DECISION MAKING FOR PROJECT SUCCESS

Introduction

The selection of project options and associated execution strategies are used in this short essay as focussing tools in assessing how decisions are optimised, including the implication and management of bias in decision-making. Reference is made to recent research and an exercise involving the recommendation of a strategy for the delivery of a project in central Africa.[1] A semi-rational approach is suggested, considering probability-based predictions, likely biases and differing frames of reference.

Organisational Commitment & Culture

Organisational commitment and cultural alignment to the decision-making process are often overlooked contributors to success. The natural decision-making process is based on selecting the highest net present value (NPV) option, however, non-monetary objectives, constraints and biases are almost always present but not specifically addressed. Silos between decision makers and stakeholders are often evident.

Framing & Setting the Criteria

Internal stakeholder requirements should be established to guide the frame of reference, through interviews with key stakeholders, a review of internal strategy papers and plans, and could include:

- Development of a substantial business, optimising value of existing assets with life extension and expansion facilitated;
- A clear development pathway, with enhancement of reputation;
- Embedding safety and a positive delivery culture;
- Maximising shareholder value.

In a recent exercise, external stakeholder requirements included:

- The United Nations Human Development Index (life expectancy, education and income per capita);[2]
- Minimisation of social and environmental impact;
- Local employment and sourcing of services;
- The application of ICMM sustainability standards.[3]

The different objectives imply a series of potentially competing analyses, adding complexity to the decision-making. The non-monetary impacts and benefits should be included in decision trees with outcomes weighted, scored and compared through utility theory or a rational process such as that suggested by Kepner and Tregoe (1981).[4]

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1 Westlund, M. (2017). *KPC Project Implementation Strategy*. Australia: MMG.
2 UN Development Programme. (2016). *Human Development Report*. USA: United Nations.
3 International Council on Mining & Metals. (2016). *ICMM Principles*. UK: ICMM.
4 Kepner, C. & Tregoe, B. (1981). *The New Rational Manager*. USA: Princeton Research Press.

Delivery Environment

Too often the effect of the external delivery environment is ignored in selecting a project execution strategy. The UK National Audit Office's Delivery Environment and Complexity Analytic (DECA) was used in the development of the strategic frame.[5]

"It is designed to help … shape the understanding of the challenges and opportunities faced in delivering objectives and outcomes, and the steps needed to address the complexities associated with these risks. The DECA provides a framework for describing and assessing the context in which outcomes are being delivered."

Rare Events

A key insight attributed to Duke Energy, and reported by PWC (2013) is informative:[6]

The most significant hurdle to keeping complex projects on track is establishing how to estimate and deliver them in the first place. Specifically, how to estimate the effect of low-probability, high-consequence events that can dramatically change the project schedule and cost. Both the project team and senior management must be aligned on the risk tolerance of the company. All too often, the risks associated with first-of-a-kind, complex projects are not well understood by all stakeholders. As a result, the estimates do not meaningfully inform senior management of the ultimate potential outcomes of the project."

Kahneman (2012), however, suggests that in making subjective judgements we tend to overestimate the likelihood of rare events, and then apply excessive weighting to such events in decision-making.[7] This can be proven by the application of simple statistics, and diversion of attention, confirmation bias and cognitive ease (laziness) are identified as contributors. Kahneman confirms that we need to invoke the systematic and thoughtful system to combat our initial responses. This implies at least a semi-rational approach to decision-making.

Kahneman also discusses the application of Bayes' theory, which specifies the way in which related beliefs and 'base rates' should be changed when combined with specific evidence.[8] This approach can be used in constructing decision trees incorporating the possibility of bias. Knowledge and application of base rate probabilities (which are readily available through benchmarking and industry data services) are essential but overlooked elements (termed 'base rate neglect'). The application of Bayes' theory in decision trees is demonstrated by Palisade (2017) in its PrecisionTree® software.[9]

Selection of Alternatives

Contracts allow the risks and opportunities associated with the construction of a major project to be transferred from the owner to various counterparties, for a price. In some cases,

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5 National Audit Office. (2013). *The DECA: Understanding challenges in delivering project objectives*. London, UK: NAO.

6 Abadie, R. & Raymond, P. (2013). *Correcting the Course of Capital Projects*. USA: PWC.

7 Kahneman, D. (2012). *Thinking, Fast and Slow*. Australia: Penguin.

8 Bayes' theorem. (2017). In *Wikipedia: The free encyclopedia*. Retrieved 11/11/2017, from http://en.m.wikipedia.org/wiki/.

9 Palisade Corp. (2017). *Precision Tree Version 7.5.1*. Software provided by www.palisade.com.

extensive risk transfer is appropriate despite the price. In other cases, it is not. Choosing the appropriate contractual strategy requires consideration of several factors, including the source and cost of funding, uncertainty in project definition, risk appetite, and so on. The options available, and their pros and cons, are described by Clayton Utz (2011) and are not repeated here.[10]

The point is that each strategy has a set of costs, benefits, and expected outcomes. The trick is to be able to predict the expected value of each option, and to use that in a rational decision-making process whilst accounting for bias and the individual preferences of the stakeholders. Confirmation bias is often seen in the period prior to making the decision, and dissonance reduction afterwards can lead to discounting of events and indicators that might point to a change of strategy, particularly as the project progresses through various development phases.

Consequences and Outcomes

Outcomes are progressively defined, and uncertainty is reduced by following well known and documented project development processes including enhanced front-end loading, to allow the preparation of probability distributions or estimates of the ranges associated with key inputs and outputs. A standard single-point or deterministic model does not satisfy the requirements for making informed and optimal decisions: [11]

- It only shows a single scenario, not a central tendency or potential variances, and does not allow for uncertainty;
- Influential variables should be modelled using probability distributions, and dependencies between variables included where they can have a major impact on results;
- Decisions should be identified and modelled, analysed and optimised using decision trees and probabilistic models.

The key questions, and their answers, differ considerably when using a stochastic or probabilistic model compared to a single-point or deterministic one. Any NPV or cash flow model should be approved as the appropriate, logical starting point for analysis. Other models such as process or production predictions should also be modelled using stochastic approaches to predict likely ranges of outcomes. This adds significant complexity but is more likely to be a real predictor of the future. Options can then be presented to decision makers when selecting appropriate project strategies.

In the pre-commitment period, different patterns of thinking are required. Peterson, DeYoung and Flanders (2011) describe the early divergent (non-linear and associative) versus later convergent (analytic, linear and logical) thinking normally associated with the assessment and selection of project options.[12] They also introduce the role of insight in the ability to "break frame", to avoid perseverance with an incorrect problem formulation. This is an important

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10 Clayton Utz. (2011). *Successful Delivery of Mining Projects*. Australia: Clayton Utz.

11 Prabhakar, R. (2018). *Financial Modelling with the DecisionTools Suite*. Australia: Palisade.

12 Peterson, J. et al. (2011). *The Path to Insight: Cognitive Abilities for Dealing with Ill-Structured Problems*. USA: Harvard Business Review.

source of decision-making clarity. The ability of leaders to recognise and deal with their own biases is clearly important in being open to frame-breaking opportunities.

CONCLUSION

According to the research described in 2017, the cognitive process changes after a decision is made.[13] Pre-decision, the data collection and assessment may be impartial however many biases are certainly present, including the desire to confirm already-held views (confirmation bias). Post-decision, the need to avoid internal conflict drives decision-makers to reduce dissonance in justifying their choices (cognitive dissonance).

Rational approaches to decision making, which generally incorporate weightings and rankings based on individual and group input, are subject to bias and in the writer's experience, have been difficult to impose. A semi-rational approach is suggested, rooted in an understanding of human cognition and the potential for bias, but based on scientific, statistical and stochastic analysis. The collection of data must include base-rates for similar situations, and any move away from the base rate probabilities should be justified and modelled in the decision-making process.

Decision trees can also incorporate chance nodes allowing for bias, and alternate paths are possible based on the likelihood of bias for or against a proposal. Of fundamental importance is initial alignment with organisational objectives, situational and environmental conditions, and the Delivery Environment and Complexity Analytic (DECA®) is recommended.

[13] Westlund, M. (2017). *Decision Making for Leaders*. Australia: MMG.