A review of techniques used to assess the credibility of a business case in public sector rail projects

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Abstract

Building a business case for a rail project is a complex and demanding task drawing on the professional skills of transport planners, economists, quantity surveyors and engineers. The decision and policy makers need to be convinced that the project sponsor is promoting a credible and robust business case that reflects the scheme’s intended investment before giving the go-ahead for the scheme. However despite these fundamental requirements with the business case the rail industry is plagued with projects that have been granted approval, by the decision and the policy makers, and have not delivered according to the forecast business case proposed by project sponsors. In most projects the conclusion that can be drawn is that costs were underestimated and benefits and revenue were overestimated in the original business case. This position naturally calls into question the credibility of the sponsor’s business case, an issue for many public sector rail schemes worldwide.

When granting approval for a project the policy and decision makers are faced with the complex and difficult decision of assessing whether the scheme is credible and robust and can go forward for implementation. Whether or not the project delivers according to the prescribed business case will not be known until the project has been completed, however the vital credibility assessment needs to be made well in advance of the final outcome. The credibility decision is based on the business case information presented to policy and decision makers by the project sponsor; therefore the sponsor has a responsibility to promote a credible business case and use robust techniques to achieve this goal. Similarly the policy and decision makers need to use robust credibility assessment techniques to assess whether the sponsor’s case is credible or not and ultimately fit for investment, otherwise disaster strikes.

Keywords: business case, credibility, investment appraisal, project development, cost overruns.
1 Introduction

1.1 The business case credibility problem

Many mega public sector projects have failed to deliver to policy and decision makers the forecast cost and revenue figures specified in their business cases. With many projects costs were understated, revenue and benefits overstated (Kain [1]). This is not a new phenomenon, nor is it a local one. Literature is plagued with papers, reports and newspaper articles on major construction projects across the globe where this has been the case for many years (Flyvbjerg et al [2]).

In major rail projects cost underestimation is certainly common practice (Flyvbjerg et al [2]). Recent examples in the United Kingdom (UK) include the Jubilee Line Extension (JLE) where outturn costs were 67% more than forecast and the project was delayed 40% longer than was forecast (Arup [3], Wolmar [4]). Others projects include the Central line one of London Underground Limited’s (LUL) stronger performing lines that ran 30% over budget, delayed by six years with actual performance was below the planned level DfT [5]. Other recent examples include South Hampshire’s Light Rail Transit (LRT) scheme whose capital costs have increased by £100 million (Petch [6]) and Greater Manchester’s expansion where capital costs have similarly increased by £100 million (Tramways [7]).

So where might the problems be occurring? Do project sponsors believe they are promoting credible business cases to the policy and decision makers and once given the go-ahead are mismanaging or subject to events that were not foreseeable. As for example the JLE project, which did not factor in an extraordinary event such as the Heathrow Express (HEX) tunnel collapse, an event that had a significant impact on JLE’s time and budget. Or are promoter knowingly ‘pulling the wool over the eyes’ of the policy and decision makers and promoting a less than credible business cases knowing that this is the only way in which to get projects started and attract funding? In either of these cases the credibility of the original business case is called into question.

The aim of the paper is to review existing techniques employed by sponsoring organisations and policy and decision makers to assess business case credibility and identify the strengths and weaknesses of these approaches. In order to conduct this review the business case development process is outlined to gauge the depth and breadth of existing credibility techniques. Before addressing this issue, the background to the business case is provided, defining the purpose of the business case and organisational decision making criteria used for selecting and prioritising projects. A review of literature is given to examine credibility models from communications research to explain how receivers assess source credibility, and examine possible explanations as to why business cases might be less credible than first thought and proposed antidotes.
2 Background

2.1 The business case in context

Figure 1 illustrates the business case in the context of the Project sponsor (the Agent), the Sponsoring organisation and the Policy and decision makers (the Principal). Importantly the diagram highlights the asymmetric information that exists between the Project sponsor, Sponsoring organisation and the Policy and decision makers on which a credibility decision is made. The responsibility for developing and creating a credible business case is with the project sponsor. The business case is presented to the sponsoring organisation for internal approval and to the Policy and decision makers for external approval. In either case the business case is assessed for credibility.

![Business Case Diagram](image-url)

Figure 1: Business case in the context of the principal and the agent.

2.2 What is a business case?

Literature and industry proves that there is no clear definition over the scope and definition of what is a business case. In some industries it is seen as synonymous with an appraisal containing costs, benefits and revenue. In other cases it is given a much deeper meaning containing more information about the project such as programme, procurement, capability statements of suppliers, financing and risks. Schmidt [8] states that the business case has three roles: (i) The Business Case is to justify the resources necessary to bring a re-engineering
effort to fruition. It is the one place where all relevant facts are documented and linked together in a cohesive story; (ii) Most importantly the role of the business case is to verify that the solution substantiates or meets the needs of the business; and (iii) It provides a consistent message to many different audiences. It is a high level view of the entire project for stakeholders affected by the project. In practice London Underground Limited refer to the business case and economic appraisal interchangeably (LT [9]). It identifies a layout in its Business Case Development Manual (BCDM) that essentially identifies costs, savings, revenue and social benefits to determine a benefit to cost ratio.

Figure 2: The role and development of the business case in the context of project life cycle.

2.3 What is a business case used for?

Figure 2 illustrates the role of the business case in the context of two forms of public sector procurement; Traditional (grant funded) and Private-Finance-Initiative/Public-Private-Partnership (PFI/PPP). It also illustrates the three major decisions the business case is used to evaluate: the Investment, the Procurement and the Finance decision. It should be noted that the decision whether to invest in the project is taken up to the implementation stage and is influenced by the procurement and finance decision.

The role of the business case depends at what stage of the project life cycle the project is at. The business case changes from a decision tool to a planning tool as the project develops through the project lifecycle. At the feasibility stage
the business case is used as a decision tool as a means of comparing and prioritising project options (multiple options) and selecting a preferred option (single option) for development. At the multiple option stage a differential focus is taken whereas an in-depth focus is taken with the development of the business case.

Figure 3: Key development processes for a business case.

2.4 Process for developing the business case at the preferred option stage

The main processes used to develop a business case, at the preferred option stage, are shown in figure 3. The figure illustrates the depth and breadth of the business case that needs to be examined when assessing business case credibility. Prior to achieving this stage multiple options for the project (‘do-something’) were considered and each evaluated against a base case (‘do-nothing’). The preferred option and the base case are now developed further in more depth during the development phase of the project.

The key processes that are considered are:
- **Component specification** – individual business case components are specified by the sponsor along with project details (requirements) and given to a consultant to forecast;
- **Component forecast** – each component is forecast using models (i.e. demand models, operating cost models) or techniques (work break down structure) during which forecasts are developed for the project. Typically with modelling a
methodology, data and assumptions are used the report is produced and reviewed by the sponsor and agreed amendments made to the report;

- **Consolidate components** – once the agreed components have been forecast they are then consolidated into a spreadsheet model to produce a cash flow statement from which a benefit to cost ratio is produced;

- **Business case output** – after a period of reviewing and validating the business case model and making adjustments the case is drafted into a summary document and consultation with stakeholders is conducted. This document contains a qualitative and quantitative summary of the business case firstly at the summary level and then at the component level.

### 2.5 Organisational decision making criteria for selecting and prioritising projects

Once the business case has been assessed it is subjected to further organisational decision making questions that includes:

(i) **Does the business case pass the investment threshold?**

The project sponsor needs to demonstrate the project has a robust and credible business case to be considered worthy of investment. For a project to be considered a worthy investment it needs to pass the institutions agreed benefit to cost ratio threshold value. Once a project has passed this threshold it proceeds onto the next development stage otherwise the project is either ‘filed’ away, with the project team disbanded, or it is re-scoped to improve the business case. With the prospect of project success or failure, sponsors are motivated to ensure their project passes the threshold. Hence this cause could lead to a variety of opportunistic behavioural effects. These effects might include making adjustments to sourced costs, re-profiling revenues (primary or secondary), creating a story that matches the proposed changes, all aimed at ensuring the project improves its chances of passing the investment threshold. Therefore the impact of the organisational investment threshold on the credibility of the business case and the associated opportunistic behaviour of the project sponsor is an area that needs careful examination.

(ii) **Is the business case credibility?**

This is an assessment of the measure of believability that can be attached to the business case. The emphasis on credibility changes as the project progresses through the development process. During the feasibility stage where multiple options are compared credibility refers to whether options have been compared fairly, all relevant costs and revenues have been identified and the options appear a reasonable representation of the project. Once a preferred option has been identified for development it is expected that the business case includes all the components and only requires more accurate forecasts to make the case. It is towards the end of the development stage that finance is committed to the project and contracts are signed, therefore the primary credibility question at this stage is will the project deliver to the forecasts contained within the business case? Are
costs understated and benefits overstatement? and does the case appears to be reasonable to the sponsor’s organisation and the policy and decision makers?.

(iii) Is the business case robust?
This is an assessment to understand the degree to which changes to input variables impact on the output variables. For instance if capital costs increase by 20% and revenue falls by 15% how does this impact on the benefit to cost ratio? Does the ratio still demonstrate that the case is above the investment threshold? Or does the business case fall below the required investment threshold level when stressed?

(iv) Where does the project’s business case rank in comparison to other projects?
In a capital rationed environment there is a need to prioritise projects due to the competition for funding. In the case of public sector projects those with the healthiest benefit to cost ratio will receive funding for implementation and those without will remain on the pile. This competition effect can lead sponsors to use optimistic forecasts in the business case to improve the output measure.

(v) Does the business case show the project to be affordable?
With the budget constraints that the organisation operates within does it have sufficient funding for to undertake the investment?

3 Review of literature

3.1 Possible explanations to the business case credibility problem

Literature suggests that promoters knowingly promote business cases that are inaccurate to obtain funding and in some cases unknowingly promote inaccurate business cases. However Flyvbjerg et al [2] believes the latter occurs. His research focuses primarily on the promoters rather than the policy and decision makers. Four types of explanations are offered as to why project costs are underestimated; Technical, Economic, Psychological and Political (Flyvbjerg et al [2]):

(i) Technical explanations refer to such affects as ‘forecasting errors’ that cover inadequate data, honest mistakes inherent problems in predicting the future, lack of experience on the part of the forecaster. Flyvbjerg et al [2] dismiss this explanation as firstly their data did not reveal a biased distribution of errors in costs estimates around zero and secondly forecaster would learn by their mistakes over time refining data collection and forecasting methods and include appropriate project risks to cover this and this has not happened;

(ii) Economic explanations are described on two accounts self interest and public interest. Self-interest covers such the interest of the cities that compete for funding and there is an interest in making the project look better than other
projects promoted by other cities. It also covers situations where organisations are likely to benefit from the scheme and are involved in the forecasting of the scheme thereby influencing the results (such as consultants who might be hoping for a large commission to develop the project for the Client or intending to be in a bidding consortium). This is done to create work for engineers and construction firms with many stakeholders making money in to the bargain. The study rejects both the economic justifications for underestimating costs on projects. Flyvbjerg et al [2] clearly indicate that both types of economic explanations as deliberate and economically rational. The arguments that support these explanations that taxpayers money is saved by cost underestimation are seriously flawed. A project might be started that has an economically flawed cost benefit ratio and it prevents another project from being undertaken that would provide a better return. In both cases it demonstrates inefficient use of resources. The study classifies this explanation as deliberate deception of costs;

(iii) Psychological explanations refer to the state of mind that occurs when engineers like to build things, planners and local transportation officials and politicians like to empire build. This enthusiasm is psychologically referred to as ‘appraisal optimism’. This condition is common during the appraisal stage where promoters and forecasters are over optimistic about the project outcome. Flyvbjerg et al [2] view appraisal as self-deception and not as lying to deceive anyone, therefore its classifies this as an error. The study rejected appraisal optimism as a primary cause of cost underestimation as learning should result from previous projects and should result in cost estimates becoming more accurate over time. The study conducted by Flyvbjerg et al [2] showed that this had not happened. Where the study did make a concession with appraisal optimism is where underestimated costs were produced by inexperienced promoters and forecasters and were not drawing on the experience and skills of more experienced colleagues; and

(iv) Political explanations link cost underestimation aimed at getting projects started. Wachs [10,11] interviewed public officials, consultants and planners involved in US transit systems. In many cases planners, engineers and economists told Wachs that they had ‘cooked’ forecasts in order to produce numbers that would satisfy their supporters and get projects started. In one case many downward adjustments were made to costs and patronage figures adjusted upwards to satisfy a local politician who wanted to get the project started. Mott Macdonald’s (MM), who conducted research for HM Treasury, suggest that promoters are being too optimistic about their forecasts (HMT [12]). The main contributor (38%) towards the optimism bias according to MM’s report was due to the inadequacy of the business case. Mackie and Preston [13] also believe that optimism was the greatest danger to cost underestimation with projects. Flyvbjerg et al [2] suggests that optimism bias might provide some explanation to the problem however they significantly rule this out as a primary cause believing that project costs and benefits are routinely exaggerated by promoters and forecasters to sell projects to the policy makers.
3.2 Antidotes to the business case credibility problem

MM’s antidote to the problem was to suggest the use of an optimism bias to be wrapped around cost estimates in order to determine an upper and lower bound cost estimate for the project (HMT [12]). This wrapping is intended to cover risk and will be managed as the project develops over time. An example of its use is with the Crossrail project. The Crossrail team believe that the base construction costs will cost £7bn. In the eyes of the Treasury the costs could be closer to £15 bn although Transport for London believe £10 bn (Muir [14]). This includes the 66% covering the optimism of the promoters with this type of scheme and makes a major assumption that any big rail project will vastly overrun on budget (Clark and Muir [15]).

Although researchers disagree with the cause of the cost overruns with projects they do at least agree with each other on the antidote to the problem. Flyvbjerg et al [2] and Mackie and Preston [13] suggest there should be more transparency and that more checks and balances should occur with public sector projects, more scrutiny of the business case should take place either independently or at public inquiries. On a more extreme view Flyvbjerg et al [2] suggest that there should be penalties, even criminal, imposed on those promoters and forecasters that regularly under estimate costs for schemes and knowingly lie to policy makers. In either case project promoters rapidly lose their credibility once they have misjudged the costs and revenues for a project knowingly or unknowingly.

4 Review of credibility techniques

4.1 Credibility models

Transport literature is sparse with regard to assessing and measuring credibility of business cases. However in the communications field credibility of newspaper articles and television news has been measured and assessed for many years. Primarily due to the growing media distrust in newspapers in the mid-80’s, increasing effort was applied to measure and validate source credibility (McComas and Trumbo [16]).

Communication research by Infante, Rancer and Womack [16] has categorized research around credibility studies in three models the Factor, Functional and Constructivist. Applying these models to understand how the sponsoring organisation and the policy and decision makers assess business case credibility provides the following insight;

(i) Factor model – this model states that receivers (sponsoring organisation or policy and decision makers) would assess the credibility of business case using a list of factors that intervene between the source (project sponsor) and themselves. Research to date has been criticized in that it fails to specify whether receivers use all factors or whether some factors are more important than others,
also whether developing a ‘laundry list’ of factors that impact on source credibility really increases its understanding (McComas and Trumbo [16]);

(ii) Functionality model – believes that source credibility depends on the function it serves for its listeners in a particular situation. It strongly relates to satisfying the receiver’s needs in a given situation. If the receiver’s needs are met then the source is considered more credible. Three criteria need to met for persuasion: a) the receiver must be aware of the sources characteristics, b) the receiver chooses what function the source serves and c) the receiver compares functional criteria to the sources characteristics (McComas and Trumbo [16]). In a policy and decision maker’s context a project’s business case that fits with existing policy and government objectives is considered more credible than perhaps it should. An illustration of this could be viewed as being with the JLE project. A project that supported government policy of regenerating Canary Wharf at the expense of huge cost overruns. Clearly questions are to be raised surrounding the credibility of the forecast business case that supported the investment;

(iii) Constructivist model – believes that people use their personal constructs of reality to assess source credibility (McComas and Trumbo [16]). In a business case context policy and decision makers would use their templates or frameworks of other projects in which to assess the project information being presented by the project sponsor. The difficulty with this model is to assess the frameworks being used by the policy and decision maker in a given situation to assess the credibility of the business case.

Of the three models the factor model remains the most prominent in communications research for the obvious reason that it is easier to operationalise and thereby assess and measure.

4.2 Overview of credibility assessment techniques

A review of techniques that are used by sponsoring organisations and policy and decision makers to assess business case credibility is given in this section, cross reference is made to figure 3 to illustrate the depth and breadth of the credibility assessments used.

(i) Benchmarking – this technique is a passive one in that it has little interaction with the source. The technique compares the hard factors of the project’s business case at the component level and consolidated level with other similar projects that have been approved or undertaken by the organisation. For instance at the consolidated level the benefit to cost ratio and at the component level the cost per train kilometre, revenue per passenger of a rail extension projects is compared with a completed rail extension project. This technique does not interrogate the data, assumptions or modelling within the business case.
(ii) **Challenge sessions** – this is where stakeholders take on the role of challenging the business case prepared by the project sponsor and their team. The sponsor prepares a business case summary document containing full details of the business case that is reviewed by group members prior to the presentation. Each major component of the business case is presented to the stakeholder group. The group asks searching questions based on their knowledge from previous projects concerning the risks, the quality, validity and practicality of the forecasts. Questions not answered at the session are required to be answered at a follow-on sessions with the sponsor. This is an interactive technique that relies primarily on hard judgements with some attention given to soft judgements. The technique does allow the assessor to investigate the data, modelling and assumptions used at the component level. It particularly relies on stakeholders having expert knowledge of business cases, previous projects and asking the right level of questions to be effective.

(iii) **Independent reviews** – components of the case are analysed by an independent expert in the field to gauge their opinion of the components credibility. For instance an independent Quantity Surveyor (QS) reviews the capital cost estimates of a rail extension prepared by another QS assigned to the project team. This technique allows the depth and breadth of the business case to be probed by the reviewer. This analysis assesses the methodology used to develop forecasts, the data and assumptions used in the modelling and concludes with a report providing support, support with reservations or no support to the forecasted components. This report primarily focuses on the hard aspects of the report with minor consideration to the softer aspects.

(iv) **Sensitivity analysis** – although this is a technique that should be used to assess a business case’s robustness it is often used as a substitute technique to assess its credibility. The analysis involves increasing or decreasing variables and assessing their impact on the output measure. It is a substitute technique to credibility analysis in that as long as the business case passes the investment threshold the case is considered credible and if values rise above an estimate they are still considered credible. This technique does not probe the business case and relies on the hard aspects of the project not considering any soft aspects.

Each of these techniques predominantly uses the business case’s hard factors to make a decision. The independent review is a technique that should provide an independent perspective on the case and allows an in depth assessment of the business case to be conducted. However it depends on who appointed the expert and for what reasons, to confirm opinion or truly review independently.

5 **Conclusion**

The paper has highlighted the business case credibility problem, demonstrated the purpose of the business case and provided an overview of the development process for a project. It has also provided an overview of credibility assessment.
techniques that are used by the sponsoring organisation and policy and decision makers to assess the credibility of the business case. Standardised frameworks ensure that a consistent approach is maintained when developing a business case however the important question still remains with the business case and that is, ‘How credible are the numbers within the framework?’

Whilst most literature directs its attention towards the actions of the project sponsors for the lack of business case credibility, the role of the sponsoring organisation and the policy and decision makers for assessing the business case should not be forgotten. In both cases the motives for projects and the approaches used to assess a business case’s credibility needs careful examination. If the business case’s credibility is at the expense of a politically driven project then perhaps it should not be too much of a surprise when the forecast business case is not delivered.

Despite credibility assessment approaches discussed in section 4, the credibility decision is primarily based on the hard factors that intervene between the source and receiver (B:C ratios, component ratios, NPV’s, or PV’s) rather than the soft aspects (the conditions at the time that influenced the numbers) of the business case. Importantly the credibility assessment techniques need to penetrate the soft factors that influence the hard factors. As an illustration of this, constraints such as investment thresholds and resultant sponsor behavioural aspects, insufficient project budget, time or availability of skilled resources to develop a business case or level of commitment to the figures are a few soft factors that will impact on the credibility of the business case. Whilst the emphasis with business case credibility is primarily based on the project’s hard factors, the authors view is that the soft factors also need to be brought into the assessment framework. In this way hard and soft factors can be combined using a multi-criteria decision making methodology to assess the business case’s credibility thus improving the quality of the decision making.

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References


