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UNCERTAINTY ANALYSES IN ALBPETROL COMPANY

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Abstract: Large companies like Albpetrol often deal with big projects. The decision to invest is based on the evaluation of the project profitability. But how certain is the calculated profitability? What if the costs overrun during implementation of the project? What if the reservoir performance is less than estimated? And what if the project completion is delayed?
The focus will be on how to make people more aware of the risks and uncertainties in economic evaluations and to show the influence of these uncertainties on the economic indicators. Economic evaluations in the oil industry are carried out with cash flow models.
Traditionally, these evaluations are carried out with the estimated (most likely) set of parameters. Usually some parameters, such as project costs or reserves, are varied manually as 'sensitivities' to show the potential impact on profitability. In this report, it is proposed to treat the uncertainties by defining stochastic parameters with carefully specified supports based on inputs from discipline experts. In this manner a better insight is gained in the distribution of the project profitability. Some of the key uncertainties in oil and gas investments have been investigated in detail. Thinking in terms of scenarios will help to take better decisions (e.g. about field development concepts) that are robust against a range of scenarios.

Keywords: uncertainty, simulation, evaluation, forecasting, scenarios.

JEL classification: C53, D81, D86, G32

INTRODUCTION

The risk analyses

The risk analysis is designed to meet the needs of organization, integration and communication. The danger is everywhere and we need to consider making

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decisions for projects that are very important. If we use data to solve problems, make predictions, develop strategies, or make decisions, then we should definitely consider doing risk analysis based on [Rose 2009]. The purpose of each of these methods is to use quantitative or qualitative techniques to help policy makers choose an action course, having a better understanding of possible outcomes that may occur. We may wonder if what we do would be appropriate for Risk Analysis. Uncertainties can be addressed more effectively through various risk analysis techniques [Cendrowski, Mair 2009].

The risk analysis generally consists of three components: risk assessment, risk management and risk communication. Risk analysis, in addition to risk assessment and risk management, is part of the concept of risk assessment [Kerlinger 1986].

Components of risk analysis

Risk assessment is a process within a risk analysis that involves identifying a risk that can cause a negative impact and characterizes the risk posed by that risk [Simkins, Fraser 2010]. The risk is characterized in qualitative or quantitative terms. This includes the assessment of:

a) Probability of a negative event occurring due to the identified risk;
b) The magnitude of the impact of the negative event;
c) Reviewing the uncertainty of the data used to assess the probability and impact on the risk components.

Simulation method, by using Crystal Ball program at Albpetrol Company

For over 20 years Albpetrol has used scenarios, rather than forecasts, to explore ways in which the future may behave. An important benefit of this approach with scenarios is that it makes us realize that the future is uncertain, that it may evolve in a number of different ways, and that decisions must be made within this context [Murck, Skiner, Porter 1998].

The idea of scenario thinking is the search for flexibility in our decisions. When just one path is adopted with no alternatives, any deviation between forecast and reality can mean a big loss [Graf 2005]. If the costs are higher in a certain year or the production is lower than estimated, things do not eventuate in the way we expected and the project may fail. Recognizing and managing possible negative scenarios should avoid this situation. It will allow us to think in advance about possible alternative scenarios and decisions to manage a negative impact on the project [Pedgen, Shanon, Sadowski 2005].

Crystal Ball is one of the software packages used to quantify the impact of uncertainties through Monte Carlo Simulation [Fishman 2000, 2008].

In this research data was collected through Albpetrol Comapny.The engineer noted that the data gathered through the research would result in some benefits. In

the oil and gas industry, quantitative risk analysis is usually undertaken at different stages of a project, shifting the focus to the specific tasks at hand:

Integrated project risk analysis forecasts the risks surrounding the oilfield projects and considers the probability distribution of the project's Net Present Value as its main output [Hubbert 2012].

Cost risk analysis focuses on the cost structure of the project, explores the deeper details of cost inputs and provides the probability distribution of the CAPEX as its main output[Waters 2011].

Schedule risk analysis focuses on the time required to complete each task, and its main outputs are the probability distribution of the project's first oil and its possible critical paths [Oakshott 2007].

Project risk analysis in Albpetrol Company

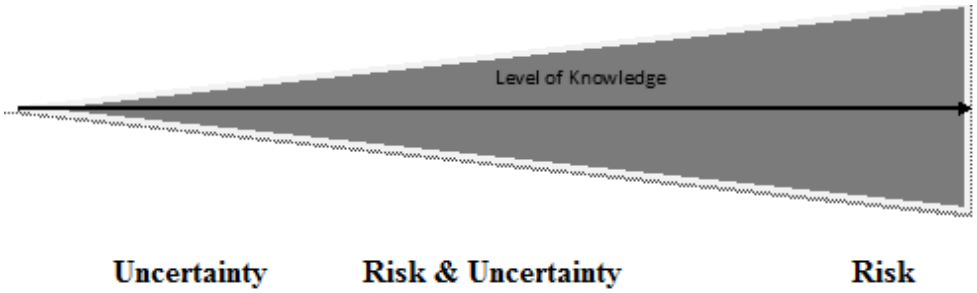
A project risk analysis can be a separate analysis, but it is often an important and integrated part of project management. The purpose of a project's risk analysis is to optimize the resources and outcome - time and budget - of the project by constantly checking the risks. In the risk analysis of the project identify the risks and uncertainties in the different phases of the project, from the dangers identified develop alternative risk innovations. An optimal project strategy is designed by combining responses by reducing risk and increasing profitability [Simpson, Lamb, Finch, Dinnie 2000]. A project risk analysis gives an overview of project risk profile, showing for example what activities and phases that involve the highest risks in the project and what risk responses reduce the most effective risk [Haataja 2000].

In a continuous project risk analysis, project and company risk awareness increases, giving a lot of positive effects. A project risk analysis is kept up-to-date through the project to detect new risks and uncertainties. Strength in project risk analysis is the strategy of using the same activities in the analysis - regardless of the level of detail. Keeping the central parts of the same analysis provides a powerful method. A project risk analysis is a central part of project management. A well-planned management project is needed and provides the opportunity to achieve project goals and requirements [Fraser 2005].

There are some important parameters in project management. Below are listed the most critical parameters for project success:

- Identification of different stakeholders and their responsibilities;
- Awareness of project impact on different actors;
- Constant assessment and updating of the necessary resources;
- Guarantee of key persons;
- Drafting future changes to the project;
- Freedom and responsibility for project members - as well as
- Tracking.

Figure 1. Level of knowledge about Risk and Uncertainty



Source**: [**Yoe 2011]

Risk management

There are three ways to manage the risk:

1. Avoiding-Assessing some risks may indicate that potential loss is greater than potential gain. This may require removal of some high risk investment opportunities or termination of certain ventures that have adverse risk / reward relationships [Miller 2013].
2. Reduction - There may be certain actions that can be taken to reduce the loss if an incident occurs. Actions to reduce the loss may require modifications or improvements in engineering designs or strengthening structural components to withstand the greatest forces.
3. Transfer - It may be possible to transfer a loss to a third party or spread the loss over a period of time to reduce its negative impact. You will eventually pay for that loss, as insurance premiums are designed to cover all losses along with administrative costs and earnings to the insurer. Increasing losses will be reflected in premium growth, so the best one can expect is to cover a high percentage of premiums paid over a long period of time. In the oil industry this can be done by a third party that takes all the risk of dry wells or fragmentation of labor where some parties proportionally share the risk of loss from a joint venture [Economides 2008].

Steps in the simulation study

The steps in a simulation study refer by [Sadowski, Sadowski, Kelton 1998] are as follows:

Problem formulation: Every study should start with a statement of the problem. If the statement is provided by policy-makers or those with problems, the analyst must ensure that the problem described is clearly understood. If a problem analysis is being developed by the analyst, it is important that policy-makers understand and agree with the wording. There are times when the problem needs to be

reformulated as the study progresses or walks. In many cases, policy makers and analysts are aware that there is a problem long before the nature of the problem is known.

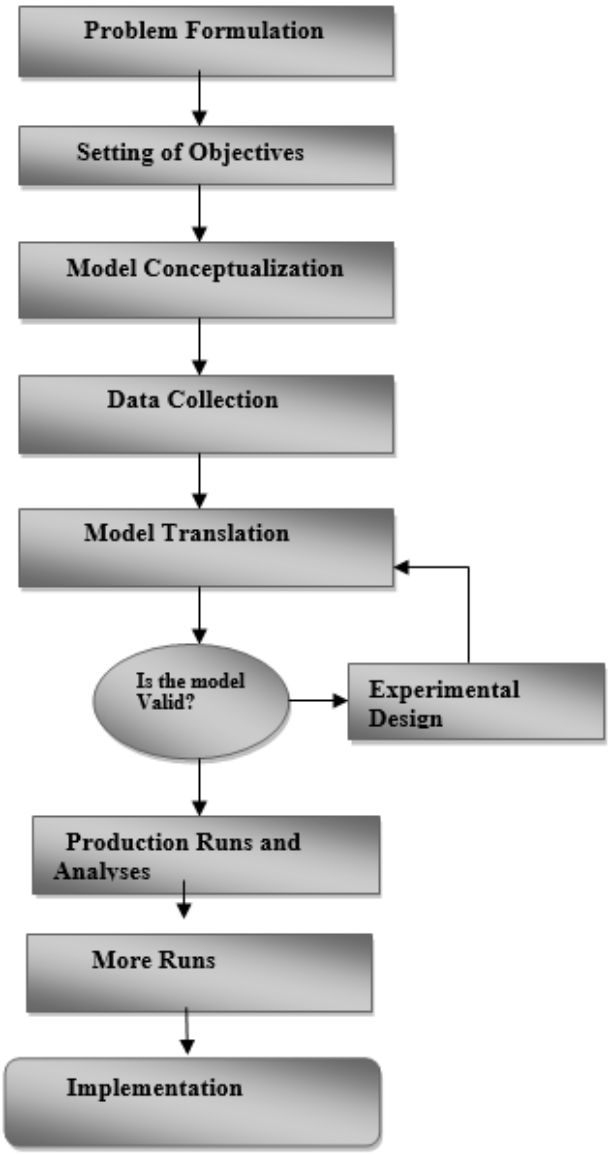
Setting the objectives and overall project plan: The objectives show questions to answer the simulation. At this point, a determination should be made whether the simulation is the appropriate methodology for the formulated problem and the defined objectives. Assuming that the simulation is appropriate, the overall project plan should include a statement of alternative systems to be considered and a method for assessing the effectiveness of these alternatives. It should also include study plans about the number of people involved, the study cost, and the number of days needed to complete each stage of the work with the predicted results at the end of each stage.

Conceptual modeling: Building a model of a system is perhaps just as art as science gives a full discussion of this step. "Although it is not possible to provide a set of guidelines that will lead to successful and successful model building in any case, there are some general guidelines that can be followed." The art of modeling increases from the ability to abstract the essential features of a problem, to select and modify the basic assumptions characterizing the system, and then to enrich and process the model until a useful approximation is achieved. Thus, it is better to start with a simple model and build towards greater complexity. However, the complexity of the model should not exceed what is required to meet the purposes for which the model is foreseen. Violating this principle will only add to the cost of building the model. There is no need to have a one-on-one map between the model and the real system. Only the very essence of the system is really needed.

Data collection: There is a continuous interaction between model building and collection of necessary input data. While the complexity of the pattern changes, the required data elements may also change. Also, since data collection takes up a large part of the total time needed to perform a simulation, it is necessary to start as early as possible, usually along with the early stages of model building. Objectives The study presents to a large extent the type of data to be collected. In a bank's survey, if the desire is to learn about the length of waiting lines as the number of indicators varies, the types of data needed would be the distribution of the arrival time (at different times of the day) the distributions at the service time for traders and historical distributions at the length of waiting lines under different conditions. This latter data will be used to validate the simulation model.

Translation of the model: Since most real-world systems result in models that require a great deal of storage and computing information. The model should be included in a familiar computer format. We use the term "program", although it is possible to achieve the desired result in many cases with little or no actual coding. The model should decide whether to program the model in a simulation language, or use special purpose simulation software.

Figure 2. Steps in a Simulation Study



Source: [Sadowski, Sadowski, Kelton 1998]

The validity: Validity is determining that a pattern is a true representation of the true system. Validity is usually achieved through calibration of the model, a repeating process of comparing the model with the current behavior of the system

and the use of discrepancies between the two, and acquired knowledge, to improve the model. This process is repeated until the model's accuracy is assessed. In the example of a bank mentioned above, data on the length of waiting lines are collected at current conditions. Does the simulation model repeat this mass of the system? This is a tool of validity.

Experimental Design: The alternatives to be simulated should be determined. Often, the decision about the alternatives they can simulate can be a function of the directions that are completed and analyzed. For each design of the simulated system, decisions should be made regarding the length of the starting period, the length of the simulation and the number of repeats to be made for each time period.

Production and analysis: Their production and subsequent analysis are used to evaluate performance measures for system designs that are simulated.

More simulation: Based on the analysis of the directions that are completed, the analyst determines whether additional scripting is needed and what designation should follow these additional experiments.

Implementation: The success of the implementation phase depends on how well the previous steps have been taken. It is also dependent on how thoroughly the analyst has included the latest model users throughout the simulation process. If the user of the model is fully involved and understands the nature of the model and its outcomes, the possibility of implementation has increased. Conversely, if the model and its basic assumptions are not properly communicated, implementation will probably suffer, regardless of the validity of the simulation model.

CONCLUSIONS

In this paper it was presented the importance of taking into the consideration analysing the risk, and the uncertainty, forecasting the future.

The simulation process, involve to run an initial set of values, analyze the result, change one more values, re-run the simulation, and repeat the process until finding a satisfactory solution [Hubbard 2009].

For any oil and gas development project the decision to implement the project needs a clear view of the project’s profitability and of the presented results [Mian 2002]. Cash flow models are often used to evaluate the profitability of a project. Economists often enter values given by the domain specialists in the cash flow models and ignore the influence of the uncertainties that are hidden in the assumed values [Heikki, Ilkka 2000].

As the Albpetrol company, faced with risk, the importance was dealing and taking into account the steps, making a simulation, by different scenarios.

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