

VALUE FOR MONEY ANALYSIS

Introduction

Value for money analysis should be the accepted basis of valid decisions, taken by individuals, business and governments. It exists to provide for wise investment and to obtain demonstrable benefits for the money invested. Sadly, the process and even the underlying science is often manipulated by decision-makers for personal, political or ideological reasons.

There is no shortage of literature available, science-based and otherwise, involving many concepts, processes and techniques to dissect and discuss value for money, ie value analysis (see Box1). One will hear such terms as business case, cost-effectiveness, firm economic benefits; wider economic benefits, benefit to cost ratios, discounted cash flow analysis, risk analysis and sensitivity analysis.

Each has a role to play but, unfortunately, these concepts are often confused and misused, deliberately or in ignorance.

Box 1

Value analysis is a set of techniques, knowledge, and skills used to improve the value of a product by eliminating unnecessary costs or improving its functions without compromising its quality, reliability, and performance. It involves understanding the components of a product and related costs.¹

Business Case

In providing justification for undertaking a project or programme that requires investment of organisational resources (money, material and human resources), a business case is the document to prove 'value for money'. [See Box 2]

Box 2

A business case provides justification for undertaking a project, programme or portfolio. It evaluates the benefit, cost and risk of alternative options and provides a rationale for the preferred solution.²

A common way of thinking about a business case is using these five elements:

- *Strategic context: The compelling case for change.*
- *Economic analysis: Return on investment based on investment appraisal of options.*
- *Commercial approach: Derived from the sourcing strategy and procurement strategy.*
- *Financial case: Affordability to the organisation in the time frame.*
- *Management approach: Roles, governance structure, life cycle choice, etc.*

Business cases can easily be abused for political reasons. For example, the so-called business case for Light Rail Stage 1 in Canberra, either did not address the fundamentals of such a case (Box 2] or manipulated them to advantage. In particular, it did not compare options for the proposed transit corridor, eg a Bus Rapid Transit (BRT) system, and there was no comparative study by the government as a basis of decision, but essentially an attempt to justify a political commitment already made.³ This business case was severely criticised by opponents of light rail for its shortcomings, particularly for having simply ignored a previous study showing the BRT was much more effective and half the cost of light rail.

Benefits to Cost

Broadly, benefits may be considered the same as perceived value by the decision maker.

Benefits may be sub-divided into firm economic benefits, wider economic benefits, perceived personal benefits or perceived social benefits.

¹ <https://sendpulse.com/support/glossary/value-analysis>

² APM Body of Knowledge 7th edition

³ See Parliamentary Agreement for 8th legislative assembly of the ACT. which committed the Labor government to build light rail, as a condition of the Greens party to join in government with Labor.

Firm **economic benefits** are those for which investment can be clearly shown to give a positive economic return, as lending institutions would expect.

Wider economic benefits are those that government love to claim, so as to justify a positive Benefit to Cost Ratio (BCR). In the case of Light Rail Stage 1, the government's business case claimed a BCR of 1.2, based on very suspect cost savings accruing from wider economic benefits, whereas the Auditor-General's report on Stage 1 said a justifiable BCR was only 0.49.⁴

Classic examples of **perceived personal benefits**, taking precedence over cost, are choices in goods for personal or family use, eg motor vehicles. While motor vehicles are seen as essential in modern times, the choice of a certain vehicle, over the need for basic transportation, may be based on prestige, on one's perceived social standing, one's wherewithal to waste money, on ideological grounds, or simply for 'virtue signalling'. A classic case for the latter two reasons is the purchase of Electric vehicles (EV) that are currently so much dearer than a comparable internal combustion powered vehicle (ICV). There is nothing essentially wrong with such choices, as long as the buyer is will to pay the price to satisfy a desire or ego.

Perceived social benefits are largely the province of governments, at all levels, in meeting ideological goals, fulfilling election promises or simply filling someone's pockets at taxpayer expense. To be fair, evaluation of the perceived social benefits of many government projects is an art form and highly subjective by decision makers. Classic cases are the acquisition of military hardware. There is no way that a government can ever put a dollar figure on the value of a particular weapon system. It becomes a judgement call on what we should do compared to what we can afford. To boot, mega-projects (in billions of dollars) can easily take on a life of their own, being subjected largely to political control or interference.

Cost-effectiveness

Effectiveness of a tendered option can be generally be taken as the same as value. But, strictly speaking, it is the extent to which an option meets a specified value, as measured or assessed quantitatively or assessed qualitatively. If a criterion is specified in quantified terms, a quantifiable response is to be expected.

However, assessment is often complicated and confused by the different scales of measurement applicable to the many value criteria, for all of which relative values have to be balanced. Invalidity can occur in assuming that all value indexes can permit ratio mathematical operations (multiplication and division). Texts⁵ on the subject define four scales of measurement and warn against their improper application in terms of statistical manipulation and amenity to mathematics. The four scales, in order of complexity, are Nominal, Ordinal, Interval and Ratio.

Costs

In this context, costs refer to dollar costs estimates (not personal or social costs) for a project or program.

Evaluation of dollar costs should always be on a defined life-cycle basis, ie comprising all costs to be incurred over a stated economic life in years, dated from a 'base-date', with all costs expected over the life-cycle to be established for the year incurred and discounted to the base-date, at an agreed percentage discount rate (cost of money).

A Life Cycle Cost (LCC) for a given contract is the sum of successive phases, namely: production and delivery over a specified period; operations and support over a specified period (normally at least 20 years); disposal or redeployment. Each phase must include the costs of all resources to be consumed: human, material, financial (borrowed and/or equity) and use of systems such as for computing and communications.

A project or program cost should also include all project-related costs outside the main contracts, such as those incurred by the project office leading up to contract and the ongoing contract management during the life of the project or program. These costs are rarely acknowledged by government but can be very significant. For example, the non-contract project costs for Light Rail Stage 1 were estimated at \$150 million. For Stage 2, these costs will be very much higher. Already, the ACT government has signed a consultancy contract for \$93 million, outside the project office costs.

If governments choose or are forced to make public a project cost, they will use every trick in the book to come up with the lowest possible value, especially if the project is controversial. They may do this by a combination of techniques, by: giving only the construction cost and ignoring the through-life cost; ignoring the cost of finance; ignoring off-contract

⁴ A-G's Report - Initiation of The Light Rail Project - Report No. 5 / 2016

⁵ Research Concepts in Human Behaviour, C.C. Helmstadter, Prentice and Hall 1970

costs; misusing or abusing discounted cash flow techniques; ignoring project-related contracts; and by hiding costs within the labyrinth of in-budget divisions and by off-budget accounting, while relying also on the ignorance or apathy of John Citizen. In addition, they will simply ignore or dismiss any legitimate criticism of the published cost.

A classic case of ignoring significant project-related contracts is the ACT Government raising London Circuit at great expense, the only reason for which is to facilitate the route for Light Rail Stage 2A, yet not including it in the project cost.

Discounted cash flow analysis

Governments are experts at minimising the apparent cost of a project by the mistaken use (either dishonestly or incompetently) of what is generally referred to as discount cash flow (DCF) analysis.

The fundamental use and purpose of DCF is in the comparison of tendered options. However, in the case of the light rail in Canberra, where there was no competing option considered, the government misuses DCF to come up with minimal cost estimates, more palatable to the taxpaying public.

In the comparison of competing options, the use of DCF is a valid practice, even though chosen discount rates are controversial, in leading to false (underestimated) costs and leading to incorrect relative discounted costs and even a different ranking.

In essence, DCF presumes correctly that a project spread over a given timeframe, would incur costs at various times throughout. For comparison purposes, these costs are discounted to a base date common to all tenders, using an assigned discount rate, which is supposed to represent the time-cost of money.

There are obvious problems with the technique, although sound in principle. First, it assumes (but does not have to) that the selected discount rate applies to all tenderers, even though they may be from different countries. Second, it normally assumes (but does not have to) that the rate will apply throughout the life of the project of 20 years plus. Third, the chosen rate often significantly higher than the real cost of money through the project period, so giving a lower but invalid discounted sum. These deficiencies can be resolved to some extent by checking the sensitivity of relative discounted costs to applied discount rates. Relativity of total discounted costs may be so validated, but not whether the discounted costs are in fact accurate.

In the case of Light rail Stage 1, the government insisted on discounting the series of future costs at a nominal 7.2% per annum whereas the real cost of money was about 2.5% per annum. In its business case for Stage 2A, the government again deliberately assumes an inappropriate 7.0% per annum discount rate when borrowing cost have been minimal for decades.

An additional trick is to discount back to a base date some years before the publication date. In the case of Light rail Stage 1, the government discounted back to January 2016, instead of 2019 when the figure was published. Again, this trick reduces the apparent cost of the project. Hence, for Light Rail Stage 1, the cost, according to the government, was about \$872 million, but, in reality, was about \$1.35 billion in 2019.

A quick test for readers is this. Assume you buy your home and borrow \$500,000, for which, over say 30 years, you will make equal monthly repayments, each comprised of part principal and part interest. Note that the respective size of these two components change with time, the early years being mostly interest.

Would you expect that the discounted sum of your interest payments would reflect the agreed bank loan rate or some higher, arbitrary rate that would give you a warm feeling but would be in error?

Risk analysis

Risk analysis of costs and schedule⁶ should also be an essential aspect of evaluation of competing tenders. Each component cost will have a point estimate but, in reality, each estimate is $\$x \pm y\%$, the value of 'y' depending on how far into the future the actual costs would be incurred.

Thus, each cost component will have a statistical distribution (actually unknown) around the point estimate. For simplicity, a technique that is used with success is to assume the distribution of all components to be triangular, with the minimum and maximum of each also estimated. However, because of the correlation between these costs (each one affecting others), it is not a simple case of adding up the means (valid) and minimums/maximums (invalid). For this to be

⁶ Note that deviations in expected schedule will translate into an effect on one or more costs for which schedule as a dependent variable.

done correctly, knowledge of sophisticated correlation statistics is needed. Luckily there is proprietary software⁷ available to perform such cost risk analysis.

Sensitivity analysis

Sensitivity analysis should also be done on estimates to test the most significant of the myriad simplifying assumptions that underlie estimates. Such analysis can be expected to change the relative discounted sums of tenders but could possibly change the ranking also.

All estimates involve assumptions, inherent or deliberate. Many, if not all dependent variables to a given cost will have initial values assigned, either known or assumed. It is the most important of the latter that should be subjected to sensitivity analysis.

Conclusion

Any expenditure should be subjected to some form of value for money analysis before committing to expense.

Sadly, the process and even the underlying science is often manipulated by decision-makers for personal, political or ideological reasons.

Some governments, especially those that are well entrenched electorally, will impose ideological values rather than subject project proposals to valid, independent scrutiny. Even when a government produces a so-called business case, these are done (often poorly) for show and any criticism ignored. Another abuse is proceeding with projects with benefit to cost ratios that are demonstrably less than unity, even grossly so, i.e, a poor investment and simple waste of taxpayer's money, while incurring huge opportunity costs.

All that said, valid value for money analysis is not easy, often needing complex computer modelling and eventually a decision through qualitative judgement of value, across multiple criteria, for the expected dollar cost range.

The literature abounds in the science, processes and techniques for valid value for money analysis and, in spite of how difficult it can be, there are mainly ideological reasons for getting it wrong.

M. Flint
ALSC
Canberra, 31 December 2021

⁷ @Risk – advanced risk analysis for spreadsheets; Palisade Corporation.