New Challenges in Project Management for Indian Steel Industry

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Presently in India many steel plants are coming up and the growth plan is in tune with the boom being experienced by the global steel industry and the high rates of growth being established by the Indian economy and the major steel-consuming sectors. The liberalisation of industrial policy in more mature industrial countries like ours and other initiatives taken by the Government have given a definite impetus for entry, participation and growth of the private sector in the steel industry. While the existing units are being modernised/expanded, a large number of new/greenfield steel plants have also come up in different parts of the country setting up production operations that places them close to natural resource supplies (both in terms of inputs and energy) based on modern, cost effective, state-of-the-art technologies. The timely completion of the projects for new forthcoming steel plants is of great challenge in the present Indian scenario. The scenario presented in this paper is only illustration of the probable difficulties which may pose hindrances for timely implementation of projects in the steel industry. New challenges in project management will drive continuing improvements in efficiency and reduction in the cost of project. Health and safety concerns will further encourage automation and technological developments amongst Indian steel industries to reduce labour costs, cost of meeting increasingly stringent environmental requirements and improve productivity and quality.

Keywords: Indian steel industry; Liberalisation; New projects; Challenges; Project management

INTRODUCTION

The Indian steel industry is more than 100 years old now. Till 1990, it operated under a regulated environment with insulated markets and large scale capacities reserved for the public sector. Production and prices were determined and regulated by the Government. SAIL and Tata Steel were the main producers, the latter being the only private player. The industry took its first faltering steps in 1907 with the setup of the first integrated steel plant in Jamshedpur by TISCO. Since then, the Indian steel industry has emerged as one of the core sectors in the Indian economy with a very significant impact on economic growth.

India with its abundant availability of high grade iron ore, the requisite technical base and cheap skilled labour is thus well placed for the development of steel industry and to provide a strong manufacturing base for the metallurgical industries. Companies in more mature industrial countries like India are increasingly forced to look to assets (and growth) by setting up production operations (steel factories) in key developing economies that places them close to natural resource supplies (both in terms of inputs and energy).

Presently in India, many steel plants are coming up. The liberalisation of industrial policy and other initiatives taken by the Government have given a definite impetus for entry, participation and growth of the private sector in the steel industry. While the existing units are being modernised/expanded, a large number of new/greenfield steel plants have also come up in different parts of the country based on modern, cost effective, state-of-the-art technologies.

The endeavour is not only in tandem with India’s National Steel Policy of achieving a production level of 110 Mt of crude steel by the year 2020. The timely completion of the projects for new forthcoming steel plants is of great challenge in the present Indian scenario.

The integrated steel plants are faced with the choice between upgrading existing plants or increasing their efficiency by other means and going in for greenfield investments. If the Indian industry has to strengthen its global presence, it will obviously have to overcome some of the major constraints and challenges lying in the project management.

Project management is the discipline of organising and managing resources, ie, people, in such a way that the project is completed within defined scope, quality, time and cost constraints. A project is a temporary and one-time endeavour undertaken to create a unique product or service that brings about beneficial change or added...
value. This property of being a temporary and a one-time undertaking contrast with processes, or operations, which are permanent or semi-permanent ongoing functional work to create the same product or service over and over again. The management of these two systems is often very different and requires varying technical skills and philosophy, hence requiring the development of project management.

**OVERVIEW OF INDIAN STEEL INDUSTRY**

We still have a number of persons in our country in SAIL, TISCO and other big and small steel plants who have the capabilities. They have the will to excel and transform the country, given a long-term vision. We should be ready to compete in outside markets. If our steel industry gears up in about 3 to 4 years, Indian steel can be both in Indian and foreign markets. Our vision should be towards this. Indian 2020: a vision for the new millennium by APJ Abdul Kalam and YS Rajan.

Steel industry has seen a sunrise after a bad and cloudy night. Worries of financial institutions are over and have taken an exposure in this sector. Indian government has planned for pumping in a lot of money in infrastructure in coming years, hence steel consumption will go up manifold.

The Indian steel industry can be divided into two distinct producer groups.

**Major Producers**

Also known as Integrated Steel Producers (ISPs), this group includes large steel producers with high levels of backward integration and capacities of over 1 Mt. These include — SAIL, TISCO, RINL, ESSAR, ISPAT and JINDAL. Now many new steel plants are coming up.

**Other Producers**

This group consists of smaller stand-alone steel plants that include producers and processors of steel, which includes — processors/rerollers, stand alone units making pig iron and sponge iron.

In 1990, the Indian steel industry had a production capacity of 23 Mt, the last decade saw the Indian steel industry integrating with the global economy and evolving considerably to adopt world-class production technology to produce high quality steel. The current production capacity of Indian steel is an estimated 43 Mt. The steel production and consumption in Indian context are shown in Figures 1 and 2, respectively.

Steel is a highly capital intensive industry and cyclic in nature. Its growth is intertwined with the growth of the economy at large, and in particular the steel consuming industries, such as, manufacturing, housing and infrastructure.

India presently accounts for less than 5% of the global output of finished steel and 1% of global trade. The per capita consumption of 30 kg is also well below even the

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**Figure 1 Pig iron and finished steel production India**

**Figure 2 Steel consumption over five decades in India**

Asian average of 128 kg, 210 kg in China and an average of over 400 kg in the developed countries. As India moves ahead in the new millennium, the steel industry will play a critical role in transforming India into an economic superpower. India’s steel industry is witnessing a lot of action. With the economy growing at a brisk pace of more than 8% per annum, demand for steel is soaring.

Many international and domestic majors have unveiled ambitious plans to set up new steel plants, but there have been huge delays in executing the projects. Most of the capacities in steel are concentrated in the east and the west as primary integrated producers are based in the east near the raw materials, while the secondary producers are based in the west. Demand is concentrated in the north and west as the consumption centres are located here.

Given the capabilities of the Indian steel industry there is tremendous scope to increase India’s share in world trade steel. While the steel industry will continue servicing the domestic demand there is a lot of untapped export potential with the industry, which will further enhance with the forthcoming capacity additions through new steel plants. The Government, in line with EXIM policy 2002-2007, should take steps to make Indian exports more competitive.

There will be a good market for steel products as shown in Table 1 and in view of this companies should trigger
their project execution very fast so that when new plants become operational the demand remains for its products (speculated in Table 1)\(^2\).

Imports of iron and steel in last four decades for finished (carbon) steel\(^2\) are shown in Figure 3.

Exports of iron and steel for finished carbon steel and pig iron during the last four years and the current year\(^2\) are shown in Figure 4.

The FICCI survey projects higher growth rates for some select core sectors during April-2006 to March-2007 as compared to the previous corresponding period April-2005 to March-2006 based on the estimates made by the industry and interaction with the concerned representatives in the industry, government and the public sector undertakings\(^3\) as shown in Table 2.

Steel consumption has increased by 10% on a compounded basis over the last three years, but production has risen by just 6.5%.

Currently the industry is at the height of the business cycle and is going through a consolidation phase, which might result in the smaller players being acquired by the larger ones.

**UPCOMING STEEL PLANTS: DESTINATION INDIA**

India has finally emerged as a steel making location for global players. The global steel industry appears to be in a race to invest in high-growth zones, such as, India. The amount of activity in the sector has picked up speed in the past few years. The sector has received investments of US$ 5994 million lined up through 102 memorandum of understanding (MoUs) signed by different state governments to add 103 Mt in steel capacity\(^4\).

Much has happened ever since SAIL’s Corporate Plan was announced in 2004. Investment plans for the three speciality steel plants have been firmed up. The company has grown in size with the amalgamation of IISCO (now renamed as IISCO Steel Plant). Production targets have been revised from 19 Mt of steel to about 24 Mt. Estimated investments have increased from Rs 250 000 million to around Rs 400 000 million. And the time period has been squeezed by two years, bringing the targeted year of completion of major projects\(^3\) from 2012 to 2010.

Besides expanding its existing facilities at Jamshedpur, Tata Steel plans three new greenfield projects in Orissa, Chhatisgarh and Jharkhand. It is also investing almost $100 million in a ferro-chrome project in South Africa.

The single biggest foreign investment proposal in India relates to steel. Posco, the South Korean steel giant, had announced an $11.3 billion project in the eastern state of Orissa, where it hopes to put up a 12 Mt steel plant in phase-wise manner. However, the project has run into controversies, with some political parties raising objections to the state government’s plans to hand over captive iron ore mines to the company.

Mittal has announced plans for an $8.7 billion, 12 Mt steel plant in the neighbouring state of Jharkhand. Japan’s Nisshin Steel Company also plans to start a unit in India, to meet the growing demand from Japanese automobile companies.

The US$ 5.25 billion Russian major Magnitogorsk Iron and Steel Company (MMK) plans to set up a 10 Mt
greenfield steel plant in Orissa.

US auto and industrial component major Timken Company has said it is looking at setting up a manufacturing facility in India with investments foreseen at around US$ 25 to 50 million.

PROJECT MANAGEMENT AND INDIAN STEEL INDUSTRY

Each developmental project involves unique challenges that require unique solutions with aim to deliver new products to markets. It is more for difficult the capacity expansion and upgradation projects. Since, more meticulous and aggressive planning is required. Moreover, the task becomes all the more daunting due to additional challenges of simultaneous management of on-going operation in steel plants.

The new projects, which are coming in the Indian steel industry, can be classified into three main categories:

- New greenfield projects
- Renovation or grayfield projects
- Mergers and upgradation projects

All the projects mentioned are different in nature. Greenfield projects need different treatment as compared to grayfield projects. These undergo great changes along either dimensions and need more resources. Research and Developmental projects are creative, high-end process: companies have different expectations about results and different strategies for funding and managing it than they do for commercial development. These differences can indeed be great, but a close relationship between R&D and commercial development is essential to ensure an appropriate balance and smooth conversion of ideas into products. This will also help in managing technological changes for project management.

Like any human undertaking, projects need to be performed and delivered under certain constraints. Traditionally, these constraints are scope, time and cost. These are also referred to as the Project Management Triangle, where each side represents a constraint. One side of the triangle can not be changed without impacting the others. A further refinement of the constraints separates product ‘quality’ or ‘performance’ from scope, and turns quality into a fourth constraint. The time constraint refers to the amount of time available to complete a project. The cost constraint refers to the budgeted amount available for the project. The scope constraint refers to what must be done to produce the project’s end result.

These three constraints are often competing constraints: increased scope typically means increased time and increased cost, a tight time constraint could mean increased costs and reduced scope, and a tight budget could mean increased time and reduced scope.

A traditional phased approach identifies a sequence of steps to be completed. In the traditional approach, five components of a project (four stages plus control) can be distinguished in the development of a project:

(a) Project initiation stage
(b) Project planning or design stage
(c) Project execution stage
(d) Project monitoring and controlling systems
(e) Project completion stage

In the agile project management the project is seen as a series of relatively small tasks conceived and executed as the situation demands in an adaptive manner, rather than as a completely pre-planned process. Project management is composed of several different types of activities, such as:

(i) Planning the work or objectives
(ii) Analysis and design of objectives
(iii) Assessing and controlling risk (or risk management)
(iv) Estimating resources
(v) Allocation of resources
(vi) Organising the work
(vii) Acquiring human and material resources
(viii) Assigning tasks
(ix) Directing activities
(x) Controlling project execution
(xi) Tracking and reporting progress
(xii) Analysing the results based on the facts achieved
(xiii) Defining the products of the project
(xiv) Forecasting future trends in the project
(xv) Quality management
(xvi) Issues management
(xvii) Issues solving
(xviii) Defect prevention
(xix) Project closure

Project objectives define target status at the end of the project, reaching of which is considered necessary for the achievement of planned benefits. These have to be formulated as SMART:

- Specific, S
- Measurable (or at least evaluable) achievement, M
- Achievable (recently acceptable is used regularly as well), A
- Realistic, R and
- Time terminated (bounded), T.

The evaluation (measurement) occurs at the project closure. However, a continuous guardance on the project progress should be kept by monitoring and evaluating.

Project control is that element of a project that keeps it on-track, on-time, and within budget. Project control

begins early in the project with planning and ends late in the project with post-implementation review, having a thorough involvement at each step in the process. Each project should be assessed for the appropriate level of control needed: too much control is too time consuming, too little control is too costly. If control is not implemented correctly, the cost to the business should be clarified in terms of errors, fixes, and additional audit fees.

Learning from the past experiences in project delays we have seen that the problems arise from the way companies approach the development process rather than ‘Aggregate Project Plan’. There are certain things to remember for successful project management:

- Discipline to be brought to project management.
- Measurements should induce parts to do what is good for the whole.
- Focus should be on a few critical areas and not divide the attentions amongst all of a project’s tasks and resources.
- When the degree of change is great, there is a need to approach projects differently.
- Project performance in today’s scenario is often less a matter of understanding constraints and more a function of personal skills.

Past Experiences in Project Management of Indian Steel Industries

Domestically, the industry will have to be technologically and operationally fit. It will have to invest continuously to modernise and replace its obsolete plants and machinery.

The earlier concept in most steel producing organisation was to have in-house engineering and executing personnel, who would carry the design and engineering of proposed steel plants by breaking up the total scope into various convenient packages and place orders on different executing agencies. The project team of the concerned organisation would take up the overall responsibility for the implementation of the project. Once, the project was completed, the team would be converted to an operation team to operate and maintain the plant. The major issue was that of project personnel who had limited past experience and kept learning on the project. This requires longer gestation periods.

The industry will know how to do that and when. The past experience in managing steel projects has revealed, important things, such as

- As the project progresses, one may find that the scope of the project has changed which requires adjustments to cost, time, quality, risk or other project deliverables.
- The ever-changing nature of our economies and organisations creates uncertainty on organisational priorities. One of the most frustrating experiences a project manager can suffer is managing within this environment—while the project is being implemented.
- The ever-changing nature of the organisation may change the project’s goal, deliverable, budget or timeline. For example, a project that is critical today is suddenly not as important tomorrow.
- A change in top management may be accompanied by a change in priorities and even in the direction of expansion and other efforts.
- If the project has been cancelled, complete a closeout evaluation report on the project. It is not made, hence more chances of failure in new endeavors and the knowledge will be lost.
- A full project management-training curriculum has been missing to address the on-going development needs of functional management, project sponsors, project managers and team members. The various aspects of project management like hands-on skills and techniques that enhance the ability to manage all elements of a project: overseeing it, ensuring success to managing the dynamics of a team, communication management, risk management, knowledge retention strategies and other important aspects of project management success has been missing. Probably this is true to all the major steel projects carried till date in India.
- Organisations have never linked their projects back to their corporate strategies and plans, which have led to project delays. One must understand how each project contributes to achieving corporate goals.

Moreover certain problems associated with the inception of project, which have put large impact on the implementation, are numerous. A lot of learning can be made from the past experiences. This is more required by the public enterprises.

The list below highlights some of the top project management challenges in past faced by Indian Steel Industry which may continue in future also:

Unrealistic Deadlines

Some would argue that the majority of projects have ‘schedule slippage’ as a standard feature rather than an anomaly. But, most project timelines do eventually slip due to faulty initial deadlines (and the assumptions that created them). The management for the stress of ‘the immovable rock and the irresistible force’ (i.e. the project deadline and the project issues) with creative planning, alternatives analysis and communication of reality to the project participants were missing.

Communication Deficit

Many project managers and team members do not provide enough information to enough people, along with the lack of an infrastructure or culture for good communication. No practices were developed to check what information (reports, status, etc) needs to be
conveyed to project participants.

Scope Changes due to Lack of Vision

In most of the steel projects it has been found that ‘The Scope Creep’ which continually tried to take control and succeed. The goals of the project (and the reasons for doing it), along with the sub-projects or major tasks involved, are not always clearly defined. Clearly communicating these vague goals to the project participants was never done.

Insufficient Team Skills and Lack of Accountability

The team members for many projects are assigned based on their availability, and some people assigned may be too proud or simply not knowledgeable. The project participants and related players are not held accountable for their results or lack of achieving all of them. Transparency was missing.

Failure to Manage Risk

A project plan has included in it some risks, simply listed, but no further review happened and no plans towards responding to the risk occurrence took place.

Resource Competition

Projects usually compete for resources (people, money, time) against other projects and initiatives, putting the project manager in the position of being in competition. Management of project portfolio to define and set priority across all projects was really missing.

Training of Project Sponsors

A survey conducted with project managers also identified ‘Training of Project Sponsors’ (58%) as something that would benefit them most to improve their ability to manage a project. They also said they would benefit from ‘Communication Skills’ (42%) and ‘Leadership Skills’ (36%). These knowledge areas have increased in importance over previous years.

The key success factors for any new upcoming steel company would be:

- Proximity and access to raw materials.
- Value addition and product range.
- Proximity to markets.
- Financial costs.

At present moment many steel majors of India are focusing on the project implementation through in-house efforts in order to save the cost but at present approach should change in view of increased competitions to have shorter gestation periods. Therefore, companies should aim to execute the job through engineering, procurement and construction (EPC) route which is costlier than the conventional methodologies adopted by steel majors in past.

The various unique challenges may come right from inception of the project to its completion. At different stages, different type of problem may come. These challenges can be classified into four major categories:

(i) Challenges during inception of the project
(ii) Challenges during planning of the project
(iii) Challenges during execution of the project
(iv) Challenges after completion of the project

The principal factors, which need thrust in view of these new challenges before project management, are discussed here.

CHALLENGES DURING INCEPTION OF THE PROJECT

Consultants and Selection of Technology

Since, day-by-day newer technologies are coming so the requirement for making composite project feasibility reports (CPFRRs), recommendations and selection of appropriate party has become necessary. In view of this
metallurgical consultants will be required. In India these options are very limited. Probably the cross-functional expertise is required which are available with only few consultants in India. Therefore, the pace with which new projects are coming in steel industry the availability of consultants will be a major problem. This may not effect more to those companies who have developed the manpower and with vision the cross functional capabilities of manpower has enhanced in a phase wise manner. The engineering companies and consultants in both private and government sector other than MECON and MN Dastur have not adequate capabilities or capacity to provide design and engineering support independently, for the upcoming large scale steel plant expansion projects.

The new technology to be adopted. With respect to steel industry major key technological areas to be addressed before any new project are

- 100% production of steel through BOF route or alternate technology
- 100% processing of steel through continuous casting route
- Provision of alternative fuel injection methods like coal dust/tar injection in all the blast furnaces
- State-of-the-art process control computerisation/automation
- State-of-the-art online testing and quality control facilities
- Envisaging Enterprise Resource Planning (ERP) across its plants

When additional capacity will come online, the oversupply situation will become more dramatic with respect to the product mix leading to cut-throat competition. Therefore, focus on producing wider productmix with emphasis on value added products and improved product quality to be made during technological plans for the projects. The project should aimed on producing those products which are or will be in demand for the fast growing sectors like oil and gas sector, construction sector and power sector etc. The IT initiatives like ERP are also being integrated with the existing business systems.

Many steel giants are coming with the technologies which are dependent on basic raw materials like coking coal and iron ore lumps. For example, POSCO is coming with FINEX technology.

**Identifying and Quantifying/ Estimation Project Benefits**

Steel is a capital-intensive industry with high fixed costs. For this reason, once these large investments are made, steel producers will go to great lengths to operate their facilities at its full capacity. Mechanics of steel making do not permit slowing a line down and its shut down. In times of excess capacity when new plants will come, producers tend to continue to produce, hoping to sell their excess production wherever they can without covering fully allocated costs. Therefore, pre-identification and quantification of project benefits are essential to pay off the loans and exist in the business with profits.

There is a need to continue the current thrust on infrastructure related activities and extend them to rural India. Rural India today presents a challenge for development of the country and the opportunity to increase usage of steel in these areas through projects, such as, rural housing etc. So the settings of new projects should aim such product mix with emphasis on value added products and improved quality, which has market adaptability and share.

**Raw Material**

Un-interrupted supply of raw material is to be ensured before commissioning or thinking about new projects. The sources of raw materials are limited. All the companies in the business of steel making have to depend on the existing available sources of raw material required for steel making. Though India has good reserves of iron ore but at the same time lack of matching and adequate reserves of coking coal and non-availability of good quality lime-stone for steel making have also to be considered while project planning unless the suitable technology bypass these primary requirements. The policies of Governments, both Central and State, should be transparent so that renewal or re-allotments of existing mining leases of primary raw materials like iron ore and coal can be made without any problem. The grants of some of the new mining leases are essential for making investment and expansion of some of the mines for new projects or capacity enhancements (example, Posco). Alternative ways like plans to enter into strategic investments/tie-ups for coking coal blocks in India and abroad to ensure assured supply of coking coal is a major hurdle to cross.

**Land Requirements**

Choice of location will be governed by various considerations, such as, likely sourcing of raw materials, target markets for finished products, envisaged capacity of operation, infrastructure facilities etc. In case of existing plants undergoing expansion/upgradation, the choice of location does not arise but for new capacities which will heavily depend on export of finished products, the coastal location could be advantageous. Any greenfield project will require land. In India, land is available in remote villages and demographically in backward states like Orissa etc. Numerous problems are there in acquiring lands. For example, Posco is doing rethink on its mega investment in Orissa, after delays occurred in the handing over of the mines and land. Soung-Sik Cho, Managing Director, Posco India, warned that the entire project was in jeopardy if the captive mines were not given to the company.
There is protest by thousands of villagers who claims that they would be displaced because of the project. This problem aggravates when political parties become part of the movements. Convincing the local people is also a great challenge for the companies. Once, the co-operation and blessings of the local people is obtained there will take no time in completing the projects and that too without any protest. They need to be convinced with the facts that those dislocated, would be provided jobs besides other facilities. Posco, other Indian steel majors, including Essar Steel and Jindal Steel, have plans to set up units in Orissa.

The land mafias may explore and encroached lands in the areas where expansion plans are envisaged. Companies have to take care of these mafias also.

**Consolidation**

Today is consolidation era where big names are engulfing the smaller ones or sick units. Therefore, any mistake in project implementation may lead the industry to engulf by some other steel giant. So the pressure is tremendous on the agencies executing projects as well as on the company investing money. A round of discussions may be required before arriving at some consensus to investment in green field or gray area of the consolidated company.

**Government Policies**

The demand for steel products is derived and the development plans of the steel industry have to be backed and synchronised by the overall industrial policy plan targets for GDP growth and the expansion of the manufacturing sector. The development of the raw material sources and the requisite infrastructure support by various Central and State Governments and other Agencies also necessitates meticulous planning for the success of the plans. The Government has thus to play a pivotal role in providing the overall policy framework and coordination for the smooth implementation of the development plans. The policies must now shift focus from protectionism to competition and development, to break the vicious circle of high prices and low demand. Indian steel industry has by and large operated in an insulated environment with high custom tariffs and non-tariff barriers. It must be realised that the competition changes the entire work culture, objectives and the efficiency of an organisation to achieve global competitiveness and several industries in India have already achieved this objective.

(i) Formulation of an integrated policy framework and roadmap for the growth of the steel industry in the next two decades and an institutional framework for structural coordination between the steel and allied industries, for the effective implementation of the development plans.

(ii) Diplomatic support for the conclusion of Regional and Bilateral trade agreements with other countries to develop steel exports and safeguard the interests of the Indian steel industry in WTO related negotiations.

(iii) Creation of special development fund to promote research and development and technological upgradation of the Secondary Producers, on the lines of the development fund set-up for the Textile Industry.

(iv) Formulate and enforce a competition policy to improve efficiency and technological development of the Industry, to the global standards.

(v) Modification of Labour Laws, inline with the global regulations, productivity linked wages and Bonus rules, to promote harmonious industrial relations and enhance productivity.

Moreover, the lack of co-ordination between different departments/ministries and state governments are also a matter of concern.

**The New Industrial Policy Regime**

The New Industrial Policy has opened up the iron and steel sector for private investment by (a) removing it from the list of industries reserved for public sector and (b) exempting it from compulsory licensing. Imports of foreign technology as well as foreign direct investment are freely permitted up to certain limits under an automatic route. Ministry of Steel plays the role of facilitator, providing broad directions and assistance to new and existing steel plants, in the liberalised scenario\(^2\).

While the process of liberalisation has been successful in correcting many problems of the earlier regime, it has brought new set of challenges in the form of uncertainty/volatility of steel prices, dumping of steel, newer forms of trade restrictions and effect of continuous increase in prices of steel downstream industries. These problems need to be tackled in the context of irreversibility of the process of economic reforms. Innovative strategies need to be adopted to tackle such problems of transition.

The National vision and the policy framework should provide valuable assistance to the steel producers and Indian and foreign investors to formulate the company level development plans and also promote domestic and foreign investment in the steel industry. The major responsibility for the implementation of the development plans and strategies will however rest on the industry and major steel players.

**CHALLENGES DURING PLANNING OF THE PROJECT**

The time at which major cost savings can be achieved is during planning and design for the project. When preparing the over all planning of project, how the identification of key issues associated with the project, activity dependencies, critical stages in the plan and early decision requiring activities are identified will pave the
path towards success.

**Funding of Projects**

Steel is a capital-intensive industry with high fixed costs. A recent study has concluded that given the large exposure that banks and financial institutions have to the steel industry, a healthy steel sector is in the interest of the economy. The steel industry still not an obvious choice for investors a recent study suggests that any new projects with target price below $270/Mt will be economically unattractive.

But the constraint that will come on the way is how to mobilise the money for it. Steel plant modernisation is not a matter of pocket money. Given the average profitability it is also doubtful if the industry will have sufficient money to carry out the necessary revamps.

**Availability of Suitable Parties and Contract Regulations**

The booming steel industry will face difficulty in locating suitable parties to execute the projects as per their feasibility studies and technical specifications on turnkey basis. Today many giant steel makers have booked many renowned manufacturing companies producing products required for steel plants even without any immediate requirements like Mittal’s have booked Russian roll manufacturer till 2010. Presently, most of the reputed organisations are extremely busy owing to the worldwide expansion of steel making capacities, as well as other major projects. Therefore, roping of these firms is also a great challenge for new upcoming projects.

Developing economy like India faced problems of building local technological capabilities. Due to this, the local manufacturing industry was not able to provide adequate technological support to steel sector. The steel manufacturers had to import many of their equipment besides technology.

The mere statistics may not tell the real story. The logistics, the tonnages, the number of executing agencies, the procedures, the contract labourers, the finance, so on and so forth — the sheer scale of operations and the range of activities are staggering. Needless to mention, the key to success lies in meticulous planning, continuous monitoring and effective finishing. The task becomes all the more daunting due to the additional challenge of simultaneous management of ongoing operations in steel plants.

Integrated project management, delegation of power to project managers, prequalification of conference with prospective bidders, MoUs with vendors for regular jobs and performance evaluation of contracting agencies are some of the challenging tasks to be completed on-time. SAIL has also simplified its purchase and contract procedures that will surely go a long way in facilitating timely completion of the projects on such a large scale.

**Technology Transfer, Technology Adaptation and Innovation**

Developing countries like India can not always afford to develop their own technologies. They need to import many technologies from developed nations. Since, late 50s, large number of steel producers in India went for technical collaborations with the world majors. Many public sector steel plants were built with collaboration from countries like United Kingdom, Germany and the erstwhile USSR. In earlier years, many of these plants faced problems in their collaboration projects. Due to elements of secrecy and other reasons, India had to deviate from what was considered suitable by the countries aiding the project. As for example, Indian Iron and Steel Company (collaboration with British, Soviet and Japanese firms), Rourkela (collaboration with West Germany) and Bokaro (collaboration with Russia) had many teething problems during execution of the projects. With the gradual adoption of technology for iron and steel making by Indian companies, these bottlenecks have reduced. Most of the state owned plants and some private ones have gone for large capital-intensive modernisation programmes, mostly with foreign collaborations. Here, there is a requirement for safe landing of imported items, technological platforms to cut time over run and the vision to adapt newer technology with innovative and competitive contents. Benchmarking with the leading global steel producers in term of the production costs, quality and service, to meet the global competition in the low tariff regime becomes essential and must be kept in mind while planning for the technology and facilities. Moreover, there will be a problem of technology transfer after the commissioning of new projects in the present guarded intellectual properties.

**Ensuring Competitiveness and Promotion of Ancillaries**

Achieving cost competitiveness remains a prime target of any future plans. This can be achieved with the help of a good consultant, feasibility study, proper selection of technology and planning. The challenge is to ensure that the projects are implemented without time and cost overruns. Moreover, the process of identification of vendors based on their expertise and ability to meet the required service levels for various processes would be an area to explore quickly for project implementation. In order to ensure cost competitiveness and smooth going of the projects, development and setting of nearby industries and ancillaries is also a major task to be performed by the upcoming steel industries. This will provide financial edge and economic size to the project and ensure competitiveness.

**Existing Infrastructure**

India is a developing country and its economy is growing very fast. Instead of this economical growth there is need for infrastructure to sustain this growth. The
Government envisions India becoming a developed nation by 2020 with a per capita GDP of $154010. For a nation that is economically strong, free of the problems of underdevelopment and plays a meaningful role in the world as befits a nation of over one billion people, the groundwork would have to begin right now. The Indian steel industry will be required and is willing to play a critical role in achieving this target.

Insufficient infrastructure refers to roadways, utilities, medical staff, educational facilities and services. In addition to building temporary housing (often called camps), companies should consider hiring their own medical staff to care for project personnel, as well as contributing back to the community in order to support maintenance of utilities and services.

The impact of poor infrastructure like high cost and poor reliability on the availability of electrical power, inadequate transport facilities, less-developed logistic network etc is very significant for cost, benefit etc analysis with respect to the investments made in the new projects.

With abundant iron ore resources and well-established base for steel production in the country, steel is poised for growth in the coming decades. Production has increased from 17 Mt in 1990 to 36 Mt in 2003 and the target for 2011\(^{10}\) is 66 Mt. While steel will continue to have a stronghold in traditional sectors, such as, construction, housing, ground transportation, special steels will be increasingly used in hi-tech engineering industries, such as, power generation, petrochemicals, fertilisers etc. Steel will continue to be the most popular, versatile and dominant material for wide ranging applications. While India may not become a leader in world steel market, it can become a powerful force.

The National Steel Policy (NSP) has made the following observations on the need of improved infrastructure for the steel industry up to 2019-20.

Comparatively High Tariffs

The movement of raw materials and finished steel would need good rail and road network as well as substantial improvement in port handling, storage and haulage facilities freight cost escalations The changes in the rates of demurrage charged by the Indian Railways and overall duty structure relating to steel, have further affected the steel industry. These are the new challenges which the steel companies face and should be fully geared to face the market challenges, converting them into opportunities.

(i) Inland Transportation

It is estimated that every tonne of steel production involves transportation of 4 t of materials. The envisaged addition of 75 Mt annually implies 300 Mt of additional traffic. In a globally integrated economy, minimisation of the overall cost of transportation becomes an important instrument of maintaining the competitive edge in both the domestic and overseas market.

(ii) Railways

The railways transport iron ore and coal from mines and ports to the plants, and steel to ports and consuming areas. However, over the last decade railways has been consistently losing traffic originating in the steel sector to the roads. The share of railways has declined from 71.9% in 1991-1992 to 34.4% in 2001-2002\(^11\). The decline has been largely on account of railway’s competitive weakness in the face of challenges from other modes of transports like roads, pipeline and coastal shipping. Replacement of the ‘equalised railway freight’ by ‘freight ceilings’ is also partly responsible for the modal switch.

According to NSP estimation based on the present share of railways and roads in the movement of raw materials and finished / saleable steel, the expected scenario by 2019-2020 would be as shown in Table 3\(^12\).

The railway facilities, therefore, would need to be expanded substantially in view of renewed investor interests in the creation of additional steel capacities—both in greenfield and brownfield projects. Resource constraints may necessitate participation of the steel industry in the creation of railway infrastructure, especially in the capital-intensive areas of laying tracks and procuring wagons. Besides ensuring availability, the railways would also need to re-examine their freight structure and improve quality of services. Dedicated freight trains in the private sector would be encouraged.

Adequate enabling infrastructure, such as, power, ports, roads, rail transport is pre-requisite for the Indian steel industry to remain competitive.

(iii) Roads

The existing road network needs to be expanded and strengthened considerably for reducing transaction costs of the Indian steel producers. The steel plants and mines need to be integrated with the on-going programmes of national highway development and also with the proposed rural road schemes for expanding the delivery chain of steel across the country, especially the rural areas.

(iv) Power

The additional requirement of power for the steel industry would be 7000 MW by 2019-2020, requiring an additional investment of Rs 24500 crore\(^13\).

Environmental Management

Environmental management has become a major issue in corporate governance. The era of industrial deregulation is being replaced by an era of environmental regulation. Indian laws on environment are stringent, but not their enforcement.
The steel industry accounts for between 5% and 6% of total man-made CO₂ emissions. This is less than accounted for by transport or power use by the general public, it does mean that the steel industry is in the frontline in making a contribution to fight global warming. It has been seen that policies applied only in the Kyoto countries are not working in terms of making any reduction in total greenhouse gas emissions. Therefore, the plants not adhering to the norms may be closed. Steel is an excellent eco-friendly material. Therefore, avenues for re-cycling of steel may be a great challenge to accept for generation of revenues and cost reduction.

Potential Utilization through Information Technology (IT)

The advantage of a proper IT-based information system is that accurate information can be obtained at a much faster rate, reducing downtime and speeding up decision-making process. Since, time is more than money, it would have direct impact on cost. The objective would be to implement IT in all operations and to integrate these with day-to-day decision making process. IT applications will help in streamlining both process chain and supply chain and would thereby result in cost reduction and increase in productivity. Therefore, the need to train the manpower to make them acquaintance with the new IT tools has to be the part of strategic planning for successful implementation of the project. There is a need to adopt the usage of IT to harness its potential for project management at appropriate places for monitoring and control even during project execution.

CHALLENGES DURING EXECUTION OF THE PROJECT

Excellent detail and scheduling alone cannot entirely guarantee the fulfillment of a project objective. There are certain areas, which were thought of to address during planning, may create lot of problems during execution of the project. For example, land has been allotted but when time comes to acquire it, there will be a great protest locally. There will be a challenge to make them understand about the betterment, which may be achieved by the project apart from the various schemes thought of for the welfare of the people. The company may not get the infrastructure at the time when it is required, so delay will take place. The major areas are as follows:

Human Resource

Humane touch to a project — the key — to successful project management. As the technological advances provide equal opportunity for learning to all, the focus is now more than ever evident on the human aspects of project management. The key differentiator to the success of an organisation and its projects is its works force that makes things happen.

Thrust on human resource development continues with a renewed focus on inculcating a greater value orientation across the company. A series of initiatives are being taken to improve the competence level of the employees in tune with changing technologies, customer demands and market dynamics. Accordingly, training modules have been redesigned with a clear focus on competence mapping, skill gap analysis, multi-skilling and multi-tasking apart from imparting training on new technologies of steel making. Efforts are also on to put a system in place to institutionalise the sharing of knowledge among the employees. Cross-functional co-ordination has improved with new solutions but due to rotation of people in organisations has dropped the in-depth learning process required for successful implementation of the projects.

The two other important HR issues that needs to be dealt with are:

(i) Rehabilitation and resettlement of people giving their land for greenfield projects

(ii) Improvement in low productivity of the steel industry in India

Apart from the above HR initiatives will be required for developing a team spirit towards integrated project management with enhanced power to project managers. Developing project leaders will also be the crucial attempt to take.

Competent Workforce and Manpower

Many contractors do not have appropriate staffing levels to supply planners and schedulers to large projects. When a number of projects will come for execution at a time, manpower availability will be a real constraint. The assignment of respective jobs as per the merit and expertise available within the organisation will be a real challenge for smooth execution of the project. Hence, faster planning and shaping of projects is required to take the services of available resources. This is to be clearly understood that the so-called big advantage of low labour cost in India is more or less a myth for two reasons. It has widely seen that more man hours utilised often neutralises low wage rates. Also, low wage rates are the root causes of poor labour productivity.

Today’s market is flourishing with new projects and investments in every field of life, which calls for skilled manpower. Since, steel industry is a tough to work due to the conditions. The working environment, job hazards etc are more as compared to the IT industry which is offering a good salary and job profiles which is attracting

Table 3 Modal distribution of traffics 2004-05 and 2019-20, Mt

<table>
<thead>
<tr>
<th>Year</th>
<th>Railways</th>
<th>Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw materials*</td>
<td>80</td>
<td>34</td>
</tr>
<tr>
<td>Finished steel</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>61</td>
</tr>
</tbody>
</table>

* Excludes traffic due to export of iron ore

<table>
<thead>
<tr>
<th>Year</th>
<th>Railways</th>
<th>Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw materials*</td>
<td>230</td>
<td>100</td>
</tr>
<tr>
<td>Finished steel</td>
<td>33</td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>177</td>
</tr>
</tbody>
</table>

IE(I) Journal-MM
the engineers and professionals. Therefore, scarcity of skilled manpower is a burning issue for most of the steel industries.

**The Employees Union**

Unionisation therefore triggered changes in the existing institutional arrangements, including internal labour market systems. Skyrocketing wages made it more and more difficult to maintain the low wage dependent managerial system, and the rationalisation of existing institutional arrangements became more and more important. Time to time varying demands, pressures and issues may come during the project execution from the unions and political leaders. Such pressure means a significant change in the existing competitive strategy based on price competition.

**Occupational Health and Safety**

The question of occupational health needs more attention in the industry. Steel is notoriously known as a hazardous industry and workers are exposed to several health hazards. The managements of steel plants have not been paying sufficient attention to this aspect. There is an urgent need to identify these health hazards and take preventive measures. Due to prolonged exposure of working in hot conditions, noisy environment and vibration due to machines, workers are facing several health hazards, which require urgent treatment. Gasses emitted while working in several departments also cause health problems for the workers.

**Changing Employment Characteristics of Steel Workers**

Information and technology has revolutionised the employment scenario. For projects with set hours of work, this can cause a difficulty in attracting workers. With insufficient workforce, the project is faced with schedule delays and increasing costs. Another thing that can make it difficult to attract workforce is any project that is located in an isolated areas. There is every likelihood that many good project managers may leave the project so alternative ways to bridge their gap has to be arranged in no time to maintain the pace of the project.

**Services at Site**

During project execution and implementation a lot of local infrastructure for stay of working force, movement of both man and machine, sewage disposal, drinking water, medical facilities etc. will be primarily required. This problem is true to both green and gray field projects. Especially for projects coming in remote places, this challenge for developing services at site is of utmost importance due to almost zero facility level at these places.

**Project Control**

During the execution of a project, procedures for project control and record keeping become indispensable for recording the financial transactions that occur as well as giving managers an indication of the progress and problems associated with a project. Continuous interpretation of project accounts may be a challenging task until a project is completed otherwise it will be too late to influence project management. Innovative methods adopted for constant monitoring for progress as per scheduled time through reports made by the responsible and accountable persons are required with full zeal and participation. Apart from this, during the implementation phase of the project how morning meetings and daily reviews are organized to point out potential problems and critical activities and timely initiation of preventive actions and contingency actions will play key role in mitigation of uncertain problems. Even after completion of a project, the accounting results may be confusing. Project control procedures should primarily intended to identify deviations from the project plan rather than to suggest possible areas for cost savings. The deviations are inherent so it will be interesting to see how thrust of project control aims on fulfilling the original design plans rather than on searching for significant improvements and cost savings.

For cost control on a project, the construction plan and the associated cash flow estimates can provide the baseline reference for subsequent project monitoring and control. The final or detailed cost estimate provides a baseline for the assessment of financial performance during the project. To the extent that costs are within the detailed cost estimate, then the project is thought to be under financial control. For control and monitoring purposes, how the original detailed cost estimate is typically converted to a project budget, and the project budget is used subsequently as a guide for management will be a utmost requirement.

The changing policies and breaking of MOUs may also disturb the project execution, which is not a surprise in today's scenario. Even getting the penalties will not serve the purpose because project may get delay unless some rescue plan has not made or correct decisions are not taken immediately.

**CHALLENGES AFTER COMPLETION OF THE PROJECT**

**Organisation Design and Recruitments**

The number of employees required for operation of plant is to be designed based on the benchmarking with some of the leading steel plants of the world. The selection of employees based on healthy mix of experienced and new recruits is also a great challenge before the plant becomes fully operational.

**Employee Amenities and Corporate Social Responsibility**

There will be a need to strengthen the social infrastructures available at the site. The suitable design of master plan for development of township, schools and other associated amenities for the employees to live
happily with their family. A number of families will be displaced if new green field plant has come. There will be a need to define policies to address rehabilitation and other related issues.

Search of New Markets

The new market for the product mix has to be explored so that the full capacity utilization of the plants can be made in spite of less consumption in the targeted sectors and areas. India is in search of a new market for its steel products particularly in South-East Asian countries, which are showing signs of economic revival. Attempts to explore additional markets in the Middle East, Bangladesh, Myanmar, South Africa, Mexico, Taiwan and some other countries are required to be made. Till date no steelmaker has tried to the best to explore the rural market, hence the unexplored rural market is needed to be explored.

Image of Steel

The last and perhaps the most important challenge of all is the image of steel. The industry is proud of the contribution that steel makes to modern society. It is indispensable in the welfare of mankind. However, recent surveys undertaken indicate that most of the population is ignorant of the contribution steel makes and as a result we cannot be satisfied with the image of steel in the world today.

A poor image for steel in society ultimately affects the choice of steel in products. A poor image of steel in young people affects their career choice. A poor image of steel in governments affects the choice of policies made on issues, which affect our ability to serve society. Lastly, a poor image of steel in the financial community affects the valuation of companies and the availability of investment capital.

China Factor—becoming Net Exporter and Global Scenario

China has substantial reserves of Iron ore but is a large steel user as well, has banned iron ore exports and in fact, actively encourages its steel producers to secure and develop iron ore deposits outside. Therefore, the international trade of iron ore is driven by China. Moreover, with their low labour costs and huge capacities, the Chinese can compete on the price front in steel. An equally strong if not stronger contender for the same is Korea. It is expected that global capacity and overproduction due to mergers and acquisitions will tend to drive prices down though it will increase trade. For the next few years, the effect of mergers on the industry would keep both prices and trade high and keeping eye on these factors proved to be crucial for the growth of business and production.

While the steel industry is no doubt passing through good times right now, there is fear that with many players rushing in to create new capacities, there may be overcapacity by 2010. However, Indian companies are in a much better position to weather the temporary mismatch in demand and supply and price declines today because their debt-equity ratios and interest rates are much lower. Yet, steel producers need to guard against the likely bottlenecks and prepare themselves for new challenges.

Post Implementation Review

In order to learn and not to commit the mistakes in new endeavours are an important activity after completion of the project. Project evaluation to be done against the various milestones and objectives. The analysis to be competitive and improve capacity utilisation and bridge the lacunas will be a challenging task to perform.

CONCLUSION

A number of new challenges have come with the time for Indian steel industries. Learning from the past and utilizing the new and modern project management tools will lead to the timely completions of the projects coming in the Indian steel industry keeping aside the new challenges. Mere statistics may not tell the real story. The logistics, the tonnages, the number of executing agencies, the procedures, the contract labourers, the finance, so on and so forth are challenges to come. Needless to mention, the key to success lies in meticulous planning, continuous monitoring and effective finish. There is a requirement of clear vision and wish.

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REFERENCES

12. www.planningcommission.nic.in.