Optimising Mine Plans
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Using Michael Porter's (Harvard Business School) Value Chain concept every activity in the value chain should add value or it should be changed or excised. It is an approach which Lean Processing is based on but too often (as well as Six Sigma) poor management kills any real gains which might be derived from it. Mine planning is a case in point. The whole issue of optimisation in mine plans is something I have discussed on a number of occasions. Every mine plan should be an exercise in optimisation. Unfortunately, many are not. The astounding part is that there are amazing tools available for our use. I remember back in the 1980's doing optimisation by hand with multiple iterations and colouring pencils on plans. Today there are advanced mine planning tools and you can use any one of a number of optimisation tools available from Excel spreadsheets (some with GUI's such as STOPS) to the industry standard Whittle 4D. I repeat again, <u>every</u> mine plan should be treated as an exercise in optimisation whether you are using Whittle or the back of an envelope. Not enough people understand this.

OK, so you don't have any excuse to not include optimization as part of a mine plan but how are you going about it? Any mine planner can (and should) do mine optimisation every time they produce a plan, but if you don't have 1) good resource information, 2) good mine planning and 3) good equipment performance and cost data then the optimisation is likely flawed.

On point one – good resource information. This was recognised 20 years ago and the first JORC code was published in 1989. The Code for Reporting of Mineral Resources and Ore Reserves (the JORC Code) is widely accepted as a standard for professional reporting of mineral reserves. Today, nobody accepts anything less.

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On point two – good mine planning. It would be a brave person to say we don't have really good mine planning tools and some pretty smart planners around Australia. (The best planners are probably located in the Consultants ranks as most people who remain on sites don't want technical careers – they want the joys of management).

On point three – good equipment performance and cost data. This is the missing link. I think every mine (optimisation) plan is doubtful if it has relied on something other than realistic production and cost data which has some basis in fact. That is, is it based on what other people are actually achieving (viz. a large number of mines and recent data)? What do the planning consultants use for equipment rate and cost inputs into mine plans? You would expect the big mining consultants to get it right – but they frequently don't. I don't blame the companies which are relying on the consultants to produce bankable documents. However, I don't think the shareholders in a number of big mining companies have been told the financial ramifications of poor mine planning and optimisation.

Every mine plan should require the three points. It is my opinion that very few mining companies have raised money on the ASX with an accurate mine plan. Very few proposals delivered to the Boards of BHP or Rio or Xstrata or Vale are sufficiently validated in this area to justify the expenditures of shareholders money. There are a couple of new, large and highly expensive mines recently brought on line, which have needed more equipment than planned because the mine plans used to raise the capital were flawed.

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Remember some of the numbers I have quoted in the past. Best practice trucks move 52% more material than the average. Best practice excavators move 42% more material than the average. Shovels – 37%. Draglines – 30%. The story continues. If a mine planner takes one number from their experience or because it is simply accepted that a certain model moves a certain amount of material then this is culpable and will usually end up with production estimates that are way above what a new mine or even many existing mines will ever achieve.

I did a job for a mine recently looking at the performance of a particular model of excavator achieved. Cutting a long story short, the manager didn't believe the best practice numbers because "he knows machines which move that much". Yep, so do we. The issue is that maintaining a mine at these levels for months and years is extremely difficult and that is why only a few mines actually achieve "best practice" levels on an ongoing basis. The problem is that many mines don't and won't ever achieve these levels for anything more than short periods of time when everything is working in their favour. \

The best practice excavator moves 22 Mt for the model in question but the average is 14 Mt and many mines (~50%) don't even achieve that. Sure, use 22 Mt in your plans but there is a 95% chance that you won't make it and a very good chance you will achieve much less. How does your mine plan and optimisation look if you are 8 Mt below plan this year on just one piece of equipment?

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We have a Joint Ore Reserves Committee; why don't we have a Joint Equipment Performance Committee which could also create a code for what checks and balances should be required for inputs into mine plans. A standard is needed, such as "The planned performance must be reported against that achieved by at least 10 of the same make and model piece of equipment in the previous year". I don't really care what the standard is but we just need a standard. Mine planners and mining consultants don't all get it wrong but it is a bit like the broken watch – it is right twice a day.

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