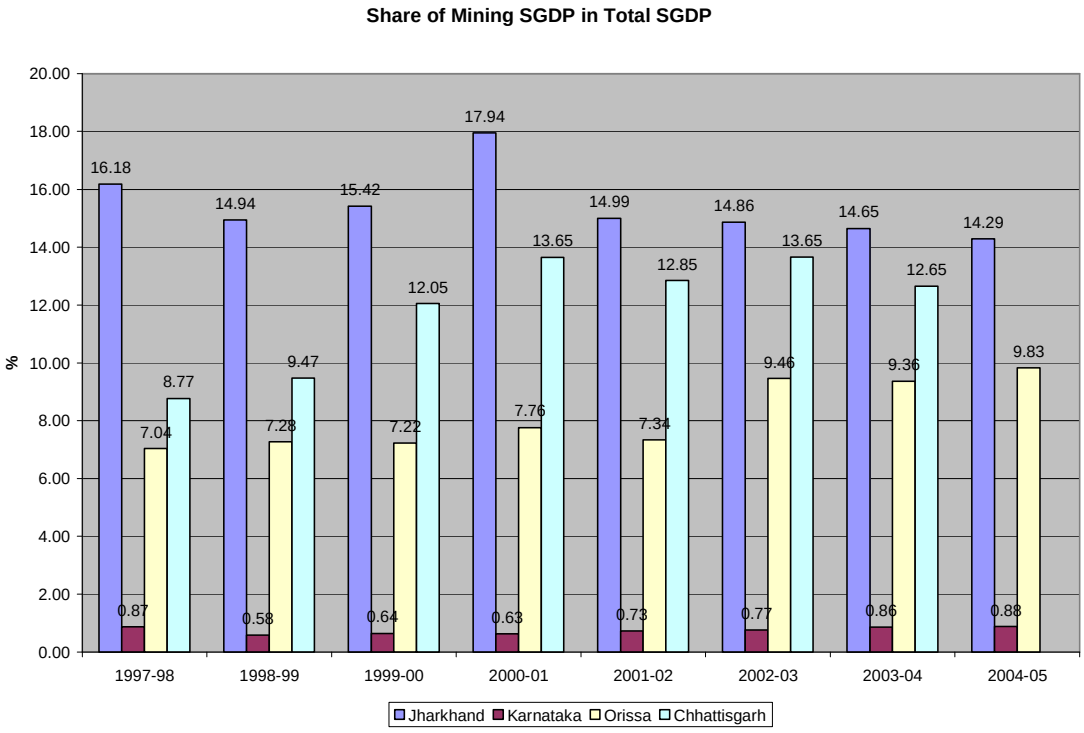
Mining industry plays a significant role in the economies of certain States of India. Whereas in the case of Jharkhand, Chhattisgarh and even Orissa, the mining industry has a major share in the state GDP, the same is insignificant in the case of Karnataka. Karnataka being an industrial state and also a leading IT hub, the share of the mining industry is very low there.

The performance of the states, which are endowed with mineral resources have not been compatible with their known potential. The growth in mineral sector in these states has also been irregular and inconsistent from year to year. Although the shares of mining in the state GDP of the states has not exhibited any clearly increasing trend, the higher growth states in the GDPs of the respective states in the past few years compared to those in the mid nineties have been clearly on account of the contribution of the mineral industries, especially iron ore, in those states. The relatively lower shares of mining in the states in the state GDP in also due to the fact that the value of the minerals has been taken at the mine head price and the entire chain of value addition that it has created through a multiplier effect in the allied activities like transportation and services have gone hidden under the respective item heads and thereby not showing the full impact of the iron ore industries growth in these state economies. There is no doubt that the growth registered by states of Chhattisgarh, Jharkhand, Orissa, Goa and also to a large extent Karnataka has been shaped by the huge contribution from the iron ore mining industries.

Table 9 : Percentage growth in minerals across different states.
(In terms of values)

	1999-00	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**
Chhattisgarh	37.9	3.2	17.8	17.1	7.6	-	-
Goa	-17.0	8.7	-2.8	18.2	22.9	-	-
Gujarat	14.2	30.9	5.4	66.0	15.0	13.9	-
Jharkhand	-18.0	25.9	-3.0	21.3	7.2	7.0	-
Karnataka	12.0	2.6	21.7	5.8	33.3	26.2	-
Maharashtra	7.8	12.9	9.9	2.7	15.6	5.5	-
Orissa	0.0	14.8	6.4	19.5	16.1	23.5	4.2
Rajasthan	14.5	2.0	-0.1	-0.1	19.2	12.8	13.2

Source: Compiled from Economic Intelligence Service (CMIE); National Income Statistics; Oct. 2006.



Since government or the public sector endeavors have been proved insufficient to meet the internal and external demands of minerals, private and foreign intervention thus are required to supplement the efforts of the government in this sector.

Understanding the need of private and foreign co-operation, various reforms in the sphere are being appraised. Till recently, foreign equity holding of 100 per cent was hitherto, allowed on automatic route for all minerals except diamond and precious stones for both mining and exploration. For diamond and precious stones 74 per cent equity was allowed through automatic route and proposals for more than 74 per cent equity had to be routed through Foreign Investment Promotion Board (FIPB) for clearance. Government now has taken a decision in January 2006 to allow 100 per cent FDI through automatic route in diamond mining and coal mining for captive use.

Export policy:

India still has a regulated export policy in the case of minerals. The extent of trade regulation varies across minerals. The nature of restrictions on export of some major minerals is given in the following table:

Table 10: The Nature of Restriction on Exports of Minerals.

Item description	Export policy	Nature of restriction
Sand and soil	restricted	Export permitted under license
Iron ore other than those specified under free category	State treading enterprise (STE)	Export through MMTC
Iron of Goa origin when exported to Chilna, Europe, Japan, South korea, and Taiwan irrespective of Fe content	Free	
All iron ore of Fe content up to 64per cent	Free	
Iron ore concentrate prepared by beneficiation and\or concentraton of low-grade ore containing 40per cent or less iron produced by KIOCL.	STE	KIOCL, Bangalore
Iron ore pellets manufactured by KIOCL out or concentrates produced by it	STE	KIOCL, Bangalore
Manganese ore excluding the following: lumpy\blended manganese ore with more than 46per cent manganese	STE	Export through: a)MMTC b) MOIL for manganese ore produced in MOIL mines.
Lumpy\blended manganese ore with more than 46per cent manganese	Restricted	Export permitted under license.
Chrome ore lumps with Cr_2O_3 not exceeding 40per cent	STE	Export through MMTC
Crude Oil	STE	Export through Indian Oil Corporation.

Source: *Indian Bureau of Mines, Govt. of India; Ministry of Mines.*

Import policy:

A number of items fall under import restriction. Import of slate falling under heading 2514, marble (excluding asbestos) under heading 2515, granite under heading 2515 and marble and other items under code No. 25174100 and 25174900 are restricted. However import of uranium and thorium ores concentrates, titanium ore and concentrates, etc. are subject to Atomic Energy Act, 1962, and therefore restricted.

Mining Rules:

Mining rules by and large, cover the followings:

- The Mineral Concession Rules, 1960.

- Mineral conservation and development rule, 1988.
- Granite conservation and development rules, 1999.
- Mining leases (modification of terms) rules, 1956.
- Mineral conservation and development rules (MCDR)Forms
- Mineral concession rules (MCR)Forms
- Granite conservation and development Rules(MCR)Forms
- Marble development and conservation rules, 2002.

Almost all the aforesaid rules deal with the rigorous procedure of granting mining operation. For example Mineral Concession Rule lays down a series of unavoidable stringent conditions that an applicant has to abide by in order to acquire reconnaissance permit or prospecting license or mining leases.

Reconnaissance permit is granted for the purpose of undertaking "reconnaissance operations" which means any operation undertaken for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping, but does not include pitting, trenching, drilling or surface excavation.

Next to reconnaissance permit, there is prospecting licensing. It means a licence granted for purpose of undertaking prospecting operations with a view to exploring, locating or proving mineral deposits.

Grant of mining lease allows the lessee to undertake mining operation and also vests with the right of sublease. But in every step the applicant has to go through an incomprehensible complex bureaucratic procedure.

Amendment to MCR:

Some noticeable amendments have taken place with reference to The Mineral Concession (Amendment) Rules, 2005 (Up to May 2005).

- Restriction of minimum area for grant of mining lease shall not be applicable in case of renewal of mining leases.
- The guidelines for computation of royalty on minerals on ad-valorem basis with reference to rule 64D (case 3) will be applicable to aluminium (bauxite and laterite dispatched for use in alumina and aluminium metal extraction) besides primary gold, silver, copper, lead, zinc, nickel, and tin.
- The amended rule 66A (special provision related to atomic metals) makes it mandatory that the licensee or lessee shall not win or dispose of any newly discovered atomic mineral which is not specified in the licence or lease.

Mining Acts:

Mining Acts include the followings:

- Mine and Minerals (Development And Regulation) Act,1957

- Cess and Other Taxes on Minerals (Validation) Act, 1992
- Goa, Daman, Diu Mining Concessions Act, 2002
- Forest (conservation) Act and rules, 1980.

Mine and Minerals (Development and Regulation) Act, 1957 discusses the regulations on reconnaissance permit, prospecting licence and mining operations. It also specifies the rates of royalty and dead rents on major minerals.

Rates of Royalty:

Royalty is a kind of levy that a lessee has to pay to the State Government for undertaking mining operation. These rates are only applicable when mining operation is in place and varies across minerals. The central government, exercising the power conferred by sub-section (3) of the section 9 of the MMDR Act1957, has amended the rates of royalty on major minerals (excluding coal, lignite and sand for stowing) and dead rents respectively. Table below provides the changed rate of royalty on some minerals.

Table 11: Rates of Royalty

Items	**Rates of royalty**
Agate	10 per cent of sale price on ad valorem basis.
Copper	3.2 per cent of LME Copper metal price chargeable on the contained copper metal in ore produced.
Diamond	10 per cent of sale price on ad valorem basis
dolomite	Rs 45 per tonne
felspar	10per cent of sale price on ad valorem basis
gypsum	20per cent of sale price on ad valorem basis
Iron ore: i) lumps a)with 65per cent Fe content or more b) with 62per cent Fe content or more but < 65per cent of Fe content c) with < 62per cent of Fe content ii) Concentrates prepared by beneficiation and\or concentration of low grade ore containing 40per cent Fe or less.	 Rs 9 per tonne. Rs 11 per tonne. Rs 8 per tonne. Rs 4 per tonne.
Kyanite	10per cent of sale price on ad valorem basis
Manganese ore: a) ore of all grades b) concentrates	3per cent of sale price on ad valorem basis 1per cent of sale price on ad valorem basis

Source : *Indian Bureau of Mines, Govt. of India; Ministry of Mines. (these rates are not applicable for the state "West Bengal")*

Dead rents:

Dead rent is a kind of duty paid by the lessee when he owns mining lease but does not start mining operation. Rate of dead rent applicable to the leases granted for low value minerals are Rs 100 \ha per annum for first two years of lease and Rs 400\ha per annum for 3rd year onward. For medium value minerals the rate is twice the rate specified before. For high value minerals the rate is thrice the rate specified for low value minerals. In case of precious metals and stones it amounts to four-times of the same.

The act "Cess and Other Taxes on Minerals (Validation) Act, 1992" validates the imposition and collection of cesses and certain other taxes on minerals under certain state laws. "Goa, Daman, Diu Mining Concessions Act, 2002" provides for the abolition of the mining concessions in operation in the union territory of Goa, Daman and Diu. Forest (conservation) Act and rules, 1980 also intends to conserve forests and other matters connected therewith.

Some of the recommendations of the Hoda Committee in this regard are as under:

- Prospecting license only approves an area of 25 sq kms. But in order to make the investment feasible the area should be increased to 50-100 sq kms.
- The minimum area for prospecting licence should be stipulated at 10 sq kms in order to avoid non-serious investors.
- Mining lease is granted over an area of 10 sq kms subject to degree of mineralisation, geology of the deposit and proposed realistic production plans. It is suggested that the area should be sufficient for exploring mines at a proposed production rate for 70 years original grant and remaining period (for the renewals) for leases linked to integrated steel plants, subject to a maximum of 20-25 sq kms within a state.
- Stipulated time periods have been mentioned for the provisions of reconnaissance permit, prospecting licensing and mining lease. But this specific period should be reckoned form the date of completion of all the clearances namely forest, environment, land etc.
- The recent framework of exclusive reconnaissance permit fails to attract investors in exploration activity. It is suggested therefore, viewing at the three-tier system practiced over the world, that an "open sky" policy of non-exclusive RP along with exclusive LAPL (on first come first served basic) should be adopted to attract investors. This LAPL, in turn would allow shallow pitting, trenching, and surface drilling. A non-exclusive RP holder with exclusive LAPL/PL would be entitled to direct grant of mining lease. Existing RP holders would be governed by existing law of priority until the duration of the RP runs out. Fees for RP, LAPL and PL would be pegged at high rate to avoid unserious applicants.
- Area, to be considered under LAPL should be 5000 square kilometer for 8 years with a reduction down to 500 sq. km after 5 years and 100 sq. km after 6 years.
- Persons holding LAPL/PL would exclusively be entitled for ML.
- Viewing at the value addition criteria, preference to the grant of LAPL/PL or ML would be given to those who are willing to set up an industry.
- Miners should be given the right to mine the associated minerals discovered during mining operation subject to all conditions mentioned therein.

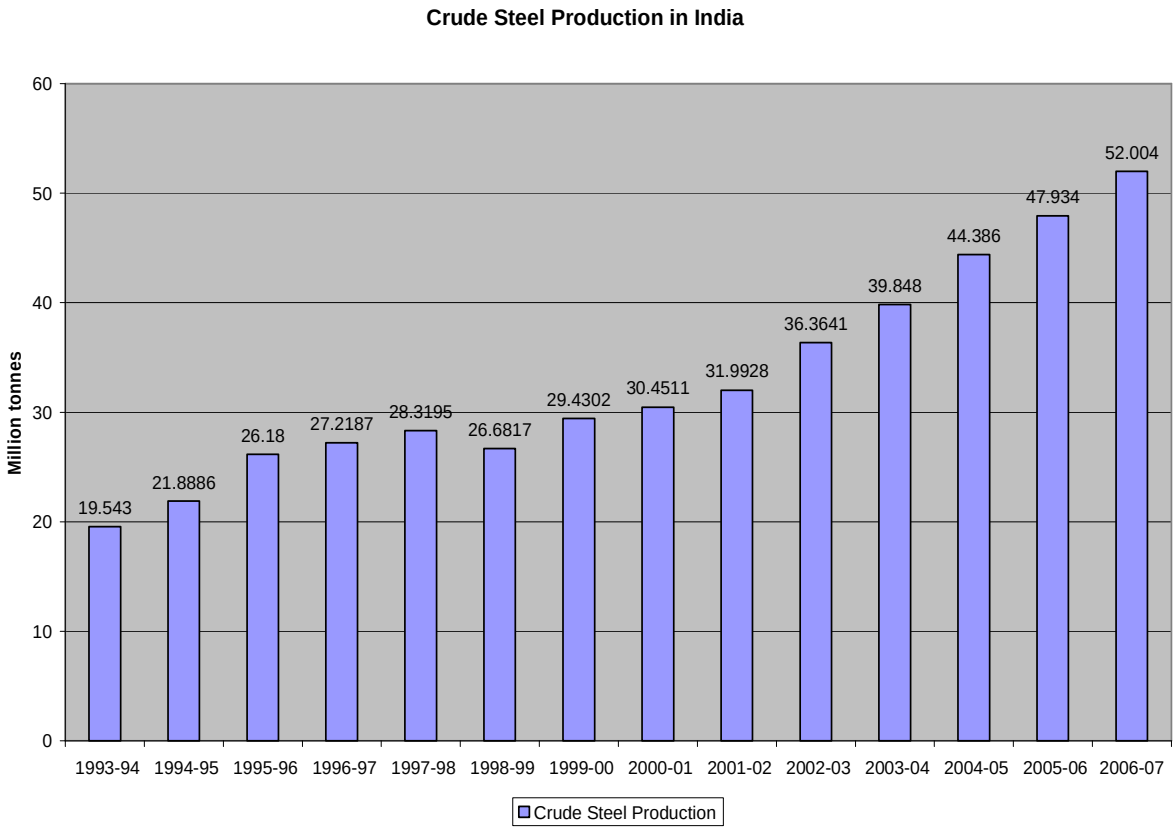
- In the context of allocation of captive mines, committee thinks that there is no problem of availability of iron ore till the end of twenty-first century; hence policy change on the ground of resource exhaustion is untenable. The position although should be kept under review and adjustment would be made in accordance with the emerging situation.
- The existing captive mine owners should get their mines renewed again.
- In a situation of multi application for grant of iron ore LAPL/PL/ML the existing investment in steel plants which have exhausted their current captive mines should also be a consideration. The applicant however has to qualify all the criteria mentioned therein.
- The steel makers who are in existence since July 1, 2006 and do not have captive mines, may be given preferential allocation of adequate iron ore reserves with in the state.
- Captive mine owners should only use reserves for their own purpose and are not allowed to sell in India or abroad.
- Each state government should form a Mineral Development Fund with an earmarked 15 per cent of annual royalty collections for the Fund.
- Mineral corporations of the state government should be encouraged to take up development financing and promotion of mining infrastructure projects. NAHI, Railways and Port authorities should expedite NH, Railway and Port projects which are pending for a long time. Power and Rural Water Supply Scheme also should be extended to the mining areas to meet the requirements.
- Recently, different states are imposing different levies on mining activity; there is no parity in the rates charged by different states. So this arbitrariness in the rates should be removed.
- The ongoing method of fixing the rate of royalty should be transformed into ad-valorem rates.
- The rates of dead rents should be revised and new formulation of dead rent needs to be brought in so as to deter unserious mine owners.
- The committee recognizing the impact of ban on export proposes that the export should not be banned and quantitative restriction on export should be removed with a condition of review of the situation after ten years. The current system of licensing and canalization also should be discontinued.
- Transaction value of minerals and the profit element should be incorporated to calculate the value of the mineral while measuring royalty.
- Section 11(5) confers a right to the state government which allows it to grant a lease to an application out of turn subject to two conditions namely i) recording special reasons and ii) previous approval of central govt., as opposed to first come first served rule. This sub- section should be deleted in view of section 11(5).
- In reference to section 11(5) state government can issue mining lease to an applicant irrespective of date of submission of application, in production of special reasons. The special reasons should be illustrated in the provision itself.
- Central Government has the power to make rules on the issues provided therein. Exercising such right, Central Government should set up Facilitation Body which would integrate the whole procedure of mining operation.

Appendix- F

A Note on the Indian Steel Industry

Production Trend

Steel production in India has maintained a reasonably strong growth trend, especially after the economic reforms in the early 1990s. For a few years, towards the end of the decade the production growth rate did slowdown on account of global economic recession, in the aftermath of the Asian financial crisis, that affected the investment scenario in India as well. The same picked up once again in the last few years.



Source: *Source: Joint Plant Committee and A.S.Firoz, Op. cit. 2007.*

Since the mid nineties, the production growth rates in India have been higher than the consumption growth rates, except for the last two years. As a result, the external trade balance has changed significantly with the changes in imports and exports.

Table-1 : India's External Trade in Iron and Steel: April December 2006-07

(Figures are in thousand tonnes)

Product	Imports	Exports
Pig Iron	2	240
Semi-Finished Products	230	296
Bars and Rods	238	258
Structurals	70	54
Railway Materials	2	0
Plates	625	96
HR Coils/Strips	950	1150
HR Sheets	14	0
CR Sheets/Coils	325	438
GP/GC Sheets	140	1353
Electrical Steel Sheets	215	18
TinPlates	82	27
TMBP	1	0
Pipes (Large Diameter)	38	135
Total Finished Steel	2725	3529

Source: Joint Plant Committee

Structure of Steel Industry in India

The Indian steel industry is highly fragmented. The level of fragmentation can be better appreciated when one looks at the number and individual size of the induction furnaces, Electric Arc Furnaces (EAF)s, Sponge Iron (DRI) plants and the stand alone rolling mills. Barring the EAFs in Essar Steel and the Ispat, the other EAFs in the country do not even exceed the 60 tonne mark, with most of them lying in the range of 20-30 tonne. The Induction furnaces are mostly in the size of 3-12 tonnes each. Most of the induction furnace units have more than one furnaces have annual production capacity in the range of 30-100,000 tonnes.

While there is no clear estimate of how many induction furnaces or rolling mills are actually in operation currently, the JPC figures, based on some earlier survey show that there are over 1200 induction furnaces and over 35 EAF units in the country. The number of rolling mills producing both long and flat products will be over 1500. Similarly, over 350 DRI units are reportedly in existence with most of them to be in operation by the end of the year.

Imports of steel into India have been either for final consumption, undertaken by the consumers directly or traders, or by steel producers themselves (merchant mills or even at times by integrated producers). The Indian steel industry is import dependent for intermediate (like HR coils) and semi-finished (billets/slabs mainly) products. Even higher value added products like Tin Mill Black Plates (TMBP) and CR sheets are occasionally imported by the merchant mills for further value addition. The part of this dependence is due to lack of domestic capacity to produce the grades in specific size and chemistry. The bulk of the imports of these materials are due to pure commercial reasons.

India's export basket was small in the past with semi-finished steel, bars, wire rods and cut to length (quarto) plates accounting for the bulk of it. The situation is quite different now with sharp rise in exports of HR coils, CR coils and sheets and galvanized or colour coated sheets.

India' stainless steel exports have also shot up sharply. Interestingly, the same products dominate the country's import basket as well. India is now a strong importer of HR coils, plates, bars and rods, pipes, tinplates and electrical steel. The country is net exporter in CR sheets/coils and galvanized sheets.

Globalisation opened up huge opportunities for the country's steel industry. The industry's bold entry in to the international market was shaped by domestic supply and demand imbalance in the first place and then by substantial export subsidies and incentives the industry got on exports (most of those are gone now) from the government in the early period. Over time, finding new avenues, the industry invested on products specifically for the global market. These include products like coated steel sheets (galvanized, colour coated etc..) and bright bars. Market niches have been effectively developed by the industry where economies of scale have been a strong factor.

India has a diverse export destination for her steel. However, the bulk of the exports are confined to six regions ; (a) The Neighbouring countries, (b) Europe, © China, (d) South East and East Asia (including Korea and Japan), (e) USA and (f) the Middle East. Since the exports have been primarily driven by market opportunities, the share of each individual country or region changes over time. In the last two years, the share of India's neighbours has dropped significantly whereas the same for Europe has increased sharply.

There are also allegations that Indian steel companies have found it strategically meaningful to continue export products like HR coils in significant quantities to maintain tactical advantage in home market. By creating artificial shortages, especially in specific size and grade dimensions, the domestic prices could be taken beyond the level permitted by the free play of the market conditions locally.

Indian government has announced its steel policy and there it has made projections for exports up to 2020. Interestingly, the government has set a target of raising steel exports to 26 million tones. Imports have been projected at 6 million tonnes.

Indian Steel Capacity

There is substantial under-coverage of production units in the official statistical system and clear under-reporting of output and capacity by individual units. These problems have been recognized by the government and attempts are being made to have to sort these out. Till a final picture emerges from the official sources, the following estimates have been accepted to represent the current status of steel industry capacity. **(Table-2)**

Table-2: Crude Steel Production Capacity

Plant/Company	Capacity 2005-06 Million tonnes	Capacity 2006-07 Million tonnes	Share in Total in 2006-07 (per cent)
SAIL	14.77	14.77	25.7
Tata Steel Ltd	5.0	5.0	8.7
RINL	3.4	3.4	5.9
Essar Steel*	2.4	3.0	5.2
JSW Steel	2.4	3.8	6.6
Ispat Industries	2.4	3.0	5.2
Induction Furnaces	18.6	20	34.8
Medium/Other Small	4.5	4.5	7.8
Total	53.47	57.47	100

** Essar Steel actual steel making capacity seems to have been raised to 4.6 million tonnes but no official communication to that effect was available. Their sponge iron capacity has also been reportedly been raised to 5.2 million tonnes*

Source: Joint Plant Committee and A.S.Firoz, Op Cit, 2007.

The major steel companies can be divided into two groups - multi product and single product plants. The multi-product group includes producers with both flat and long products. SAIL and Tata Steel are the main players. Among SAIL plants, Bokaro (BSL) and Rourkela (RSP) are fully flat products plants while Bhilai (BSP) produces long products as also cut to length plates. Durgapur (DSP) produces long products as also some quantities of narrow HR strips (skelp). The IISCO plant produces long products.

On the other hand, RINL and JSPL are fully long products plants while Essar Steel, JSW Steel and Ispat Industries are fully flat products plants. JSW, however, has acquired Hospet Steel that produces billets. While allocating capacities either to the flat or the long stream is easier in a single product plant, there are always some difficulties doing the same with a multi- product plant, given the excess mill capacities that provide the flexibility to the producers to change product mix at will depending on the market conditions.

The existing capacity is largely utilized in the larger plants but the capacity addition there has been lethargic. The additions have come mostly in small bits and largely scattered. The industry lived for the first couple of years of this boom on the capacities built in the mid and the later part of the 1990s. These were mainly for flat products. Thereafter, most of the plants, however, continued to add some small capacities at their existing locations in brownfield mode.

The long products capacities have been added largely by smaller plants – most of them are induction furnace based with a few mid size plants with either Mini Blast Furnace (MBF)/ (Basic Oxygen Furnace) BOF or MBF/Direct Reduced Iron (DRI)-BOF/EAF as the technology route. Capacity utilization rates in smaller plants has been lower. Low break even rates facilitate continuation of these plants at lower capacity utilization.

The steel industry is upbeat with new projects announcements every day. The progress in these projects, however, not been very encouraging. Therefore, one is constrained to remain cautious over these announcements.

Appendix-G

Occurrences of Iron Ore in India

The entire country is divided into five zones of iron ore occurrences as indicated below:

Zone-A Jharkhand and Orissa

Zone-B Chhattisgarh and Maharastra

Zone-C Karnataka

Zone-D Goa and Reddi, and

Zone-E Kudremukh, Bababudan and Kuda Chadari of Karnataka.

Zone-wise description of the deposits is given below:

ZONE – A

Jharkhand

In Jharkhand state, Haematite deposits occur in a number of prominent hills in Singhbhum district. The significant deposits of this district are Noamundi, Gua, Barajamda, Kiriburu, Meghahatuburu, Manoharpur and Chiria. The Chiria deposit is reported to be the single largest deposit in the country. The annual production from Jharkhand at present is around 18 mt.

Orissa

The iron ore deposits in Orissa are found in the District of Keonjhar, Sundargarh, Mayurbanj, Cuttak, Koraput, Sambalpur and Dheen Kanal. Of these, deposits of Keonjhar and Sundargarh districts are worth mentioning. The important deposits containing large reserves of high grade (55per cent to 69per cent Fe) are Thakurani, Joda, Banspani, Joruri, Malangtoli, Khandadhar pahad, Kalmang, Barsua, Bolani, and Kalta. Malangtoli is the largest deposit containing high reserves with Fe content varying from (55per cent to 63per cent Fe). Gandhmardhan is another large deposit in terms of size and grade.

Orissa contributes about 50 million tonnes of iron ore production per annum.

ZONE - B

Chhattisgarh

Important deposits in this zone are Bailadila, Dalli, Rajahara, Rowghat, Mahamaya etc Two important iron ore bearing areas i.e Bailadila range and Rowghat are located in Bastar Tribal region of Chhattisgarh state.

Bailadila

Bailadilla range of hills is about 40 Kms in length and 10 kms in width. 14 deposits have been distinctly demarcated and designated serially from 1 to 14. Initially explored and prospected by GSI the deposit remained un-exploited till 1960 on account of remote location inaccessibility. Further exploration was taken up in early 60's by IBM, GSI and NMDC for planned exploitation. Since then NMDC has been operating mines at deposits 14,11C, 5, 10 & 11A.

The reserves in the explored deposits were estimated at 972 million tonnes. 8 blocks in the region are yet to be prospected. They are assessed to contain about 256 mt of ore (based on geological mapping). Thus the total available reserve at Bailadila work out to1228 million tones which accounts for 11 per cent of the total Haematite ore in the country.

Currently Bailadila produces around 20 million tonnes of high grade iron ore.

Rowghat

Rowghat deposit is another large deposit in Bastar tribal region. Six deposits viz. have been identified with total geological reserves of about 711 million tonnes.

Dalli – Rajahara

Containing high grade of iron ore these deposits are located in Durg district of Chhattisgarh State and are being exploited by Bhilai Steel Plant for vaptive consumption.

ZONE – C

Prominent deposits are located in Bellary – Hospet sector and those are Donimalai, Ramandurg, Kumaraswami, Thimmappan gudi, NEB range Ettinahatti and Belegal. Of above Donimalai and Kumaraswamy are under exploitation by NMDC while part of Thimmappan gudi is owned by M/s.Mysore Minerals and other private companies. The annual production of iron ore from this zone is around 34 mt. contributed by NMDC, M/s. Mysore Minerals, M/s.MSPL and other parties.

ZONE – D

Goa, Reddi

Goa is the only State where large number of iron ore deposits are concentrated in a small area of about 3700 sq.km. The production from Goa region is about 24 million tonnes at present.

ZONE – E

This zone contains mainly magnetite ore deposits at Kudremukh, Bababudan and Kuda chadari. Prospecting at Kudremukh and Bababudan deposits was done by NMDC.

Bababudan did not get clearance from Ministry of Environment & Forests for exploitation.

However Kudremukh project was developed as an export oriented unit and the mine was in operation with a high level of mechanization and automation for about 29 years. Mining activities at Kudremukh mine have been discontinued since December 2005 following a directive from the Hon'ble Supreme Court.

In order to exploit the magnetite ore in the eco-fragile "Zone-E", the only option available is by underground mining like the Kiruna iron ore mine of Sweden.

To take care of the flora and fauna, while mining can be carried out below the superjacent ground, the beneficiation plant can be suitably located in an area where disposal of tailings can be with the least possible impact on the surrounding environment.

Appendix-H

Extracts of CAG report

Steel Authority of India Limited

18.4.1 Non-disposal of iron ore fines accumulated at Gua Ore Mines **Non-disposal of iron ore fines accumulated at Gua Ore Mines resulted in nonrealisation of revenue of Rs.1507 crore.**

The mechanised mining of Gua Iron Ore Mine, a captive mine of IISCO♣, was started in May 1958. The iron ore lump produced in the mines was directly consumed by IISCO in its blast furnaces but the fines generated were required to be converted into pellets in the Pelletisation Plant or sinter in the Sinter Plant before they could be consumed. As IISCO had no Sinter Plant, the fines could not be consumed in IISCO. The fines were either sold or dumped in the stockyard. Examination of records (April 2005) revealed that Bokaro steel plant and Durgapur steel plant of Steel Authority of India Limited had sinter plants and supply of iron ore fines to these plants from Gua mines was economically feasible. Bokaro steel plant regularly received iron ore fines from the Kiriburu mines (368 km) and Meghahataburu mines (369 km) linked to it but was accepting iron ore fines from Gua mines (272 km) only to meet the shortage of ore fines. Similarly Durgapur steel plant received iron ore fines from Bolani mines (319 km) and not from Gua (312 km). The sale/dispatch of fines from Gua mines had been very poor. Out of the average production of 1.78 MMT *per annum* during the five years 2000-01 to 2004-05 only 0.71 MMT (40 *per cent*) was dispatched and the balance of 1.07 MMT was being added every year to the accumulated stock of 12.16 MMT (March 2000) dumped in the stock yard. As a result there was accumulation of 35.04 MMT of iron ore fines valuing Rs.1507 crore as on 31 March 2005.

The Management while accepting the facts (September 2006) stated that the fines stockpile had accumulated over a long period (from 1958) and could not be liquidated within a short span of time due to various constraints such as:

(i) Railways did not have adequate capacity to dispatch fines from Gua station,

(ii) Supply through land routes to different ports was not economically viable,

(iii) Price of fines was erratic and

(iv) Poor quality of fines.

Further, efforts were being made to increase the dispatch of fines from Gua mines and about 1.52 MMT were dispatched during 2005-06. The reply of the Management did not reflect the position fairly as the stockpiling was mainly due to the inability of the

Management to dispose of enough quantity of fines. Dispatch of 1.52 MMT of fines subsequently during 2005-06 provided evidence that it was possible to dispatch substantial quantity of iron ore fines from Gua. This was despite export of large quantities of iron ore fines from the country and significant increase in the price of the iron ore fines in recent years.

The matter was reported to the Ministry in November 2006. The Ministry while accepting the fact (December 2006) stated that the Government of Jharkhand had raised objection to the sale of iron ore for export on the plea that SAIL was not an iron ore trading company. The reply did not appear to be relevant since the Audit comment was on sale of iron ore fines and not export of iron ore.

Thus, the accumulation of iron ore fines resulted in non-realisation of revenue of Rs.1507 crore*. In addition, accumulation of iron ore fines was an environmental hazard and attracted objections from environmental authority also.

****Calculated at Rs.430 per MT, the rate at which fines were supplied to Rashtriya Ispat Nigam Limited***

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