

Senate Rural and Regional Affairs and Transport References Committee

Inquiry into how Qantas can remain a viable national carrier

Submission from the systems perspective

Summary

- Given the particular wording of the Committee's terms of reference (viz what initiatives can be taken by Government ...) it is recommended that these comprise encouraging the Airline to take necessary and sufficient steps within its own remit to become a strong national carrier. The essential points are that a) while Qantas may be viable at this time it is not currently 'strong', but that b) it could become so by taking steps within its management that should have been taken a long time ago.
- Qantas has to date omitted to use established modern decision-support and management control techniques in its business.
- Owing to high system complexity, Qantas effectiveness and efficiency are inevitably far short of what they would be if the techniques were in use. Its costs are necessarily higher and its profitability is lower.
- Qantas has moreover declined to evaluate a comprehensive and detailed application of these techniques for airlines; thereby arguably demonstrating poor management attitudes in this regard.
- A debt guarantee and/or an equity stake, and removing stipulations that much of the airline facilities and staff be based in Australia, would not solve Qantas' underlying control problems. Only the modern management techniques can do that. There is an evident disconnect between the type of 'solution' that is officially promoted (cf the Committee's terms of reference) and the real problems that beset Qantas.
- The Federal Government and Qantas should both shelve their present intentions until the Airline has attained modern effectiveness and efficiency. At that stage the situation could be re-evaluated, in a rigorous scientific manner.

Approach of this paper

The Committee's terms of reference specify only initiatives that can be taken by Government. That is unfortunate. What actually needs to be done in the short and medium terms must be done by the Airline. Government's role is to encourage the Airline to take those steps.

The phrase '...to ensure Qantas remains a strong national carrier ...' is somewhat misleading. Qantas may be currently viable, but recent developments indicate that it is hardly strong. The objective must be to make it much stronger. Again, the steps needed to do that must be taken by the Airline.

A debt guarantee and an equity stake are apparently unlikely to be approved. They are in any case not part of the real solution in the short and medium terms. Those steps would give a false confidence that problems have been solved, and would involve additional loss of time before a real solution is implemented. Perhaps there would be significant loss to the Australian economy during the delay period from ongoing Qantas problems.

Shedding Australian jobs (including in rural and regional areas) and exporting Qantas functions might reduce costs in the short term. However, these steps would not solve Qantas' underlying control problems. The best way to protect Australian jobs at the Airline is for Qantas to be as effective and efficient as possible.

Mr Barnaby Joyce is quoted as saying that one of Qantas's great strengths is its regional Australian network, with returns from rural flights effectively subsidising its unprofitable international division. That is not very advantageous for rural areas. A stronger Qantas would be more competitive in the international arena. It would then have less or no need to subsidise its international operations at the expense of rural areas. Those areas would gain commercially and economically.

The 'real' solution comprises adoption by Qantas of established modern techniques of decision support and management control. These techniques would be a game changer for the Airline.

As a highly-complex managed system (system complexity is the real underlying cause of its woes) Qantas should be encouraged to adopt these techniques as modern best practice. The resulting transformation of Qantas' effectiveness, efficiency and proactiveness would also benefit rural and regional areas and the Australian economy. Enhanced effectiveness and efficiency ('strength') would translate fairly directly into improved competitiveness

These techniques are apparently little used in Australia. That reflects on the 'ethos' here, not on the techniques. One reason for lack of use in this country is that the many corporate users around the world, for good reasons, virtually never publicise their use of the techniques. Most Australian potential users have probably never heard of the techniques.

Use of the techniques in a high-profile case such as Qantas could have beneficial flow-on effects for other players in the Australian economy. It is also very desirable that the Committee should be aware of these techniques and their implications, both for the current Inquiry and for its future work. Lack of awareness means that underlying situations ('drivers') may not be identified.

This paper accordingly introduces the techniques and discusses how Qantas could use and benefit from them. The Committee would be justified in reporting that measures to be undertaken by Government are not the way forward at this stage, but that a path leading to enhanced Qantas effectiveness and efficiency is.

Use of the appropriate modern techniques would also be needed to determine authoritatively effects of any proposed (regulatory) initiatives on Australian aviation, and on the rural, regional and national economies.

The Committee has been asked to consider the potential impact on Australian jobs arising from the Government's plan to repeal Part 3 of the Qantas Sale Act 1992. A recent submission to the Senate Economics Legislation Committee stated in part:

The Qantas Sale Amendment Bill 2014 is regarded as an ideologically-driven distraction that

- has little to do with the real reasons for Qantas' present situation;
- would not lead to resolution of the Airline's problems;
- would involve additional loss of time before a real solution is implemented and, perhaps, significant loss to the Australian economy.

According to the ABC's website 'the airline itself says changing its ownership restrictions won't address the immediate and urgent matters at hand'.

System complexity

Qantas is a highly-complex managed system. Complexity refers to things such as

- Large numbers of variables, each of which is linked to all other variables directly and/or indirectly by interacting feedback loops. Variables on those loops are impacted by many parameters or constants.
- Nonlinearities. Each of these can cause that part of the system which is currently dominating behaviour and outcomes to change, unpredictably and invisibly.
- Randomness, which can be represented by probability distributions.
- Output and performance effects that are distributed over two or more time periods.
- Impacts from external events and forces etc.

Complexity greatly exceeds levels at which human managers can operate optimally (effectively and efficiently in terms of modern standards). Qantas as a 'system' in management-science terms is literally invisible to its managers, as long as they operate in manual terms. They are therefore not in proper control of their system.

The modern solution to system complexity

During WW2 the US military and industry became concerned about their limited capacity to handle control problems of that period. In the late 1940s those interests approached the Sloan School of Management at the MIT to request development of new techniques for control of complex managed systems. Development was funded in part by the Ford Foundation. The techniques, known as system dynamics (SD), became publicly available in 1957.

Now, over fifty years later, many (perhaps most) large companies and corporations around the world have SD models of themselves. These are used for

- activity and resource control (physical and financial);
- tactical and strategic planning;
- budgeting;
- coordination and rationalisation etc;
- commercial-industrial intelligence;
- major civil litigation;
- international corporate tax avoidance.

XYZ Corporation's model looks exactly like the actual XYZ. It is a 'virtual XYZ'. The model can behave in the same detailed manner as XYZ will or may (subject to assumptions) in future time.

This model provides the following capacities to XYZ:

- real prediction and replication (prediction of system values for past periods);
- controlled, low-risk 'what if' experimentation;
- causal analysis of reasons for actual and simulated outcomes;
- abatement of decision and operating risk.

Real prediction is estimation of (future) system variable values in terms of the same factors that generate those system values in reality. It is far superior to forecasting.

The above capacities are modern best practice. No other approach, including manual, can approximate their decision-support benefits and services, or the resulting system effectiveness and efficiency. This, of course, translates into big positive impacts upon costs and profitability in companies.

Who uses corporate models?

With apparently only one exception none of the many corporate models developed since the late 1950s has been publicised. Reasons for lack of publicity are easily understood. A company's corporate model is among its most secret possessions, especially in regard to the model's input and output data (numbers), and to some of the uses listed above.

The sole exception whose corporate model was publicised is a large US shipbuilder known as Ingalls, now part of Huntington-Ingalls. H-I, based in Newport News VA, is currently (early 2014) building two of the next generation of nuclear-powered super carriers: the Gerald R Ford and the John F Kennedy.

The Ingalls model was publicised (*Naval shipbuilding – a claim settled and a framework built*, Interfaces, Kenneth G Cooper, 1980) because it made legal history as the first occasion on which a simulation model provided the main basis of proof in major civil litigation.

In the 1970s Ingalls (then owned by Litton Industries) contracted with US Navy for two large shipbuilding projects. During the next six years Navy bankrupted the

shipbuilder to the extent of \$US500 million in mid-1970s prices, by delays, disruptions, and changes of mind etc. Litton intended to close down Ingalls.

The problem was: how to prove Navy responsibility? Ingalls' management knew that traditional approaches to litigating such complaints had proved vulnerable in court.

Instead Ingalls commissioned the development of a SD model of its total engineering operations. These included the two Navy projects and all other work in hand during the period.

For litigation purposes the model was run twice. The first run, the control, recreated the events and outcomes of the six years. This was prediction in past time, or *replication*. The second run repeated the first, except that Navy actions and omissions subject to complaint were excluded. The courtroom basis of proof comprised a detailed comparison of output from the two runs. That is a frequent way of using a SD model as a decision-support tool.

Navy agreed that the first run accurately reproduced the events and outcomes of the six years. Evidently Navy also accepted the results of the second run, and the comparison between the runs. There was an out-of-court settlement for \$US447 million in mid-1970s prices, in favour of Ingalls. The model was responsible for the majority of this outcome. This underlined the great predictive and analytical power of SD corporate models.

The shipbuilder survived and applied its model to future management decision support. Litton also adopted the causal modeling techniques for its own management control etc. The techniques have been employed in subsequent cases of major civil litigation.

Some other large companies and corporations known to be using SD corporate models include Cummins Diesel, GE, GM, Northrop-Grumman (Ingalls' current parent company), McDonnell-Douglas, Fluor Corporation, Raytheon, Mastercard, Ford, IBM.

Significantly, airlines around the world (including Qantas) apparently do not currently use SD corporate models. However, an airline has been modeled in SD, comprehensively and in detail. If and when provided with Qantas input data (numbers) this software would become a 'virtual Qantas' in the senses described above. That capacity would have significant advantages for the Company; including abatement of operating risk.

Implications for recent Qantas developments

Qantas was offered the airline software in early 2013, but declined to evaluate it or to give reasons for that refusal. Now, more than a year later, Qantas could be benefiting from the software's formidable technical capacities. Its commercial and financial situations would arguably be much more favourable than is actually the case. This reflects the gulf between current best practice, on the one hand, and the manual management practices of Qantas, on the other hand.

The Airline is entitled to exercise its business judgment and to make its corporate decisions. In the present case, however, if it continues to turn its back on modern best practice, it will not become a strong operation. Its support of aviation jobs in Australia will remain questionable, as will its future contributions to the rural, regional and Australian economies.

The preferable outcome is for both Government and Qantas to shelve their present intentions, in favour of the Airline adopting modern best management practice. The situation could then be re-evaluated.

The writer

I have a Master's degree in managerial economics from the ANU. My Ph.D (also from the ANU) is in the management-science causal modeling techniques referred to above. I am a fellow of the Institute of Chartered Accountants in England and Wales.

I have over thirty years' professional experience in large-scale modeling of private- and public-sector managed systems for decision-support and management control purposes. I have modeled a series of managed system types. Airline is one of these types.

John P Weldon (Dr)