

Thought processes during the project initiation phase

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The overall supply of platinum is forecast to rise more than the demand, and market deficit will narrow somewhat, but is still substantial at about 480 000 ounces. Because of this deficit, the price of platinum is expected to remain high, not taking into account the impetus from funds and speculators.

With this strong demand for platinum and the high price, platinum producers still need to initiate projects to not only sustain current production, but also expand output into the high demand. However, the rise in the platinum price does not entirely offset the drop in revenue due to the strong rand. Consequently, in the current economic environment, executives and managers are under extreme pressure to initiate only the highest yielding projects and implementing them successfully.

During the initiation phase of a project, the cost of changing concepts is the least, and strategic project decisions are the most important. It is during this phase that the most value can be added to a project, therefore requiring inputs from highly skilled, creative and experienced people.

This paper will discuss thought processes and paradigms during the initiation of projects that will assist project owners in the selection and initiation of successful and profitable projects. The project initiation process will also be discussed outlining selection models, risk analyses and funding considerations.

Objectives of the article

The objective of the article is to discuss the thought processes and paradigms during the initiation phase of projects that will assist project owners in the selection and initiation of successful and profitable projects. The project initiation process will also be discussed outlining selection models, risk analyses and funding considerations.

Importance of the article

Platinum production in particular has played a major role in the South African economy over the last number of years, and will continue to do so in the near future, backed by a strong world wide demand for platinum. Demand from the autocatalyst industry will surge further as diesel car sales grow strongly in Europe and purchase of platinum by the US auto industry will rise as less stockpile metal is used. In Japan, the retrofitting of catalysts and particulate filters to trucks and buses in the Tokyo area will push up platinum consumption.

South African platinum producers have to initiate only high-yielding projects. This has become increasingly difficult in an economic environment where the rand is at strong levels against the US dollar. This article aims to discuss various elements that play a role in project initiation and selection that can assist executives and managers in the selection process of mining projects.

The managers of any company are constantly under pressure to ensure that the company provides value to the shareholders. With the amount of capital expenditure in the mining sector in recent times, given the high volatility of the market (both metal prices and exchange rates), managers in this sector have to make sure that the most profitable projects are initiated to ensure shareholder value.

The article does not stem from negative symptoms, but from the urge to improve on current practices. The purpose is to discuss new ways of thinking when initiating projects, adhering to sound business principles to ensure that shareholder value is increased and not destroyed by the projects selected.

Industry review

Large-scale mining projects continue to be initiated, not only by mining giants, but also increasingly by smaller players. Most mining projects can be grouped together in following types of projects:

- Expansion capital projects
- Ongoing capital projects
- Health and safety related projects
- Risk related projects
- Environmental projects.

The selection of most projects is driven by a larger company strategic business plan (SBP). Top management often generate a purpose objective statement, which is a statement of corporate management's perception of what the shareholders or owners 'want' in terms of earnings per share, return on equity and growth¹. From this purpose objective statement, a SBP is developed.

The SBP includes all the aspects of the business, including production expansions, ongoing replacements of assets, health and safety, risk and environmental, to name but a few.

Operational executives and managers are then tasked to initiate projects to meet the objectives in the SBP. It is on the operational level that detailed tactical planning is required to meet the company strategic plan by identifying

relevant projects. The selected projects go through a lengthy process of review before capital is approved for implementation.

Initiation and selection considerations

Introduction

A review of available research is provided in the following paragraphs, the objective of which is to facilitate understanding of relevant concepts and factors that are to be considered during project selection and funding.

An overview of some important aspects that should form part of the project selection process, selection models and funding options is offered, and its benefits are explained.

Engineering feasibility

Engineers develop the project configurations and detailed assessments of raw material, equipment and machinery. Many alternatives are sifted and progressively tighter estimates of capital and operating costs are made. The final estimate is normally written up in a definitive feasibility study with a +15% to–10% accuracy.

Financial feasibility

The engineering feasibility study's financial pro forma will normally include an *internal rate of return* (IRR) and a *net present value* (NPV) estimate, often on an unescalated basis. The project sponsor will set the cost of capital (hurdle rate). The most important financial estimate for project finance is the determination of the *base case financing cash flow*.

There are two approaches for the financial feasibility. One is a 'quick and dirty' screening model that is used to develop a likely project finance structure, which is progressively refined to handle sensitivities, different funding trenches and reserves.

The other approach is to adopt a detailed model to the project in question, which is normally a large spreadsheet where many features and options can be selected.

The 'mother's milk' of project financing is the earnings before interest, taxes, depreciation and amortization (EBITDA). The EBITDA is the cash flow available to pay interest and debt principal. Conservative projections of internally generated EBITDA cash flows must be prepared and justified by independent feasibility and engineering studies. The EBITDA cash flow projections must be sufficient to service any debt contemplated, provide for cash needs, pay operating expenses, and still provide an adequate cushion for contingencies.

The financial feasibility study is very important, as it will be used by the lenders to determine EBITDA debt coverage over the loan life. The various conclusions of the feasibility study should be confirmed and supported by independent feasibility studies by reputable consultants on, for example, engineering, construction costs, production costs and the markets. Independent consultants might also be used to review the entire project and provide an independent opinion on the merits of the project.

Energy supplies

Energy costs are of paramount importance, because of their escalation and possible fluctuations in future. In the past, a number of projects got into serious financial trouble, because of their failure to anticipate future rising energy costs. Energy sources used in the mining industry mainly

consist of electricity and water. In the case of inadequate electrical energy supplies, the project may have to build its own substations, or other power-generating facilities.

Water is a very scarce commodity in most of the Bushveld Complex, and its availability and costs will increasingly become a major factor in platinum mining projects. Some projects already allow considerable funds to install large-capacity pipelines and storage reservoir facilities.

Market for the product

The financial success of many projects depends on the future existence of a market for the product, commodity or service produced or furnished by the project, and at prices that will provide the anticipated cash flows necessary to service debt, cover operating expenses and provide a return to the equity of the investors. Market surveys should provide a basis for the anticipated volume and price of the product, commodity or services to be produced. Other factors such as competing products, and competition from other suppliers which are closer to the markets, or with less expensive sources of raw materials, feed stocks or energy, should be studied carefully.

Experienced and reliable contractors

The expertise and good reputation of the contractors that are used to construct a project facility must be well established. The contractors must have technical expertise to complete the project, so that it will operate according to the technical, financial and operating requirements and specifications of the project. Ideally, the contractors used should be contractors that have done previous, similar work successfully. The contractors should be financially strong, since the financial failure of a contractor is a disaster that few projects can survive.

Lenders and investors of a project will be concerned about the choice of contractors used. They will require someone with an established reputation for constructing similar projects who can overcome any problems in engineering, construction, start-up and operation that might arise.

Equity

The equity investment in a project financing represents the risk capital. It forms that basis for lenders or investors advancing more senior forms of capital to the project. Equity investors are the last in priority for repayment. However, the upside potential is substantial: this is the motivating factor for investors providing equity capital. Equity is typically advanced as the subscription price for common or preferred stock.

The debt/equity ratio for a given project is a matter for negotiation between sponsors and senior lenders. Many factors are taken into consideration, including customary debt to equity ratios for the particular industry involved, market expectations and risks, which include considerations as to whether the commodity or product is being provided to an assured market, evidenced by an unconditional long-term contract, or is subject to the uncertainties of general future market conditions.

There is a popular misconception among some prospective project financiers that project financing requires little or no equity investment by the owners or sponsors of the project, and that the project can be completely financed on the basis of optimistic projections

and financial plans. Unless guarantees are available from very creditworthy guarantors, lenders will always require a substantial equity investment in a project. Even where guarantees are available, lenders will still want sponsors to have enough equity invested in the project to ensure their continued interest and attention to complete and operate the project, and make it a success.

Production payments as collateral to obtain financing

A mineral production payment is a right to either a specified share of the production from a certain mineral property or a sum of money in place of production. A production payment is a conveyance by a mineral owner of certain undivided interests in minerals to be produced or sold in the future. The value of a production payment can be accurately calculated and the value thereof is the present value of the expected future stream of production payments discounted at some interest rate (often agreed to by both the sponsors and senior lenders).

For a production payment to be valuable enough to use as a collateral for a loan, the production payment must be from a proven mineral reserve. Therefore an appraisal of the property must be obtained from one or more reputable appraisers, who analyse the kind and extent of the reserves. The feasibility of the production must be confirmed by an engineering study, which analyses the economies of obtaining the production, expected quality of production, probable markets, cash flows expected to be generated and cash needs.

Project cash flows

Accounting reports such as a pro forma profit and loss, balance sheet, and sources and applications are useful to get as accurate as possible an estimate of the future cash flow of the project. Three types of reports are important:

- an operations report
- an operating cash flow report; and
- financing reports.

Structuring

Project finance has three phases:

- *Construction/pre-completion*—the construction phase of most projects is funded progressively and interest during construction (IDC) is capitalized into the loan.
- *Completion*—normally a report is required from the independent engineer to detail the anticipated cost to complete the project
- *Post-completion repayment (project finance proper)*—once the completion test is passed, a period of 3–6 months is normally granted before principle repayment starts.

Funding

Project financiers seek to determine how funding best fits the structure of the project, and the cash flow report provides a persuasive tool for that purpose. Although many project financings aim to maximize the gearing, equity requirements are normally substantial to prevent the sponsor from withdrawing its support when the going gets tough.

After the completion of the project, the project financing relies solely on the cash flow generated by the project, and there is little or no recourse to equity. Therefore the equity

contribution is mainly oriented at completion.

Project selection models

The proper choice of investment projects is crucial to the long-term survival of every firm. In an industry where the product is sold in dollar terms and the operating costs are born in terms of the local currency, with a very strong rand, profits of platinum mining companies have come down considerably. This makes the selection and initiation of profitable projects very difficult. Yet the demand for platinum is still very strong, and supply of platinum lags behind. Platinum producers are still expanding to supply the demand for platinum ounces; therefore new projects are continuously being initiated under extremely difficult circumstances.

There are two basic types of project selection models, numeric and non-numeric. Both are widely used. It is important to consider what the purpose of a selection model is.

- Models cannot make a decision—managers do. The responsibility of making the decision cannot be abdicated by the manager
- All models are only partly a presentation of the reality they are meant to reflect. No model can yield an optimal decision except within its own, possibly inadequate, framework².

Various kinds of information are required when selecting a project, and can be listed as production, marketing, financial, personnel, administrative and miscellaneous. These factors will all influence the selection of the project in one way or the other, and it is important to consider them during the selection process.

Non-numeric selection models are the simpler and older type. A typical example of a non-numeric model is *The Operating Necessity*. If a safety risk exists on a plant, the project to construct protective barriers or additional walkways will not require much formal evaluation.

Another example of such projects is regulatory-type projects—a new ventilation shaft to sustain deep level mining. No formal evaluation is required; it has to be done to comply with regulations. Health and safety of personnel are non-negotiable, and such projects are initiated where required without lengthy reviews in terms of economic and financial justification.

Other examples of non-numeric selection models are:

- The sacred cow (the project is suggested by a senior or powerful official)
- The competitive necessity (the project is done based on the desire to maintain the company's competitive position in the market)
- The comparative benefit model (a subset of projects needs to be selected, and the selection committee think that some projects benefit the company more than others, without being able to define or measure 'benefit')³.

The second type of selection model is the numeric type model. The most important and widely used numeric models is the *profit/profitability model*, which includes the payback period, internal rate of return (IRR) and discounted cash flow (NPV) analyses.

The NPV is generally more commonly used to select a project than the IRR. The rationale of the NPV is straightforward. An NPV of zero signifies that the project's

cash flows are just sufficient to repay the invested capital and to provide the required rate of return on that capital. If a project has a positive NPV, then it generates more cash than is needed to service its debt and to provide a required rate of return to the shareholders, and this excess cash accrues solely to the firm's shareholders.

The reason that the internal rate of return (IRR) of a project is often used, is because the IRR on a project is the expected return of the project. If the IRR exceeds the cost of the funds used to finance the project (weighted average cost of capital), a surplus remains after paying for the capital, which then accrues directly to the shareholders. In other words, taking on a project that has an IRR higher than the cost of capital, will increase the shareholders' wealth.

The payback period is defined as the period it takes (expected number of years) to recover the original investment. The shorter the payback period, the better because then the time that the firm is exposed to risk on that

project is less⁴.

Other numeric selection models, such as Pacifico's Method and Dean's Profitability Method also exist, but will not be discussed, as these are not commonly used.

Risk analysis

In the decision-making process when selecting new projects, the most important aspect to consider is the extent and nature of uncertainty associated with the variables that form part of the decision. Although this uncertainty (risk) analysis can be applied to most kinds of variables and decision variables, risk analysis is mostly understood to use financial measures to determine the decision to invest in a project or not.

Risk analysis is different from financial analysis because it incorporates uncertainty in the decision input data. Instead of point estimates for variables, probability distributions are determined or subjectively estimated for

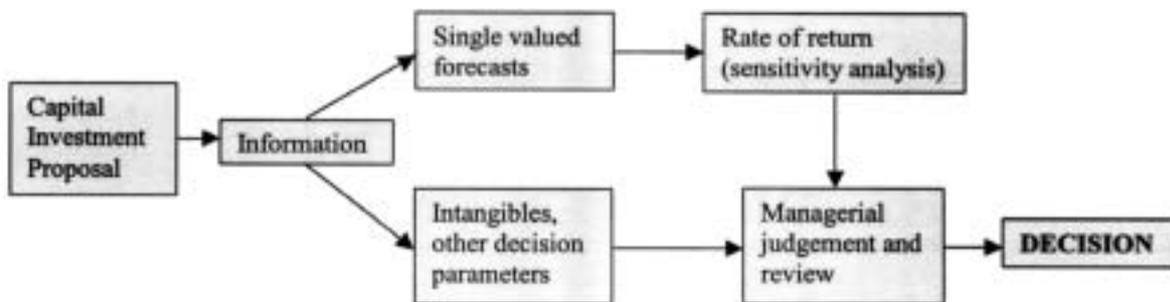


Figure 1. Traditional financial analysis

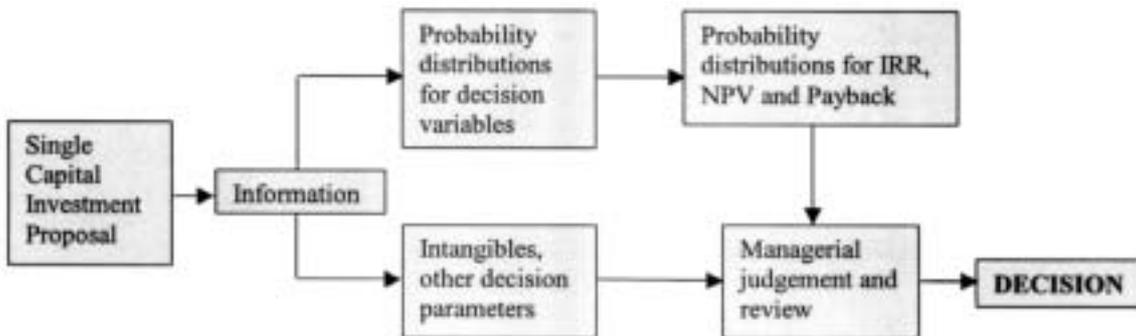


Figure 2. Risk analysis

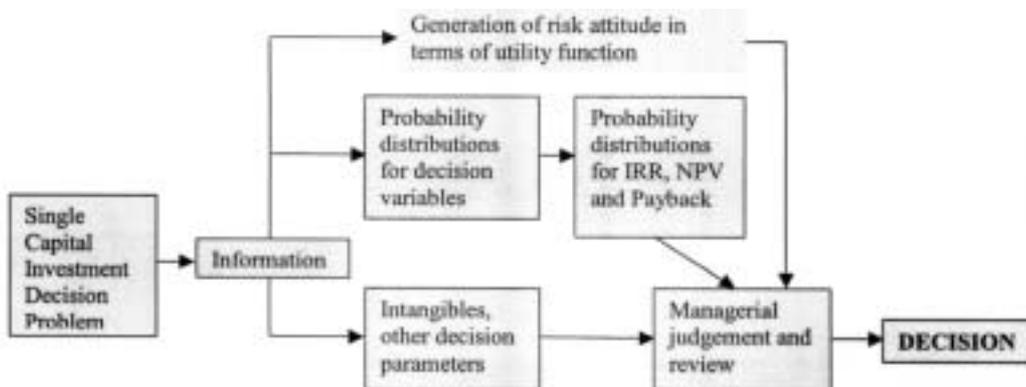


Figure 3. Decision analysis

each of the uncertain variables. This fundamental difference can be seen when Figures 1 and 2 are compared⁵.

With such inputs, the probability distribution of the IRR or NPV is then found by simulation. The decision-maker not only has probabilistic information about the rate of return and future cash flows, but also gains knowledge about the variability of such estimates as measured by the standard deviation of the financial returns. With this method, both the expectation and its variability come forward, which are the two most important aspects of uncertainty for the evaluator.

Discussion

So often managers are under tremendous pressure to increase production or replace existing plant and machinery that not enough time is spent on the proper evaluation and selection of concepts during the initial phases of projects. Re-evaluation of concepts occur later in the project life cycle leading to very costly changes to designs and delays to the project.

It is during the initial phases of a project that concepts are changed most easily with the least effect on cost. The further down the life cycle of the project, the more difficult it becomes to make changes and the more costly those changes become. The most creative, skilled and experienced people should be used in the initial phases of a project to set the concepts, cost structures, quality requirement, labour requirements, operation requirements etc. These building blocks will form a solid foundation for project managers to take those concepts, develop them further into the level of detail required for successful implementation.

The strategic business plan of a company plays the most important role in the selection and initiation of new projects. It is based on the parameters and goals set out in the SBP, that operational managers must produce tactical plans to meet such goals. Various projects are identified, reviewed and screened for implementation. Once all the technical, operating and capital cost aspects of a project are defined, the next major consideration is the financing options, which will be discussed briefly.

Mining companies have the option of one of three different methods of financing projects. In the first instance, *structured finance* can be used. In structured finance, the parent company applies for a loan from a bank, and offers the company's balance sheet as collateral to the loan. In the case of reputable and mature mining companies, such loans are normally granted without too much concern from the banks.

Project finance is a financing of an economic unit, a mine or a process plant, where the lender will initially be satisfied that the cash flows and earnings of that project are the source of funds from which the loan will be repaid, and the assets of the projects (the ore reserves, plant and machinery) be the collateral for the loan.

Internal sources are the third option of financing projects. If the parent or sponsor company can maintain a strong balance sheet, it will be able to meet the working capital requirements of the company and provide internal funding for ongoing and expansion projects. It was found in the research that, generally speaking, large mining companies do maintain strong balance sheets, and therefore tend to use internal sources of finance to finance projects in South Africa.

A few years ago large mining companies reported substantial amounts of cash and cash equivalents at times

when metal prices and exchange rates were favourable. By using the available cash on hand, as well as operating cash flows to finance projects, companies could provide cheaper finance than borrowing from a bank at, say, the prime lending rate. Although there is a tax benefit on the interest payments of such a loan, it is still more beneficial to the company to use the internal source of finance.

There is, however, an important proviso regarding that use of internal funds, and that is that there must be sufficient money available to maintain the working capital requirements. Monthly cash flow forecasts are normally done based on expected sales and prevailing metal prices as well as creditors, requirements, to consolidate the expected cash inflows and outflows. If the project requires additional funds over and above the working capital requirements, then the company would have no option but to borrow additional money to finance the project. If the financial strategy of the company is one of low gearing, then the company has substantial debt capacity, which it will utilize where circumstances are such that the obligations are matched to specific requirements without creating undue risk.

There are definite advantages of project finance over on-balance sheet finance and structured finance. Although the cost of project finance is slightly higher than on-balance sheet finance, because the sponsors must make an equity contribution to the project, the risk borne by the sponsor is less. Both the investment and risk are 'ring fenced', in other words both are covered. If the project is not a success for whatever reason, the lender (investment bank) can only turn to the project for repayment of the loan, and not the sponsor company. The financial risk of the sponsor company is only the amount of equity that is injected into the project. Under normal circumstances, it is in the order of 30–40% of the project value.

If on-balance sheet finance is used, then the sponsor company provides the total amount required to fund the project. Therefore the financial risk to the sponsor company is much higher than with project financing.

From the perspective of the large mining company, on-balance sheet finance provides more value to the shareholder, because internal sources of finance are the cheapest way to finance investments (provided that internal funds are available). This concept is also explained by the 'pecking order' theory⁶. According to the pecking order theory, companies will finance new investments with the 'cheapest available' source of funds. Specifically, they prefer internally generated funds (retained earnings) to outside funding. And if internal funds are insufficient, they prefer debt to equity because of debt's lower flotation and information costs. Under this model, companies issue equity only as a last resort, when their debt capacity is fully exhausted.

Conclusion

As long as the strong demand for platinum remains high and continues to grow, mining companies will continue to initiate projects to supply sufficient platinum to try and meet that demand, *ceteris paribus*. There are many important factors that need consideration when projects are initiated, not only from a technical point of view of the project itself, but also from the strategic, financial, marketing and environmental goals of the company. A number of the most important aspects of the project initiation and selection have been discussed and are issues such as the engineering feasibility, financial feasibility, energy supplies, market for the product, experienced and

reliable contractors, equity, cash flows, funding, selection models and risk analysis.

In the current economic climate in South Africa, mining companies with strong balance sheets will continue to fund mining projects from internal sources. This does provide the best value to the shareholders because it is the cheapest form of finance. However, if operating and production costs continue to rise due to inflation and a weak rand, and the metal prices fall, due to unforeseen market and economic factors, mining companies could see their margins fall, declare less profit and generate less cash. They may find themselves in the position where they may have to increase their gearing and borrow more funds to finance the company. In such a situation, project finance will become a much more attractive and viable option to finance projects, than on-balance sheet finance.

Careful consideration of the above-mentioned aspects and their influence not only on the project, but also on the company, is vital to the success of the project in creating shareholder value. It can assist project owners and managers in the selection and initiation of successful and profitable projects. It is during the initiation phase of a project that the most value can be added because changes

are easy and cheap, compared to the later stages in the project life cycle.

References

1. SCHUTTE, F.G. *Integrated management systems*. Butterworth Publishers, Pretoria, 1993. p. 69.
2. MEREDITH, J. and MANTEL, J.R. *Project Management, a Managerial Approach*, Third Edition. John Wiley and Sons Inc. United States 1995. p. 43.
3. MEREDITH, J. and MANTEL, J.R. *Project Management, a Managerial Approach*, Third Edition. John Wiley and Sons Inc. United States 1995. pp. 47–48.
4. BRIGHAM, E.F., GAPENSKI, L.C., and EHRHARDT, M.C. *Financial Management, Theory and Practice*, Ninth Edition. The Dryden Press, Orlando, Florida, 1999. p. 431.
5. MEREDITH, J. and MANTEL, J.R. *Project Management, a Managerial Approach*, Third Edition. John Wiley and Sons Inc. United States 1995. p. 69.