SUCCESSFUL EXECUTION OF MINING PROJECTS

On time Project Delivery with no cost overrun is the key challenge

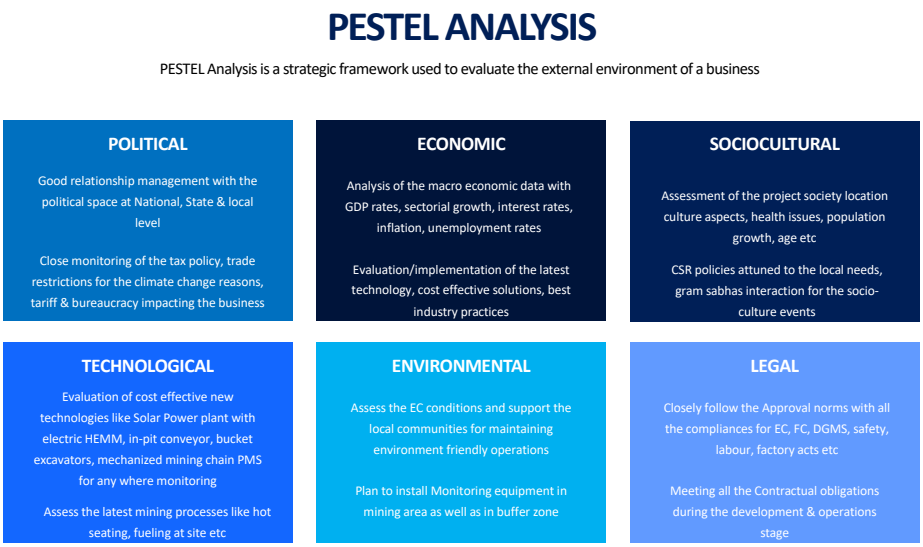
Over 1500 operating mines, India's mining production covers in over 90 minerals including 04 fuel minerals, 10 metallic minerals, 23 non-metallic minerals, 03 atomic minerals and 55 minor minerals with major reserves in iron ore, bauxite, chromium, manganese, baryte, rare earths, coal and others. Production of metallic minerals in the country increased from US$ 6.96 billion in FY18 to US$ 9.1 billion in FY22E. In the same period, production of non-metallic minerals increased from US$ 1.16 billion in FY18 to US$ 1.22 billion in FY22E. Iron ore production ranges in 200 Million Tonnes per year. Coal production with over 700 million tonnes per year still falls short of demand with an import requirement of over approx. 150 million tonnes per year. In March 2021, CIL approved 32 new coal mining projects, of which 24 are expansion of the existing projects and the remaining are greenfield. Estimated cost of the project is Rs. 47,000 crore (US$ 6.47 billion) aiming to reach a target of 1 billion tonnes per year by 2024-25. In the recent auctions, Coal blocks have been auctioned for 45 mines so far aiming to produce 11 million tonnes per year in addition to 24 allotted coal blocks with an aim to produce 13 million tonnes per year to increase the coal production to minimise the coal import. However, only around 25% mines with mine opening permission which needs to be enhanced. Gross Value Added (GVA) from mining and quarrying stood at over US$ 40 billion at constant prices in FY22, as per the advance estimates. GVA is defined as the value of output less the value of intermediate consumption. GVA becomes the GDP but adding taxes and reducing subsidies.

Delay and cost overrun are major challenges to any mining projects. On many occasions, the various statutory approvals, land acquisition and Rehabilitation (and resettlement) share the delay, however, even project proponents also have to adopt the right strategy for project & mine planning, project financing (equity & debt), mining infrastructure, construction strategy (EPC or EPCM ?), sub-contract mining, workplace relations, facilitation and safety which if not put in place rightly may cause enormous delays. Such situation is

prevalent in the mine operator and developer (MDO) contracts wherein while direct responsibility of the various statutory approvals, land acquisition and Rehabilitation (and resettlement) lie with the project owner but MDO still has to successfully deliver the mining projects with specified production in a define time lines and the production output covering various activities as mentioned above. In one of the article, McKinsey alluded that[1] "More than four out of five mining projects come in late and over budget, by an average of 43 percent. One reason for the poor performance is that project leaders find it difficult to know whether and when to intervene". During my several years of association in the sector, I found that there are numbers of issues which take enormous time and at times completely exacerbating the time schedule and cost overrun. In this article, an attempt is made to discuss such issues for the successful execution of the mining projects.

PESTEL analysis

Before getting on to the projects issues, I always preferred to do a robust PESTEL analysis for the project to understand the various aspects like



Political, Economic, Social, Technological, Environment and Legal for the project. This analysis will help in every future decisions. The typical PESTEL analysis template prepared for one of our advisory is as above.

Project Financing

Project financing is a mechanism wherein project is debt financed for the construction and initial operation and the debt repayment including interest payment is done through the anticipated cash flows of the project. Equity quantum, project risks and past performance of the project proponent decide the debt quantum as well as the interest rates. Usually, project leaders depend on their corporate finance team for this activity meaning that they are oblivious of the situation with respect to equity as well as debt on several occasion. While finance team being the subject matter expert (SMEs) steer the subject but the project leaders have to be their solution provider for various issues related to Equity as well as debt and Project itself. Firstly, my suggestion is to prepare a robust financial model which is supported by the definite costs meaning all the costs going into the model should be backed up by the Vendors' quote with in-house executed data. I suggest to use Pareto principle approach ie *"80% of outputs come from only 20% of the inputs"*.

In the mining projects such costs are divided into two major parts: 1) Mining related like HEMM, dewatering pumps/pipes and 2) Projects related like Buildings, workshops, mineral beneficiation, handling/ conveying, storage & reclaimer, transportation (Railway or trucks) & loading. As you notice that second part is very different than the first part. Second part will be dealt in the following discussion when we will discuss the construction strategy like EPC or EPCM.

The first Part which is mining related mainly mining equipment (HEMM) ie excavators and mining dumpers. Equipment specifications with numbers are taken from the mining plan as the preparation of the mine plan handles carefully the techno-economic- safe extraction of the minerals. The mining equipments ie

[1] Getting big mining projects right: Lessons from (and for) the industry by Mark Kuvshinikov, Piotr Pikul & Robert Samek , Feb 2017

HEMM can be financed based on the leasing basis. There are two options for the HEMM leasing which are popular ie 1) Financing lease and 2) Operating lease. Equity commitment ranges around 10% however, it is advisable that team should have a detailed discussions with the leasing companies to freeze the terms. This is referred as Equipment financing.

For the second part, we need to carry out a preliminary engineering first for the quotes from the suppliers. Once the model has come to the shape with the above inputs, the requirement of the Equity as well as Debt becomes very clear. During this time, the initial discussions with the lenders are very helpful to further filter the model with respect to debt to equity ratio and interest rates. Typical financing structures in brief are:

Senior debt
The senior debt will have a priority over others for the repayment typically sourced from the major financial institutions and/or banks. Senior debt lenders typically go in for a detailed due diligence of the project covering; a) Technical like GR, mining plan, DPR, site reports, reserves/resource estimation etc, b) Mine infrastructure, c) Mining cost, d) Off-take contract and price, e) insurance, contracts, tax, legal & environment and f) financial model, before deciding on lending and will calculate the amount of senior debt they are ready to lend by applying the financial covers ratio tests like Loan life cover ration, Debt service cover ratio, Principal/Interest cover ratio etc.

Mezzanine financing
This funding is on a sub-ordinated basis. In principle, mezzanine funding increases the funds for the project by reducing the amount of the equity required is cheaper than the equity resulting a cost saving in the project. Although this can be provided by the banks or other financial institution but one can also explore the possibility from the trading company who is associated with the project as a long term off-taker with a banking repute.

Export Credit agencies (ECA)
In order to the supply of the goods and services for the project, the ECA of the country can directly lend to a project or give a guarantee support for the suppliers. ECA can be insurance against the commercial or political risks and very attractive source of funds. The project leaders have to evaluate the goods and services from the ECA providing country. At times, ECA funding is time consuming but one has to evaluate the specific project. In the past, many companies have evaluated such ECA funding from China for their mining projects.

Equity
The remaining project funding requirement will be met by the equity, which will be brought by the project sponsors. The banks typically will require to upfront the equity disbursements before the disbursement of debt. Once the project is operational, equity holders are paid after the payment of the above lenders and such restrictions are imposed by the debt financiers. Equity holders may be required to pledge the shares in favour of lenders. Inter-creditor agreement deals with the order of the payment of senior and mezzanine debt and a financial tests that must be met before payment of interest and principal to mezzanine debt holders including the rights of lenders.

The financing structure strategy is to be initiated from day 1 as this is a pivot for a success for the delivery of the mining project.

Statutory Approvals, DPR, CSR, Land Acquistion and R&R

The parallel actions should be focussed on the various approvals. The major approvals are:

Mine Plan	Mining Lease	Detailed Project Report	Forest Clearence Stage 1 & 2
Environment Clearence	Wildlife Clearance	Approval under PESA	Nallah/River Diversion
Power line/ Rail/Road diversion	Permission to draw Water / Power	Consent to Establish / Power	Land Acquistion + R&R - possession of land
Grant of Mining Lease	Intimation to DGMS for mine opening	Permission under Factories Act, 1948	Permission - radio frequency communicatio n system
Labour related permission	Escrow account for mine closure	Permission for explosives	Mine opening permission

In addition to the above there are other approvals which have not listed as major ones but still are required to be taken. Please note some of the approvals are time consuming and are inter-linked. My suggestion is to plot the sub-activities of the each approval with inter-linkage in a time-schedule software like of Primavera and control each of these activities. Some of the approvals related to the EC, Forest, Land acquisition and R&R need public hearings and therefore a robust on-site strategy is required to be in place. Land acquisition should be initiated to acquire the land in place for at least 1st five years of the mine plan area for the extraction to start with. The rest of land acquisition may follow without mining extraction interruptions. This will facilitate a smooth mining operations. I highly recommend to initiate the CSR activities on a continuous basis in the directly affected villages of the project as well as in the buffer zone of the project which will bring awareness among the people at large for the benefits of the project. Usually EC clearance imposes the on-going commitments which can be clubbed with the CSR activities during the mining operations.

Construction Strategy

Construction strategy is an important step leading to the successful execution of the project resulting into specified production output. The following common types of contract are to be considered depending on the various risk assessments:

- Traditional execution by the project owner
- Engineering, Procurement & Construction (EPC)
- Engineering, Procurement & Construction Management (EPCM)
- Partnership Contracting

The first & last approach, as the names suggest, are self explanatory, however, at times these forms of contract face challenges from the lenders as the risks are shifted to the project owners. EPC project contract execution approach has an advantage as the contractor bears the major risks relating to the cost, time & quality of the project. Under the EPCM form of the contract, the contractor is responsible for design, procurement of the necessary materials & equipments on behalf of the project owner and finally managing the construction on behalf of the owner. The main liabilities of the EPCM contractor relate to the deign work performance, project procurement and construction.

EPC or EPCM ?

EPC contract offers a single point responsibility on the basis of project specifications provided by the project owner. It takes the risks for timely completion of the specified quality project with the cost. However, the engineering design is EPC responsibility and if not taken care on a progressive basis will result into the defective project which is then too late. While drafting the EPC contract, a reject clause for deign and a variation clause need to be considered. Lenders therefore suggest to the project owner to select the EPC contractor from a list of reputed contractors who can provide the liabilities which the lenders can rely upon. However, if the cost of the limitation on liabilities, the project owner may consider EPCM approach for project delivery. EPCM contractor is like an agent of the project owner and therefore does not assume the risks for project time and costs as the owner progressively approves the design as well as construction. The approach needs a technically team with the project owner to support the EPCM contractor. In oil & gas sector in India, this approach is adopted for the project delivery. In the mining projects the projects relate to the mine infrastructure projects that may typically include material handling & beneficiation, storage, stacker & reclaimer, conveyors, rapid loading system, railway siding with marry go round systems.

Partnership Contracting or Contract mining

This is a popular form of execution of the mining projects wherein the mining contracts are subcontracted and the project owner invests mainly into the material handling, transport and final despatch. At times, mostly in the MDO contracts, this form is restricted to a defined level only or restricts the association only in the defined areas. The contract mining typically on a Rs per tonne basis with the defined outputs and this brings the hedging of the risks/capex/opex/profits between the project owner & contract miners. Project owner assumes the overall project responsibility with safety standards and mine closure obligations. Project leaders have to draft the contract mining contract carefully to avoid the subsequent conflicts. Standard contracts are

increasingly becoming popular to balance the risks like AMPLA model contracts in Australia.

Geological report, mining plan & detailed project report, facilities diversion studies

Robustness of the drilling work is very important. Even if the Geological report & mining plans are available for the project but it is advisable that the Geologists & mining engineers should check the GR report as well as mining plan to ascertain the sufficient density of the borehole data is available for the mine plane. If required, there should be additional drillings in the area so as to further gain the confidence on the reserves and mine plan. During the PESTEL analysis, the project leader should thoroughly evaluate the use of, for example cost effective & efficient new mining technology like In-pit crushing & conveying, Solar plants & electric HEMM, bucket-wheel excavators & conveying, use of angle conveyors, mechanised operations with GPS. All these options need to be viewed with respect to their capex and opex resulting into higher NPV of the project. At times, it is important to keep the initial project cost low and implementation such projects then may be planned in the phases during operations after ramping up period from the project available cash flows rather than up-fronting it which makes project owner as well as lenders bit nervous. A detailed feasibility report should be commissioned from consultants of repute like CMPDIL which will only be required for the project but also for the financing institution for the purpose of their due diligence and financing. Surface plans need to be studied in detail and typically the mining projects are with various existing structures like nallah, river, culverts, roads, railway, power transmission lines etc. Such relocation requires additional relocation studies and expenses as well as the approval from their respective authorities resulting at times into a time consuming process therefore needs to be kick-start sooner than later.

Project Time/cost Schedule and controls

Unlike in the process industry where this function is well adopted, mining projects need to catch up. Now-a-days, there are several project cost & time schedule software which can take several predecessor & successor activities with the dependencies along with the cost can easily conclude the critical path for the project in a real time basis. Software like Primavera etc (or others) can be employed. Agile values for the project implementation may be adopted. Agile improves the project delivery by maximising business value, reducing implementation risks and increasing team engagement. The timely actions can then be initiated to avoid any future delays with respect to time & cost keeping project quality intact.

Man-power resource

Mining industry is very people centric industry. The skill set covers the specified education, experience and certain certification like Mining engineer with first class certificate, mineral processing engineers, geologists, project planners, project controls engineers, safety mining engineers, mine planner, project engineers, land acquisition and liaison officers etc are few to name. Better structured project teams, with diversity will deliver the mining projects more successfully. Employment of the local people according to their skill set is very important to have the local community support into the project.

To conclude, the above issues are some of the important ones, but not exhaustive, to deliver the successful mining projects.

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