

Innovative framework to improve the take-up of ROA in the mineral industry

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Innovation is taking two things that already exist and putting them together in a new way.

Tom Freston

Introduction

This paper:

- constructs an innovation framework based on the works of Everett Rogers in *Diffusion of Innovations* (2003) and Eliyahu Goldratt and Jeff Cox in *The Goal* (2004)
- addresses the challenges associated with the bottlenecks in the application of ROA
- discusses practical ways of making ROA compatible with and less complex for mineral operations.

Background

In 2015, to identify the additional information that real options analysis (ROA) generates over the DCF method in mineral project evaluation, as part of my PhD thesis, I took-up a project to evaluate a gold mine, Adinkra Mine, initially valued in 2004 using the DCF method. The initial DCF method valued the project at \$493 million; however, using ROA the project recorded a \$528 million mean project value with a 62% probability of the project returning a higher value than the DCF value. The results of the DCF and ROA were statistically compared with the actual market and project data from 2004 to 2015. The results indicated a higher correlation between the project's output recorded between 2004 and 2015 and the results estimated using the ROA method. In addition, using the ROA approach enabled useful information to be generated that showed significant potential for improving the way mining companies manage risks and uncertainties as well strategically placing their assets to optimise value.

In this paper, I share my experience on how the process was initiated and use those experiences to develop an innovative framework that can enhance the adoption of ROA in the mineral industry.

Framework

This paper builds a framework that will encourage the mineral industry to adopt ROA. The framework is built on the initial theories of management developed by Everett Rogers and Eliyahu Goldratt in their respective books, *Diffusion of Innovations* (2003) and *The Goal*

(2004). For a company to consider implementing ROA, I identified six factors that must be considered and deliberated on. I used my two case studies, that is, my field work with the Adinkra Mine and qualitative interviews with industry experts to align my experiences with the framework. I then draw conclusions on the most appropriate approach to improving the take-up of ROA in the mineral industry. The framework, illustrated in Figure 1.0, dwells on the following factors:

- bottleneck
- idea
- persuasion
- decision
- implementation
- evaluation

Bottleneck

Identifying the company's current bottlenecks is the first step towards innovation. Situations are often the biggest incentive for innovation. At Adinkra, I identified that valuation of their asset under uncertainty was the main challenge. Identifying challenges enables the company to properly list what help they require and also develop benchmarks to track outputs and goals. To gain further insight into the challenge, I engaged with the senior management of the company to identify their big-picture solution of the problem. Another engagement session was arranged on site to gain first-hand insight into the company's bottleneck of evaluating mineral projects under uncertainty. On site, I brainstormed with various departments and personnel to sharpen the challenge suggest a goal to work towards and develop the working plan.

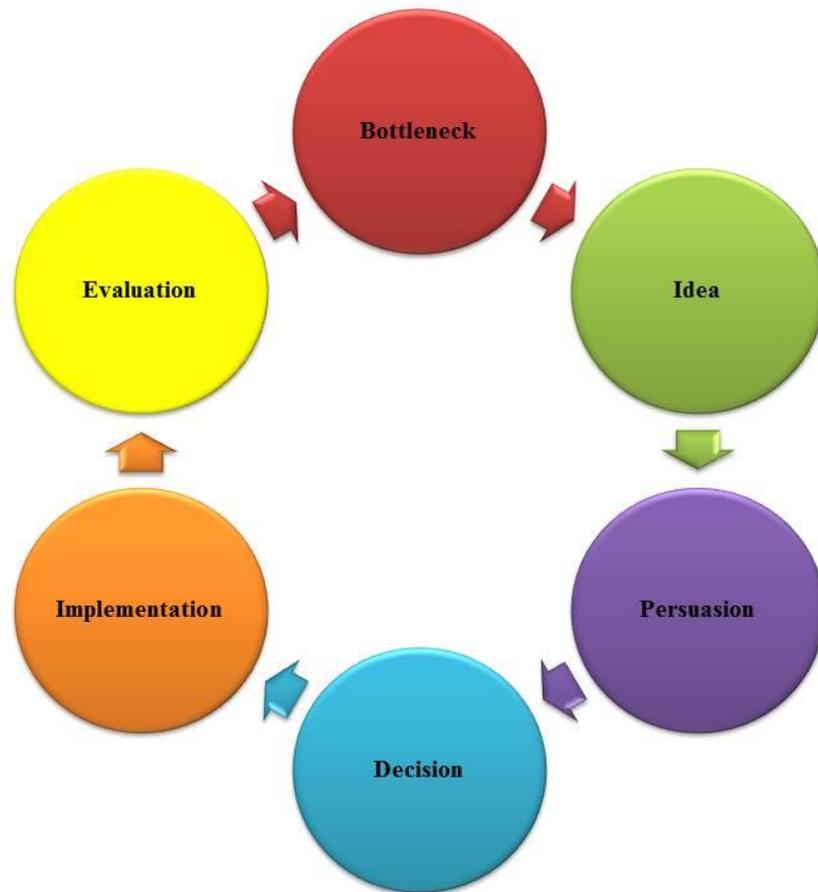


Figure 1.0: Framework to improve the take-up of ROA in the mineral industry.

In essence, identifying the bottleneck enabled all parties involved in the project to see the big picture and also follow through the process towards the solution. Adopting such an approach to applying ROA eases the barrier of communication and trust.

Idea

With the problem clearly defined, the next stage was to develop the idea of how the problems would be solved. Working with Adinkra, I now introduced the concept of ROA as the innovative idea to solve the identified bottleneck. I had worked on ROA for a few years, so my knowledge and capability in that area helped convince the personnel, both on site and at the offices, about the value of considering ROA. To promote the idea within the company, I was given the opportunity to present on the merits and demerits of ROA to various departments within the company. These presentations allowed all of the parties involved in the project to have a productive dialogue on the applicability of ROA to their operations.

Promoting the idea, its functions and merits enabled the company to share in my knowledge and expertise on the subject of ROA. This approach also standardised our language since we all agreed on the definition of ROA. This approach also focused on educating the potential end-users right from inception.

Persuasion

After I had shared the idea of ROA applicability to the company, the next step was to persuade the decision-makers to consider applying it. In spite of the fact that the personnel at Adinkra communicated to me a general consensus on the merits of ROA, there still existed pockets of resistance and scepticism among some field-based managers. To persuade these managers, I had to further discuss the innovative idea of ROA and link it to practical impacts on their operations. Collectively, we looked at some performance data from their operations and ran a comparative analysis with the results ROA can offer. Based on this comparison, some of the managers softened their resistance and decided to give the method a cautious trial.

Using data and comparative analysis as the focal point of persuasion helped bring the merits of ROA into focus. This enabled the managers to relate to the method better than by simply explaining the idea, as had been done previously. Using their operational data also helped most of the managers to assess the impact of the method and at the same time assess the impact of ignoring the method.

Decision

With most of the managers and personnel convinced about the merits and added value that ROA offers, the next step was to make a decision about whether to proceed with the innovation or not. The decision-making involved several strata of administrative procedures. This involved:

- Does the method in question align with the company's business plans?
- What are the legal implications?
- Have issues with data sharing being addressed?
- Have all ethical issues being considered?

Going through all these thick-boxes enabled the decision to be refined to ensure that the product and method in question would be of optimal value to the company. Adinkra's decision-making process was an extended one since the tool required company data that was not in the public domain. After all the required assessments had been fulfilled, the company decided to go ahead with applying ROA to the Adinkra Mine.

This consultative approach to decision-making ensured that no party was left in the dark during the implementation process. The legal team, administrators, accountants and projects teams all assessed the impact that introducing the new methodology would have on their activities. This approach made the subsequent implementation process very smooth and transparent.

Implementation

Having decided to proceed with the innovation, the next phase was implementing ROA at the mine to evaluate the project value under market uncertainties. The model was developed on the mine-site and the results later shared with the corporate team. Often, people in charge of promoting innovation skip the prior steps and go straight to the implementation. In some instances, going straight to implementation works, but for a method such as ROA that is perceived as complex and cumbersome and is often met with scepticism, preceding the implementation with the phases described will likely guarantee a positive result. At Adinkra, having described in detail the merits of ROA, assessed the impact of the added information to most of the departments and collectively mapped out the implementation plan, the process of deploying the ROA method was a simple, efficient and effective one.

Implementing innovation as part of a process is likely to yield results of acceptance within most companies, as evidenced in the Adinkra case study.

Evaluation

The evaluation process allows the company to track the progress of the innovation, assess its usefulness and review their initial decision. During the evaluation process at Adinkra, the ease with which personnel can independently apply ROA was one challenge that succeeded. Also, the team suggested linking the ROA method to operational options, so it could be used beyond evaluation. This evaluation process enabled the next set of bottlenecks to be identified and subsequent actions taken to ensure the smooth running of the Adinkra Mine.

Using this cyclic framework presented many merits to the company. It ensured that implementing innovation was seen as a responsibility of all personnel in the company and not simply the preserve of the external consultants. This framework also enabled problems to be easily identified and action taken procedurally to solve them.

Bottlenecks affecting ROA implementation in the mineral industry

Adopting ROA in the mineral industry

Conclusion