PERFORMANCE MEASUREMENT AND EVALUATION

Block 4 The Broader Scene
Unit 11 Evaluating complex situations
The Course Team

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Unit 11
Evaluating complex situations

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Aims and objectives

- To extend the conceptual frameworks for critically examining performance measures.
- To define strategic success and how can it be measured.
- To examine the problems associated with making comparisons and the implications for performance indicators.
- To develop a critical framework for examining models, evidence and assumptions.
1 Introduction

In this last part of the course we will be taking a slightly different tack from that which has gone before. Here our over-arching theme is *coping with complexity*. Note the word 'coping'. We are going to address a type of situation that will be familiar to all: a problem that cannot be 'solved', only dealt with temporarily. In a very real sense we are talking about managing the situation. The situational environment is constantly changing — either by evolution or by revolution — and the appropriate action must be designed accordingly. To use a slightly simplistic analogy, the willow bends before every breeze but survives the storm whereas the oak is steadfast before minor winds but may break in the typhoon. A good manager has the ability and confidence to know when to imitate the willow and when the oak; we expect OBS MBA graduates to be able to out-think all the trees they meet — be they of the rooted or the two-legged variety.

This unit, like cigarettes or great white sharks, should perhaps carry a 'health warning'. We do not suppose that it will severely impair your physical well-being but hope that it will challenge and extend your thinking about some of the issues raised by your study of the preceding parts of the course.

We return to a more general level of analysis, one that is not as issue- or context-specific as Blocks 2 and 3. We will invite you to put your new knowledge, skills and perspectives to the test and by so doing extend and refine your use of concepts and models. We will look at some of the problems that we get into when making comparisons, particularly across nations, and help you to develop a framework that you can use to probe and question your own and others' use of performance criteria. To help you in this there are lots of activities linked to your own organization. The hope is that they will help you with the final TMA. There are also some interesting cases in both text and audio-visual form for you to work with and develop ideas from.

Unfortunately, and this is where the health warning comes into play, this may, we think, result initially in more, not less, confusion; in more, not less, ambiguity, for as Jim March — who provided the framework which started off the course — said in the introduction to his 'collected works':

> If scientific progress is measured by simplification, this [book] is a story of retrogression. From a simple perspective of anticipatory, consequential, rational choice, we have gone first to a recognition of the limitations on rationality, then to concerns for internal conflict, then to history dependent conceptions of human action, and finally to an awareness of the profound ambiguities surrounding action in organizations. Although decision-making as it occurs in organizations can probably be better understood and improved through these speculations, the speculations force us to less simple formulations. Life has proven to be more complicated than our earlier mythologies of it.

(March, 1988, p. 15)

Thus it appears that we are not in the business of providing simple explanations. Logically then, advancing understanding results in complexity, but what does complexity actually mean? Can we measure it?

Complexity, like other words, carries with it definition(s) that may be more or less precise, more or less situation-specific and more or less specific to an individual.
Let us look at each of these issues.

- First definition: 'Consisting of parts, composite, complicated, involved.' 
  *(Pocket Oxford Dictionary)*

- Second definition: 'Composed of two or more parts.'
  *(Webster's New Collegiate Dictionary)*

Thus it looks as if complexity has to do with a whole consisting of parts. This may be a composite and/or be convoluted (however that might be defined).

To demonstrate by example, let us now look at a situation that involves the concept of complexity. We will use this technique of approximate definition by analogy and example quite frequently in this unit; it is a useful 'umbrella strategy' when we have to deal with topics which are too broad or 'fuzzy' for precise declaration.

**Example of complexity**

The world has become a bigger, more complicated place in which to do business. The markets for both goods and services, for resources both physical and human are bigger. Electronic data processing and communications technology have transformed the transfer of data around the world. News of international events reaches us almost instantaneously via dedicated 24-hour news networks (e.g. CNN). Some markets – for example for capital and currencies – operate 24 hours a day in various locations. The number of potential stakeholders in organizations has increased. Their concerns and needs have to be recognized and taken into account. As evidence for this assertion we could cite the increase of supra-national organizations and their relative power *vis-à-vis* national or regional organizations. The EU, trade legislation and agreements (NAFTA and GATT), the World Bank, EBRD, multinational corporations, pressure and lobby groups, institutional investors, and so on are having an impact on organizations and their decision makers and increasing the complexity that managers face.

This fairly simple and general description of the emergence of the 'global village' may be very familiar to you; it may also be so simplistic as to be wrong. It does, nevertheless, help to raise a couple of questions related to complexity.

**Activity 1**

What is 'complexity' in this situation? How could we 'measure' it or express it in measurable terms?

**Comment**

We could see complexity in this situation as being a function (a composite) of two components. The first would be the sheer volume of interests that can potentially impact upon a given organization. This is a relatively easy 'measure'.
The second, not so easy, measure would be some construct of diversity or heterogeneity of the various interests. For example, you may have a large number of clients but if they all want the same thing or are taking a standardized product or service then the world is a busy but not particularly complex place. If, however, their demands are different, if they want ‘personalized’ service, or if you are subjected to the attentions of several pressure groups each wanting different or conflicting things, then the world is more diverse and thus potentially more complex.

Complexity may also, as the dictionary definitions suggest, be how all the components or interests interact.

Our main reason for dealing at some length with this is that it might stimulate you to start thinking below the surface of even a simple concept or measure to uncover what it might mean or represent.

**Activity 2**

Using the measures of complexity developed above, assess the level of complexity that your organization faces.

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Having discussed an empirical definition of ‘complexity’ – you need not agree with our definition, but at least you will know what we mean when we use the word – we need to consider one other important term which will be much used in this unit: stakeholder.

This can be defined much more exactly: a stakeholder is any person, group or organization that has a demonstrable interest in the outcome of the particular situation under consideration. Note the word ‘demonstrable’. The link need not be direct or material but it must be more than just idle curiosity or the exercise of arbitrary influence.

An example may clarify the difference. If a farmer – chosen simply because farm buildings are relatively free from the protections of planning regulations – decides to build a large, ugly barn adjacent to a private house, the householder would be a stakeholder. But, just because he or she was related to the Secretary General, it would not make the UN a legitimate stakeholder.

One of the key impacts that stakeholders have on organizations is when they articulate and/or promote their interest in a decision-making environment (or choice situation). This may be directly stated or it may have to be inferred or interpreted from their actions or non-actions.

To decode or understand these actions we want to suggest a methodology. It involves the idea of argument. We are not suggesting that stakeholders shout a lot but that you can analyse what they are saying by looking at the ‘case’ that they are making or stating.

The proposed framework has been borrowed largely from the work of a philosopher, Steven Toulmin, who suggests in his book *The Uses of Argument* (1958)
that as the science of logic has become free from all practical concerns we should take as a model the discipline of jurisprudence. For him:

"Logic is concerned with the soundness of claims we make – with the solidity of the grounds that we produce to support them, the firmness of the backing we provide for them – or, to change the metaphor, with the sort of case we present in defence of our claims. The legal analogy implied in this last way of putting the point can for once be a real help. So let us forget about psychology, sociology, technology and mathematics ..."

(Toulmin, 1958, p. 7)

This is not a totally novel approach; it has already been used to great effect to explore a variety of decision-making situations such as the location of a hazardous waste incinerator (Vári, 1991) or more general examples (Fletcher and Huff, 1990).

Using this approach we can break down an argument or train of reasoning into its four main components:

1. the key claim or, if you like, conclusion
2. the data or grounds
3. the warrants or assumptions or model that shows the ways in which the data and claim are linked
4. any ‘qualifiers’ which limit the claim.

We can represent this diagramatically (Figure 1).

![Figure 1 The components of argumentation](image)

When we discussed the notion and measurement of complexity we put in several caveats, the significance of which we will explore in a moment. If you would care to return at this point to the example above in which we characterized the ‘global village’ you will find that in the first line we made the massive assertion that the world has become ‘a bigger, more complicated place in which to do business’. This, even if it comes first in the text, is actually the conclusion or claim.

We then went on to cite data to support that assertion, that is the rest of the text, and to ask you to use it to think about complexity, and followed it by our view of complexity.

What is happening here is that we want you to view complexity in the ways that we do and so we constructed an argument to make that happen. We did this because we have a ‘stake’ in this learning experience and want you to view the
world (for the time being at least) in the same ways as us. The definition of complexity is ours (more or less) and so we backed up our case with the evidence in the example. To do this we used a model of complexity through which to present the data and thus exposed our working logic to you. Do ‘stakeholders’ do this when they interact with your organization?

Another example from Fletcher and Huff (1990) may help to illustrate the idea.

(a) It is going to rain.
(b) The barometric pressure has dropped and the wind speed has risen in the last hour.
(c) A drop in barometric pressure and increasing wind speed can signal the arrival of a low pressure system that usually brings rain.

Which is the claim, the warrant and the data here?
Clearly, (a) is the claim, (b) the data and (c) the warrant or model with its own qualifier.

Most work using this methodology has focused on text analysis and the major problems seem to be breaking down the text into ‘arguments’. There may be many of them and they may be ‘nested’ or interrelated, and uncovering the warrant or model may be complicated.

These two reasons might make this methodology very difficult to apply fully in real-life management situations, but we think it is robust enough as an idea for you to use in a fairly broad-brush way to uncover the logic or assumptions that people use when they use data.

As Vári (1991, p. 4) says:

...(i) it enables the integration of various empirical data and mental constructions (theories, standards, specifications), and of subjective judgments (e.g. preferences, estimations) included by the argumentations, which are indispensable in decision situations; (ii) it can be applied not only for the description of deterministic statements but also for beliefs, hypotheses and for conditional inferences being crucial in future-oriented decision situations.

This quite simple idea (if not simply expressed) focuses attention on to some key elements of evaluating performance and making decisions. First the notion of data. In much of the course to date you have examined performance measures in various situations. These are essentially data. Managers and others use these data to make claims that performance is good or bad. In some cases these claims are couched in comparative terms: Department A is not performing as well as B; there is higher unemployment in country A compared with country B, and so on. This also suggests that there exists a model of what constitutes good versus bad, low versus high, etc.

In the sections which follow we will explore some of the elements of the framework for analysing complex situations in more depth, particularly the notion of models, and their limitations. We hope that the thread of linking data (which as you will now be aware has limitations) from model to claim will help you through the unit.

Activity 3

Examine a ‘claim’ made by a politician or manager using the framework. Could you uncover the way in which the model interacts with the data?
Of course, managers in an organization may face many such stakeholder claims, indeed potentially as many different claims as there are stakeholders. It may be impossible to satisfy them all, indeed it may be inappropriate so to do. This adds of course to the complexity of managing. There is also the significant impact of stakeholder power to face up to. As you work through this unit you should refresh your knowledge of the impact of power in inter- and intra-organizational relations from Unit 12 in B881 Strategic Management as we shall meet it again. Those ‘in power’ have an enormous capacity to shape not only events but also perceptions of events which can be sources of bias in managing.
2 A case for analysis

Later in this unit we will discuss some ways to evaluate models for aiding analysis and decision-making, but you have already acquired many such tools in your earlier studies of this and other courses. Let us practise some of these skills before adding any more.

Activity 4

Read 'Raging bull - a Taurus case study' in the Reader. Please do not at this point look at Part II of the case.
Taking the position of John Watson and the Siscot committee, produce an overall strategy for developing Taurus. Do not feel restricted to the three proposals (Taurus 1, 2 and 3) described in the case.
Together with your strategic solution make clear your reasons for it. In particular, show:
- The range of benefits offered by your solution.
- Which of the interests have you satisfied? Why did you pick those and how will you satisfy them?
- Which interests have you disappointed, and what will be done to deflect any reaction?

Activity 5

Once you have completed Activity 4, take a moment to consider how you dealt with the case in terms of:
- analysing and using information
- coping with the 'messiness' of the situation
- deciding between stakeholders.
While the case required you to plan future actions rather than to measure performance explicitly, the latter is implicit in all such project management tasks, and we should address the problem from the very start.

Activity 6

Consider how you would monitor the performance of your solution during development. How could you tell at any particular moment whether to continue or 'pull the plug?'

Activity 7

Read 'Raging bull - Part II'. Note the main reasons for the unfortunate outcome. Assuming you had been the project manager employed to implement the Siscot solution, what would you have done differently?

There are two sets of errors that should be identified separately. The first group consists of problems caused by the chosen solution and/or the planning for the project. The second group includes items identifiable as poor implementation and project control. Note that this set is our opinion rather than a definitive answer – you will have a list that intersects with ours but which is unlikely to be a precise match.
While there is much talk in what follows about ‘technology’, ‘structure’ and ‘system architecture’ the points are completely generalizable to any major project situation. All such undertakings need to consider what resources (real or intellectual) to employ, and what method of utilization is appropriate in the particular context. Since Taurus was an information technology project these considerations here take the form of engineering-type words – but the learning points are universal.

Problems with the chosen solution

1 Too complex – the combination of distributed databases, full encryption and non-standardized hardware was a real hostage to fortune. No previous project had tried to include all three elements. All large projects need to be kept as simple as their basic requirements allow – that is already as much complexity as usually can be coped with in any sensible way.

2 No clear specification – it is fundamental to any major project that its basic design and architecture is specified before work starts. Taurus did not have a complete specification when it was cancelled, let alone when it was begun!

3 Attempting to reconcile the irreconcilable – the practicalities and needs of efficient clearance pointed clearly towards a unitary solution, politics and entrenched privilege to the distributed databases. This was not strictly Siscot’s fault, being implicit in the brief set; where the committee was at fault was in accepting the parameters as set by the Bank of England and the Stock Exchange. Basically, they fudged the main issue rather than faced it. If they felt unable to confront the power groups (understandable given their relatively weak position) then they should have invoked the authority of the Old Lady of Threadneedle Street, who certainly did have the necessary positional power – if forced to use it.

4 Planning to implement the core functions last – frankly, this is unbelievable! It is like building the outer skin or windows of a skyscraper first then thinking about the structural framework. A clear indication that right from the start ‘image’ had too much importance vis-à-vis engineering integrity.

5 Basing it on old, obsolete technology – using Talisman was a very poor idea, in effect shackling a system for the 1990s with software technology designed in the 1970s. Again, bad practice: for a long-lived system one should design using technology as close to the state-of-the-art as is reconcilable with keeping to non-experimental equipment. In other words, avoid the over-ambition implied in point 1, but remember that the system will be old-fashioned soon after it is implemented anyway – it should not be a dinosaur before it is even begun.

6 Too much tailoring – the Vista system (excellent in its own right) was expected to need 70% adaptation. This was so high that it would almost certainly have been better to start from scratch. One may have to do some ‘wheel reinvention’ but this is normally outweighed by the benefit gained from being able to design a purpose-built architecture.

7 Hiring Vista on a ‘cost +’ basis – there is plenty of very plain evidence from other sources, such as the defence industry, that cost-plus contracts almost inevitably lead to significant cost-overruns. Under such contracts there is little or no incentive for the contractor to control cost.

8 The DTI claim – there was enough expert legal advice available to make it clear that caution needed to be applied when putting faith in the authorities’ claim that changing the regulations to allow dematerialization would be ‘easy’. As the changes were fundamental to Taurus fulfilling its brief, Siscot or
the Stock Exchange should have investigated further or demanded more formal commitments from government.

Implementation troubles

1. No ‘product champion’ – there was little evidence of someone taking personal responsibility for the success of the project. A project as diverse and dispersed as Taurus had an especial need for someone to look on it as his or her ‘baby’.

2. Independent teams, geographically isolated – it is possible to work in such a way but it is not optimal. It also requires a great deal of time spent on and emphasis attached to communication between the teams, and strict adherence to project discipline. None of this was evident in the Taurus project.

3. Too many alterations accepted – the project should never have taken on so many changes mid-term, and the Stock Exchange should have had the spine to protect the team from such requests.

4. Still no specification – it was bad enough not having one to start with, but continuing without one was tantamount to project suicide.

5. No independent project overseer – the equivalent of a major construction site’s quantity surveyor. In other words, someone able to take an Olympian view of progress – and willing to be rude when necessary. It is the combination of an ‘insider’ product champion and an ‘outsider’ watch-dog that usually lets projects make progress. Incidentally, Taurus demonstrated the danger of using consultants in such a role – they normally hate giving the client bad news.

Overall, the Taurus project demonstrates well one of our two themes. The influence of stakeholders was of crucial importance. Note that this is said not just because they were surrendered to: even if Siscot/Bank of England/stock Exchange had resisted the stakeholders’ remonstrations, they would still have been a key factor in the problem. (You will probably not have been able to use our ‘data/model/claim’ framework for looking at stakeholders as in this particular case (as with other teaching cases) the positions of the various interest groups or stakeholders have been pre-digested and analysed for you. It might be interesting to reflect on how you, in the John Watson role, might have evaluated some of the claims made.)

The case is less good at bringing out the issues of complexity, except in one regard: we need to distinguish between complexity of task and of situation. The latter is of most concern to our debate in this unit. Developing Taurus was most certainly a complex task, but the situation was quite straightforward – a single clear objective with definable sub-sets (e.g. dematerialization, delivery against payment, rolling settlement, etc.). Even so, the end result was not exactly a triumph. Case studies later in this unit will involve more in the way of situational complexity.

We hope you found the Taurus case both interesting and instructive, but the three key reasons for using it here are:

- To demonstrate the importance of complexity and stakeholders’ influence in strategically ‘messy’ situations.
- To reinforce the iterative and interrelated nature of decision-making and performance measurement.
- To remind ourselves that in management ‘to get there I wouldn’t start from here’ is not a useful comment – we work with the cards as they are dealt.
Later in this unit you will be asked to work through two other cases posing more complicated questions: an energy industry study and one on the operational performance of airlines. The last video will present a third. At this stage of the course we feel that, instead of us pontificating, you should practise your skills as much as possible.
3 Models

In Sections 1 and 2 we looked at two complex situations (albeit the first was described in a very compressed form) and asked you to use a model or framework of your choice for analysing it. This is one very powerful use of models. Another is to focus on the events we described as 'outcomes' and use a model, or models, to explain how they came to be. One other use of a model is as a predictor. Given one thing then something else will follow; at a crude level, if X then Y.

In your earlier studies you will have focused on models or theories which help you to describe and simplify situations, or which purport to tell you how things will be. In these studies you will have come across several such models, for example the 'Boston Matrix', Mintzberg and Waters' Deliberate-Emergent continuum to name but two. Another type of model is the paradigmatical or procedural model. The 4IA model in Unit 6 is an example of this class, where the intent is to provide a mnemonic of action steps rather than a situational map.

Quickly jot down the names of any models or frameworks that you can remember from your previous studies. Identify how they help you as either analyser, explainer or predictor of outcomes or events.

3.1 What is a model?

There are, we suppose, many definitions or meanings of what a model might be. If you check your dictionary you will probably find quite a few depending on whether you use it as a noun, a verb or an adjective. The Webster's New Collegiate, for example, has 20 definitions. At the moment let us concentrate on the more common analytical form of model (e.g. SIS) rather than the paradigmatical type (e.g. 4IA). We will take some common items out of the various definitions and take a model to be a representation of something: a pattern, an example.

But a representation of what? Kerlinger (1986, p. 167) is much more precise when he talks about the use of models in research:

 Doing research is in effect setting up models of what 'reality' is supposed to be and then testing the models against empirical data.

Thus an analytical model helps us to represent real situations in some way.

Kerlinger continues:

The trouble is that the world in which influences and variables operate is almost always complex, and scientists are always limited to aspects of this complexity. The whole 'reality' of anything is forever beyond reach. Perhaps
we can only rarely say that A is related to B in all times and all circumstances. Indeed, the variables A and B are themselves complex. We have already seen this. Intelligence, achievement, level of aspiration, social class, and political development, for example, are all complex ideas that reflect the natural complexity of the behavioral world. Now add to this individual variable complexity the additional complexity of the relations among the variables and one wonders how it is possible to study the complexity and actually advance knowledge. Indeed, in the face of these difficulties it is remarkable that science has been as successful as it has been.

(Kerlinger, 1986, p. 167)

So for Kerlinger a model 'is an abstract outline specifying hypothesized relations in a set of data'. In a footnote he does, however, point out that this definition is less than satisfactory and argues that it 'is very difficult if not impossible to define "model" satisfactorily. Yet we have to have something to go on and the above definition should work.'

These quotations should accord with much of what we said in the introduction to this unit in that the world is a complex place and the variables that we use to describe or measure it are in themselves complex. What is now emerging is that the relationships among the variables themselves are complex and the implication is that they are changing—that is, our models of 'reality' are at best imperfect and therefore transitory. As Popper (1972) has argued, it only needs one case which does not fit for a theory (model) to have to be developed and changed.

3.2 What kinds of models do we use?

In B881 Unit 8 you met Allison's (1971) incisive analysis of the Cuban Missile Crisis which took place in October 1962. This was the first time that the world was led to the brink of a probable nuclear war and its impact loomed large in the eyes of those who experienced those events.

Allison's analysis looked at the decisions that the Government of the United States made in response to the placement by the Soviet Union of strategic nuclear missiles in Cuba. To do this he used three 'conceptual lenses' or models to explain the policy outcomes. He was interested in the power of models to do this. He was seeking an explanation of why an outcome occurred.

_In pursuing the answers to these questions, the serious analyst seeks to discover why one specific state of the world came about—rather than some other._

(Allison, 1971, p. 3)

He goes on (p. 4):

_In thinking about problems of foreign affairs, professional analysts as well as ordinary laymen proceed in a straightforward, informal, non theoretical fashion. Careful examination of explanations of events like the Soviet installation of missiles in Cuba, however, reveals a more complex theoretical substructure. Explanations by particular analysts show regular and predictable characteristics, which reflect unrecognized assumptions about the character of puzzles, the categories in which problems should be considered, the types of evidence that are relevant, and the determinants of occurrences. The first proposition is that bundles of such related assumptions constitute basic frames of reference or conceptual models in terms of which analysts and ordinary laymen ask and answer the questions: What happened? Why did it happen? What will happen?
Of course, many managers have models which are totally uninformed by theories of strategic management, motivation or whatever as they are taught in business schools and textbooks. Managers and indeed all of us, however, require and do have models of the world; Argyris and Schön (1974) call them ‘theories in use’ and quite a significant amount of empirical research has been and is being done to uncover them (Bowman and Johnson, 1992; Calori et al., 1992). Work is also proceeding to uncover how managers use more ‘theoretical’ formulations in the practice of making sense of events (McKevitt et al., 1992).

There undoubtedly is what Allison calls a ‘complex theoretical substructure’ to these models.

For Allison (1971, pp. 4–5) most analysts:

... attempt to understand happenings in foreign affairs as the more or less purposive acts of unified national governments. Laymen personify rational actors and speak of their aims and choices.

Some of us think that we can ‘second-guess’ the manager of the national football side and pick a better team. Each of us has ‘theories’, whether explicit or implicit, on which their selections were based. This is the logic of the ‘rational actor’. Decision-making theories based on this assume a unitary rational actor.

What happens if more than one actor is involved and that actor represents or is a specific interest group (or stakeholder)? Such a widening introduces two more frames of reference.

First, that acts and choices can be seen as outputs of organizations (or sub-units of organizations). Organizations have procedures and repertoires of behaviours which produce solutions to problems in their own terms, or – using the idea of the ‘storage shelf’ – have solutions ready for problems which may or may not yet exist. An analogous example: in much the same way, commercial as opposed to governmental electronic data processing (DP) was a solution that did not have a problem. So the DP managers went looking for a problem that they could solve, that is one that required lots of regular volume data processing and management information outputs. They invariably came up with the same answer as well: mechanize the payroll system, sales and purchase ledgers, etc.

In the Cuban Missile Crisis it was possible to view the policy options in just that light. The options initially considered ranged from diplomacy (State department), to naval blockade (the Navy). The choice hinged on what could actually be done and was quickly narrowed down to two: a ‘surgical air strike’ and the naval blockade. According to Allison’s analysis:

The choice of the blockade instead of the air strike turned on two points: (1) the argument from both morality and tradition that the United States could not perpetrate a ‘Pearl Harbour in reverse’; (2) the belief that a ‘surgical’ air strike was impossible.

(Allison, 1971, pp. 123–124)

According to this interpretation it was a factual question of capabilities. Could the solution do the job? We will return to issues about morality and feelings soon.

Activity 9

Think of a situation within your own organization in which choices are based on the outputs of units or interest groups. How was the decision finally made?
The second frame of reference is the last model that Allison used to analyse the final choice – the bureaucratic politics model:

*The leaders who sit on top of organizations are not a monolithic group. Rather, each individual in this group is, in his own right, a player in a central competitive game. The name of the game is politics: bargaining along regularized circuits among players positioned hierarchically within the government.*

(Allison, 1971, p. 144)

Policy can then be seen as a result of bargaining games. This model 'sees no unitary actor but rather many actors as players'; Allison continues (p. 144) ‘... players who act in terms of no consistent set of strategic objectives but rather according to various conceptions of national, organizational and personal goals; players who make government decisions not by a single, rational choice but by the pulling and hauling that is politics'.

This then sets us with the problem of which model(s) to use. Some studies of decision making have combined the rational, almost technical, problem-solving approach with the realization that there is scope for organizational preferences and political behaviour to impact on outcomes (Hickson et al., 1986). Indeed, the decision-making framework in Unit 2 integrates these to some extent.

So there is more than one way of looking at the world and, as someone remarked, 'The problem with perspective is that it depends on where you are looking from.'

Let us now look at some examples and begin to explore the limitations of models, for there are many situations where bad theory (or model) is better than no theory if it helps you to come to terms with the problem (an adaptation of an idea of the US economist Milton Friedman). The theory that the Earth was flat was sufficient for most people for most of history; regarding the world as a ball was only important once travel over large distances became significant. There is an analogy in decision making: it is an old military training point that 'a good officer always makes a decision. Only a great officer always makes the right one.' Working with imperfect information and/or theory is better than 'going catatonic' until conditions are perfect. But when using imperfect and/or incomplete theories and models it is crucial that one is aware of the power and limitations that they have. In accounting, the idea is epitomized by 'relevant range', where complex cost relationships are modelled by linear ones within a span of activity levels where the approximation is reasonable. We will return to this idea shortly.

We will start with some very simple ideas and models: navigation and break-even analysis. The former provides a broad, generic illustration, the latter a specific business operations example.

One way of thinking about managing is as a problem in navigation. How to get from A to B avoiding shoals, rocks, taking account of the weather, tides – that is, of different states of the world. Part of the process of navigating involves the navigator monitoring course, speed, conditions, etc. and making any necessary adjustments.

In parallel, let us also consider a fairly straightforward management problem: looking at the costs and benefits of producing or providing goods and services – the simple cost volume profit ('CVP') analysis (and its sub-set, break-even analysis) which you will have met in your earlier studies.
Activity 10

List the five factors that are taken into account in CVP analysis.

Comment

The five factors are:
1. Variable cost per unit
2. Total fixed cost
3. Level of output or volume
4. Price of product sold
5. Mix of product sold

Taking our first problem of navigating a boat or ship, you can use several techniques depending on what you are, where you are and when you are there, even though they are all based on the same principle.

Navigating a large bulk carrier out of a crowded harbour can be a very difficult operation compared with making your way around the same port in a 12-foot sailing dinghy. The pilot of the carrier will be more constrained by depth of water (and hence the state of the tide) and will take lots of compass bearings to fix the position accurately. Moreover, this will be done very frequently. In contrast, our dinghy skipper will probably have only a rough idea of where salient marks (buoys, landmarks, etc.) are and will need to have only a rough estimate of the position of the boat vis-à-vis these at any one point in time, and a general view of the state of the tide. On the other hand, the importance of position might suddenly become more vital to the dinghy than to the carrier if the latter were steaming apace straight for the former!

Transfer the scenario offshore, out of sight of land and the techniques used for piloting in a crowded anchorage near land will not be of any use to the bulk carrier skipper (nor the dinghy skipper who ventures offshore). The state of the tide does not matter much nor are there landmarks available for fixing position. There are, however, the planets, stars, sun and increasingly satellites which can be used to fix position with a fair to excellent degree of accuracy. Moreover, the position will only be fixed and any change made to the course at infrequent intervals.

What is the message from this analogy?

The techniques appropriate for a particular situation need to be chosen such that it becomes manageable but without involving excessive resource usage. Indeed, sometimes too much information can be damaging. Continuing our in-shore navigation analogy, a dinghy sailor constantly checking a hand-held global positioning receiver might not notice that the ‘fix’ was not only accurate to 10 metres but also placed the boat 500 metres in front of a bulk carrier travelling at eight knots. Claiming sail’s right of way over power would be a poor way of managing the crisis ...
Techniques, while sharing basic principles, can invoke different applications. It is an important management skill to be able to pick the optimum one, and to understand how to use it. Taking satellite fixes to navigate in a crowded waterway might just be accurate enough but would be like using a sledgehammer to crack walnuts. Vice versa, trying to fix the position by the sun or stars with a compass and sextant would be an interesting exercise perhaps but not very productive. For both the ship and the dinghy the most appropriate method would be simple direct observation, probably combined with, for the large vessel, watching the radar.

The last example brings out another point that should be borne in mind when choosing an appropriate technique. The satellite system gives a supremely accurate position; looking out the window gives an answer considerably less precise but it confers other information too. Such as whether or not other blithering idiots are on a collision course. In general, the scope of information can be as important as the level of detail.

What lessons can we apply to CVP modelling?

CVP, like navigating, represents an attitude towards thinking rather than being a set of techniques which will always apply and give in every set of circumstances a 'correct' answer to a problem state.

Indeed, there are states in which it may not hold. This is basically the proposition that underpinning most models are sets of assumptions which set limits to the use of the model.

The assumptions underlying the CVP model are:

1. extraneous variables remain constant
2. profits are calculated on a marginal cost basis
3. linearity
4. analysis is within the relevant range
5. constant sales mix or single product.

Let us look at each of these in turn.

**Extraneous variables**

As with many other forms of investigation, CVP analysis assumes that everything, apart from the main variables addressed directly by the system, remains the same over the whole range and time of analysis. If conditions – or relationships between variables – change the previous results are no longer meaningful and recalculation for the new situation is required. This may be inconvenient but is not necessarily a problem provided the change in conditions is noticed. All too often extraneous changes are not spotted even though they have a material bearing on the analysis at hand.

**Marginal costing basis**

If absorption costing methods are used, the whole CVP system is inappropriate. An analytical framework is only usable where the measuring systems and causal models available match the requirements of the framework. For CVP, a marginal costing system must be the relationship between revenue, expenditure and profit. Other systems such as absorption costing are perfectly reasonable but are unhelpful in the context of CVP analysis. It is important to match the horse to the course.
Linearity

This is an example of a simplifying assumption. Most costs and revenues actually vary in a complicated manner with volume. For example, as production increases, wastage may be roughly constant until one reaches 95% of a machine's capacity, but then it increases faster and faster as the tool reaches its operating limit. Multiply that by 500 different machines all at different load factors, and the true cost function is unlikely to be a nice, neat straight line. However, if the 'wobbles' are not too extreme it may well be a perfectly reasonable approximation to treat such a cost function as if it were described by a simple \((ax + b)\) formula. One is trading off accuracy for computational ease, and provided one is aware of the situation one can make due allowance when reading the results. Note that this is not a fundamental assumption (which the preceding one was) but one made solely for convenience; with modern computers, calculating break-even with non-linear formulae is not particularly difficult provided one can describe the non-linear relationship in the first place. It is interesting to note that this assumption was originally included, pre-computers, to make the method computationally feasible but is usually still kept for a different reason: it makes the problem definition practical.

Relevant range

In a way this is an extension of the linearity assumption. If one is using approximations to model real-world causal relationships one must be very careful not to stray beyond the area in which the errors of such approximation remain within acceptable limits. Note that if one was using a full and accurate description of the way variables change with volume, one would not need to impose restrictions such as relevant range. The key here from a managerial point of view is that it is extremely important to know the limits as well as the accuracy of one's chosen model. By business standards, accounting models are quite rigorous, yet as we see with CVP analysis even they must be applied only within severely bounded ranges of applicability — and it is the responsibility of both the provider and the user to ensure that those limits are made apparent.

Constant sales mix

A cousin of both the 'extraneous variables' and 'linearity' assumptions, a change in the sales mix is akin to a change in the underlying conditions — like the 'extraneous' situation — but it may be predictable and so could be allowed for in a more complete description of the cost/volume and revenue/volume relationships. So, like 'linearity', it is a simplifying assumption included for practical rather than inherent reasons.

So what does this tell us in more generic terms about model assumptions? First, such assumptions can be subdivided into those that are inherent to the situation and those that are imposed for reasons of model practicality. The former would be referred to in mathematics as axiomatic — they cannot be relaxed without fundamentally altering the model. The latter are, in a sense, 'negotiable', trading off accuracy against convenience and usability. It is important to recognize the distinction, particularly when trying to modify or improve a particular model.

Break-even analysis is a very useful model and gives very helpful information, provided one pays due attention to the limitations. But it can also send misleading signals if used without care. An example is shown by the following activity.
Activity 11

A product has a break-even level of 10,000 units. Would an order for 1,000 units be most valuable if the present tally of sales was:

(a) 7,500 units
(b) 9,500 units
(c) 11,500 units?

Comment

All three are equally valuable, giving exactly the same contribution. Nevertheless, most people choose (initially, at least) 9,500 as the new order pushes sales above 'break-even'.

3.3 Problems with models and modelling

Models are usually based on assumptions which constrain the power of the model to explain and/or predict events or outcomes. It is important therefore not only to uncover the model but also to look at the assumptions that underpin it, and thus make them explicit as they may be valid only in a certain context at a certain point in time.

Models can be based on interrelationships between variables or concepts which may change over time. Moreover, these changes may occur at different rates starting from different initial states. (For example, see Roger Hall's (1976) paper on 'The rise and fall of the old Saturday Evening Post'.)

Models can constrain thinking. In Unit 9 of B881, Gerry Johnson (1988) describes how managers' models of the world or their interpretation or operationalization of the paradigm may cause signals to be missed, misinterpreted and/or ignored. This can of course happen for a variety of reasons, not the least being the bias that is introduced from their 'habitual domain' of thinking. They may also risk or cause escalated commitment to solutions which are just not working (compare with the Raging Bull case study.)

Models, like any theory, may be only transitory. They provide us with powerful tools for understanding data but the explanations they engender may only be partial and temporary.
4 Messy problem situations and transitory solutions

At the end of Unit 2, Figure 13 depicted a simplified form of the contingency framework of decision making and concluded by hedging its bets somewhat with the following statement.

*We do not claim that there are any tidy solutions that can remove ambiguity and uncertainty from your managerial lives but we are sure that the knowledge and application of a rich variety of systematic frameworks can improve organizational performance.*

(Unit 2, p. 39)

Was our initial faith misplaced? As we have seen throughout the course, ambiguity and uncertainty are invariably present in organizations (and perhaps our personal lives too). Yet, despite this, managers both singly and in the collective do make choices about how to close the gaps between existing and desired states. A lot of what you will have done so far deals with defining the existing and desired states in terms of both the broad objectives to be achieved (desired state) and progress towards that via performance indicators (existing state). At each stage there are difficulties but perhaps none more so than when generating and choosing from among a set of options to close that gap. Managers do make choices, they exercise judgements and in this section we will reflect more on what that means. They can also employ a whole range of strategies for dealing with ambiguity, so for example they may try to decompose problems into small solvable parts. We will review some of these techniques in depth.

Solutions presuppose the existence of a problem or, as we might say, an opportunity. As we said above, the problems we are talking about exist when there is a gap between an existing state and some desired state. If we monitor our own performance on TMAs and decide that there is a gap between that and our desired goal—which might be to obtain a distinction—then we have to generate some options for closing the gap, and then choose that or even those which we judge will be the most effective. As you may remember, 'effectiveness' is a difficult concept to deal with and we must make trade-offs between the effort needed to reach the goal and the pay-off (utility) we will get from achieving it. In a sense managers must continually perform cost-benefit analyses, on a small or large scale depending on the situation.

Attempts to define the various states and options result in greater or lesser clarity, and thus the problem—the gap—'chains' with existing and desired states. Application of SIS and other methodologies may help you sort out these issues but there is still the potential for ambiguity and uncertainty.

Inseparable from the activity of decision making is judgement. We, as the Reader article by Hogarth suggests, are called upon to make judgements and choices every day of our lives. You as managers make choices which you may call judgements. You may have 'hunches', 'intuitions', etc. How do you do this? It is now time for us to explore the nature of the concept of judgement in more depth.

**Activity 12**

Please read the chapter from Hogarth's book on judgement, 'The nature of human judgement', in the Reader.

How does his analysis extend our thinking about decision making?
Comment

Hogarth uses and examines what should now be a familiar portrait or metaphor of decision makers coming to terms with limited information-processing capacity. He says that this has four major consequences.

1. That our perceptions of events and situations is selective and that ‘anticipations’ or our models of the world (‘habitual domains’) play a large part in what we actually do see. He goes on to suggest that when we are confronted with too much information we add even more in order to make sense of the latter – an interesting paradox but one that we should be familiar with as we apply our models and frameworks to attempt to understand a complex or difficult situation.

2. Integration of information is difficult and we tend to process in a sequential manner. Hogarth suggests that this is normally not as serious as it first seems. It is only when there are serious discontinuities that this really becomes a problem. This indeed may be so if our mental maps are fairly accurate, but if they are not it may lead to the kind of pathologies which cause system failure.

3. People tend to use simple rules of thumb rather than exhaustive calculations as a base for making judgements. These rules, of course, stemming as they do from experience of previous choices or from a desire to simplify, may also lead the decision maker into traps.

4. We have limited memory capacity and, again, we tend to use associations to reconstruct past events.

Two prescriptions that emerge from this brief review of Hogarth’s initial thoughts are that:

1. Intention is no longer (even if it ever was) an adequate basis for judgement.
2. As a consequence we should critically examine our judgemental processes in a given context or problem state.

One could now propose that, if it is our limited capacity to process data that inhibits our dealing with complex problems, then surely, with advances in IT, the advent of expert systems and the ready availability of this ‘processing power’, choices and judgements will become ‘better’.

Activity 13

Quickly evaluate this proposition.

Comment

There have indeed been significant advances in processing capability and in the software to support decision makers.

For example, the ability of the computer to cope with complex spreadsheet models has had significant impacts on the ways in which we work. As one-time students of capital budgeting, one of the authors had to work through a capital budgeting model and make changes and corrections with a pencil and calculator. This did not improve the learning process. The other author experienced the power of spreadsheets without the pain of ‘writer’s cramp’ and could concentrate more on the initial and varying models of the budget rather than on the grind of generating them. On the other hand, the latter author had to learn the skills of ‘spreadsheeting’ before any work could be done.
Other innovations such as the ready availability of packages to perform the long and complex calculations involved in multivariate statistics have transformed the way in which complex systems can be modelled. Similarly, the dynamic modeling of systems, for example, can be accomplished faster and they are more user-friendly. Also there are now many expert systems applications or application development tools which are available to support decision making.

Despite – and maybe even because of – the existence of such aids (compare with Hogarth's Reader article), decision making still involves us, as individuals or in the collective, in making choices. There are techniques for mapping our states of the world, but we still have to articulate and interpret them. We still have to recognize the existence of problems. In short, we may have to cope with more and not less uncertainty and ambiguity.

How can we do this?

In an extensive review of the then extant literature on decision making, McCrimmon and Taylor (1976) identified and summarized more than 70 strategies which are available to decision makers who operate in uncertain, complex and conflictive situations.

We do not propose to go through these one by one or make you read the original paper of some 56 pages. Instead we will bundle the strategies into seven categories and give illustrative examples of each.

Let us first look briefly at the distinction that McCrimmon and Taylor draw between uncertainty, complexity and conflict.

Uncertainty occurs when a decision maker is faced with one or more of the following:
(a) Does not know which of the events that affect outcomes will occur.
(b) Does not know the causal linkages in the situation.
(c) Has little or no control over the situation.
(d) Is operating in an unstable situation.

Complexity occurs when:
(a) There are a lot of highly interconnected factors (variables) to be considered.
(b) They are different.
(c) They are probably abstract rather than concrete in nature.

Conflict results from (or with) multi-person situations in which interactions are necessary, including:
(a) different goals
(b) preferred outcomes.

We have met these three concepts before in this and the first block. We have tended to conflate uncertainty and complexity and called it either uncertainty or ambiguity. We have also accounted for conflict by pointing up the additional source of complexity inherent in an organizational context which provides the potential for conflicts to occur. Thus we do not propose to decompose the strategies that McCrimmon and Taylor identify into those three headings, unless the strategy only applies in, say, a situation that involves complexity.

Table 1 (overleaf) links the seven classes of strategy with contexts for their use, and a description of strategies follows.
1 Perception

The strategies referred to here do not actually reduce uncertainty or complexity by providing more complete information, what they do is reduce the **perception** of uncertainty, etc.

The most straightforward way to reduce perception of uncertainty is simply to ignore it, or to act as if things are certain. An example would be to act as though things such as interest rates or competitors' pricing strategies will be the same as they have been in the past. This is not as silly as it first sounds. Do things often change dramatically? Consider financial 'shocks'. Yes, sometimes interest rates are raised dramatically. On the other hand, the changes that occurred just prior to sterling being pulled out of the EMS in 1992 were, if not predictable, then at least to some extent expected and close monitoring would not have made that much difference to any forecast. The precise actions were not predictable, but the overall effect was – witness the huge profits made by those who saw ‘the writing on the wall’.

One could also simply delay a decision and wait for the uncertainty to resolve itself.

Another strategy which stems from the work of Cyert and March (1963) involves ‘local search’ – seeking solutions which are close to the existing state, moving incrementally towards a desired state. This reduces the number and diversity of options or alternatives to be considered, and is therefore a simplifying procedure.

2 Models

We have already discussed at some length in a previous section some of the issues in modelling situations. In doing this in complex or uncertain situations, decision makers may encounter some difficulties. First, making projections from the patterns of relationships amongst variables. For this, decision makers can and do use time series data. As McCrimmon and Taylor (1976) suggest, there are a variety of techniques for doing this which require careful use. They suggest that while they are useful for short-term forecasts, they are poor for reducing uncertainty in the long run. Again, we would re- emphasise the caveats that apply to the use of models.

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Table 1  Classes of strategy

<table>
<thead>
<tr>
<th>Class of strategy</th>
<th>Applicability</th>
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<tbody>
<tr>
<td>Perception</td>
<td>All</td>
</tr>
<tr>
<td>Models</td>
<td>All</td>
</tr>
<tr>
<td>Alternatives</td>
<td>All</td>
</tr>
<tr>
<td>Information processing</td>
<td>All</td>
</tr>
<tr>
<td>Adverse consequences</td>
<td>Complexity and uncertainty</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Complexity</td>
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<tr>
<td>Aggregating preferences</td>
<td>Conflict and complexity</td>
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Another strategy is to decompose the problem into 'solvable' bits or sub-problems. But again, one must be aware of the linkages or interdependencies amongst the bits. This could invalidate this strategy as it might add to, rather than reduce, uncertainty.

3 Alternatives

This class deals with strategies for developing appropriate alternatives. Sometimes they also need to be 'creative', which means that they are relevant and practical but also at first sight somewhat improbable. The techniques here are probably very familiar to most of you; brainstorming is perhaps one of the most well known, straightforward and recognizable. Others which you may have met include synectics, simulation using morphology for relating combinations of factors, and so on. McCrimmon and Taylor (1976, p. 1416) give a good example:

The morphological approach requires the decision maker to first identify the key dimensions of the solution. For example, if the problem involved developing an innovative program for recruiting college graduates, the decision maker may elect to examine all possible combinations of such elements as characteristics of potential recruits (e.g., degree level, degree program), recruiting media (advertising, visits to campus), assessment techniques (face-to-face interview, videotaped interview), interviewer (personnel department representative, recent hire), and interview location (in plant, on campus, both). For each of these dimensions, it is necessary to identify values, which are then taken in all possible combinations. In this case, one alternative may be to develop a college recruitment system which is focused on MBAs and involves videotaped on-campus interviews conducted by a personnel department representative and viewed in the plant by the operating manager.

Even when using only a few attributes a very large number of combinations arise. Working through these means that there is little likelihood of neglecting an important element.

Bargaining can also be seen as a way of reducing the uncertainties caused by conflict, initially by the use of modelling. Gaining and projecting knowledge of others' positions, their preferences and constraints are precursors to and the outcome of the bargaining process.

4 Information processing

We have already introduced some of the issues and strategies that come into this class. Included here are:

- Grouping data into categories or 'chunks'.
- The use of metaphor to give and communicate meaning — perhaps another good example.
- Aggregating data — for example, the use of total sales rather than sales by area. Caution is advised here as aggregation must be done at an appropriate level because it may prove difficult to disaggregate data.

Decision makers could also reduce the amount of data by processing only that which is valid and/or reliable. In practice though this may take some time to work out and may involve trial and error iterations, by asking such questions as
‘How reliable has a source been in the past?’. However, this could also induce bias if ‘new’ sources are not evaluated with the ‘old’.

It is also worth reviewing the nature of communication channels under this heading. As McCrimmon and Taylor (1976) point out: ‘Effective decision making by groups clearly depends upon accurate and efficient exchange of information among group members’. They go on to suggest that ‘research findings have seriously challenged the standard assumption ... “that communication channels are most efficient when structured as in hierarchy”’. There have been many studies of different communication structures: the wheel, the chain, the circle, and so on. However, evidence does suggest that, for complex tasks, decentralized networks are more efficient. This latter strategy also suggests first allowing participation, while seeming to increase complexity and the potential for conflict may in fact reduce it. Clearly also the extent and nature of participation varies with the urgency of the situation, the resources available to solve it and the need to gain acceptance of a decision.

5 Adverse consequences

Trying to change adverse consequences by reducing the risk of loss or increasing the probability of gain lies at the heart of this approach to reducing uncertainty. In making investments, for example, you are probably aware of the power of diversification for minimizing the market risk of a portfolio of investments. But note that it cannot eliminate all possible risks. At a different level, when companies hire employees with a wide range of skills or competences, they are using diversification to deal with any possible shifts in the need for those skills.

Another version of this is avoidance of catastrophic outcomes. Sometimes one must forgo a possible plan of action if it might lead to an outcome that has a low probability of occurring but which cannot be allowed to happen under any circumstances. To paraphrase the plot of a Roald Dahl story, one might bet £1,000 for a 50/50 chance of winning a new car—but probably not the little finger of one’s left hand. The potential gain is attractive, but the possible loss is not bearable.

Uncertainty may also be transferred or reduced through contractual agreement (Cyert and March, 1963). Uncertainty about short-term fluctuations in prices may be reduced by signing longer-term contracts with suppliers. If we are dealing in commodities, futures and options can serve a similar purpose. However, as there is no such thing as ‘a free lunch’, arrangements of this nature do carry a cost.

6 Diagnosis

Decision makers may be confronted with many dimensions of a problem. There may be many different gaps between performance and desired states, and there may be many interconnections between them. Again, limited capacity to process leads to a strategy of sequential attention: the setting of priorities. This involves deciding on what are the crucial activities. This may cause one to focus on threats rather than on opportunities; to fight fires rather than ask ‘Do we have to fight this time?’. Another strategy is to look for causes rather than at symptoms. For example, look for any changes that occurred to cause, say, low morale rather than putting into place programmes to raise it.
Another suggestion is to focus on the factors that you can actually control or do something about – a strategy that McCrimmon and Taylor call ‘Work forward and work back’. This strategy is a way of finding what mechanisms will reduce the performance gap:

*A basic strategy for approaching a problem involves direction of search. ... the decision maker may work (forward) from the existing state to see how it might be transformed into the desired state, or he may work (back) from the desired state to see if he can develop a means for arriving at the existing state ...*

(McCrimmon and Taylor, 1976, p. 1418)

7 Aggregating preferences

Strategies falling into this class also involve a form of modelling. An example comes from personnel selection. For a simple linear model we can treat the ratings of hireability of the candidates as a dependent variable and the factors describing a candidate as the independents. This can become a useful screening device as it highlights those factors which most successfully discriminate a successful candidate. Or one could ask a decision maker to do the weighting for you – which factor do they believe best discriminates?

One prestigious UK business school selects undergraduate students purely on the basis of actual or predicted ‘A’ level grades. Repeated trials indicated that this was the best predictor of degree class obtained and hence success. Other British business schools attach similar ratings to GMAT and other test scores.

In a related fashion, decision makers can also set out finite constraints to limit or screen out alternatives or solutions. Examples would be a GMAT score of at least 500 for a graduate student; an IRR of, say, 15% for an investment, and so on.

Summary

We began this unit with ideas of situations being complex and uncertain and problems being messy and difficult. In this section we have described some techniques or strategies that have been identified in theory and practice as being ways of coping with or managing such situations. As situations change, models of the world change and solutions become transitory. As we gain more data, or as we can better utilize the data that we have, solutions may change. This sounds like an argument for an incrementalist or a trial and error approach to decision making or even managing and indeed this is probably a ‘safe’ strategy. It involves the recognition that mistakes or errors have been made. Maybe you can see why in some cases this recognition is suppressed. As we suggested earlier, suppression may lead to the very real risk that escalation of commitment will occur as managers cling to ‘their’ solution despite evidence that it is failing. Two reasons are usually advanced for this. First that managers block or distort negative information due to personal involvement. They simply hang on, refusing to pull the plug, hoping that things will come right, that they can turn a situation around. The danger is that they commit even more resources to these kinds of projects. In this are they making judgements on intentions rather than data (compare with Hogarth’s Reader article)?
The second reason for maintaining or escalating commitment has something to do with a culture (either organizational or national) that values consistency and persistence. If consistent managers are considered to be better leaders, etc., then there is a very real danger that escalation will occur.

Is it better to admit a mistake and learn, or to hold on regardless?

Activity 13

Before tackling the case study in the next section, review the material and ideas presented so far in this unit. How could you improve upon your own and your organization's decision-making processes?
5 Assessing the case for renewable energy

It is time to make use of some of the ideas from the preceding sections – and from the earlier units – on another case study. You should by now be aware of some of the theoretical and methodological issues that underpin performance measurement and decision making. You have worked through some fairly complex cases and had the issues surrounding performance measurement elaborated and explained with reference to specific functional areas such as marketing, HR and operations. You will have looked at the issues and problems posed by specific contexts such as health care and education. You will also have been made aware of the problems of measuring and managing quality and environmental impacts.

As we said in the introduction, we return to a more general approach and attempt to provide you with tools that are not context-specific and are powerful enough to transport across functions, organizations and – we feel – even cultures. Bear this in mind when analysing the next case study, and look out for any opportunities to draw general points of note from the specific examples of the energy industry. By now you should realize that such extrapolation is seldom going to be perfect, but usefulness does not rely on perfection.

Activity 14

Read carefully the renewable energy case prepared by our colleague Dave Elliott in the Faculty of Technology. It is the article 'The UK renewable energy R&D programme' in the Reader. Try to answer the following questions.

1. What was the outcome?
2. The case commentary mentions bias. Did you spot any? If so, what was the bias, what was the source and how was it expressed?
3. How did you arrive at the answer to question 2? This is not a trivial question as it is asking you to explore the way in which you made sense of the data.

Did you use an idea, a model or a framework? If so which one(s) and where did you get it (them) from? Essentially, you may have found that we framed your answer by the questions we posed. Perhaps in general how you set up a question in some way determines the answer. To cast this into decision-making terms: does defining the criteria or measures which one uses determine the outcome? Is this a form of bias?

If so, having biased you one way let us follow through and suggest an answer to our question.

One model that might be used is that of Toulmin from Section 1. The claim or conclusion reached by the investigators here was definitely constrained by the parameters set in the original brief. Note that this is not necessarily a criticism of those parameters – one must always work to and within specified limits, as we discussed in Section 3 in the CVP context – but there is a fine line between providing enough guidance to ensure meaningful answers and so corolling the problem that the results are preordained. The latter may be politically expedient (with a small or large 'p') but it is not managerially sound. If one will accept only one outcome, resources spent on investigation are only of public relations benefit.
However, we chose to use a 'stakeholders' model to look at the case and its outcome. The intention with this would be to identify the various stakeholders, figure out the nature of their interest and map how they relate to one another. Could one also make some hypotheses about who had the power to bias the outcome? We suggest the following.

- All Party Select Committee on Energy. Their role is one of scrutiny, asking questions to ensure that the Department acts in the interest of the country.
- Department of Energy – this began by wanting a review of alternative energy sources and then switched to a more economic focus after the election of the Conservative government, which called for reduced R&D expenditure. It thus is an implementer of policy?

It has within it the:
- Energy Technology Support Unit (ETSU), based at Harwell, responsible for the strategic review.
- Chief Scientist-Adviser to the Department who also chairs ACORD, a government advisory committee on R&D. It is debatable whether or not this is an interest group or a forum or an arena where interests can interact. Membership of this group consists of representatives from nationalized industries, the UK Atomic Energy Authority, the Science and Engineering Research Council, plus an unknown number of ‘independent’ members appointed by the Secretary of State.
- The project teams – all doubtless pushing their own ‘solutions’.

Who then had the power to induce bias into the system?

The most immediately obvious is the Secretary of State who is initially responsible for giving policy guidelines to the Department of Energy. If the Department is responsible for the implementation of a policy then it will ‘recommend’ options to the minister which will or should act to ensure achievement of the minister’s objectives. In this case we would include such actions as nominating people to ACORD, setting overall parameters by which the projects are judged, and so on. We will explore the detail of these later in this unit.

ETSU, being responsible for the review, needs input from the department but also mediates the output from the project teams to ACORD. Again, there would appear to be biases caused by this relationship – the case narrative indicates some thought that the unit being based at Harwell would favour the nuclear option.

There was also an ad hoc group set up by the Department with ‘an even wider representation’ which reported directly.

Bias can also be introduced by what one leaves out or ignores. In this situation it seems very clear that the groups considering renewables refrained from considering the case using the same sorts of criteria as were applied to nuclear research, either as it was conducted at the time or by which it was judged when it was also a fledgling technology. This is not a direct criticism of the expenditure on fusion research but of the suspicion of ‘double standards’. These types of investigation are impoverished if they consider only absolute measures or only relative ones – both are invariably needed, and taken together give better information than either (one might even dare to say that the two types of measure were synergistic ...).

This analysis highlights one important facet of decision making – that there is invariably a political dimension. Writers from fields such as organization studies (Hickson et al., 1986) and political science (Bacharach and Baratz, 1962) have
described the impact of political activity on decision making. The contingency framework of decision making presented in Unit 2 suggests that conflict and bargaining occur more when there is low consensus over objectives even though there may be certainty over consequences. This conflict and bargaining is the expression or manifestation of political action in decision making.

**Activity 15**

Where in the framework would you place this decision now?

In this unit, then, we will look at the consequences of there being high ambiguity. At the moment it appears that it increases the potential for 'political' activity.

What is the purpose of this political activity? In Unit 2 a quotation from Jim March suggested that decision making 'presumes an ordering of the confusions of life'. Could political action be seen as one way of accomplishing this?

**Activity 16**

Look again at the renewable energy case study and extract examples of 'political actions'. What purpose do they serve? Is it to shift the outcome in some explicit or implicit direction or is it to reduce ambiguity? Excluding the ETSU project team managers from the ACORD meeting is an example.

So why is ambiguity a source of potential conflict? At one level, if events or data are subject to different interpretation and/or if consequences cannot be accurately predicted then there exists a potential for alternative interpretation, explanation and therefore prediction.

Given that economic activity generates data, why are there different interpretations of the consequences which in turn lead to different macro-economic policy recommendations? Why do the economic predictions of the Treasury differ from those of the London Business School or Cambridge? Why would the policy options generated by a monetarist differ from those of a Keynesian?

The answer is at one level simple, in that it depends on the model of events and the initial conditions that each uses to inform its explanation, etc. What is not so easy is to say what the model is, where it came from - or how realistic a representation it is of the real environment.

One final point to consider regarding this case study. The impression is that the recommendations made were based on the conclusion that the most likely outcome for deep-sea wave power was that it would be uneconomic. But this sort of 'blue sky' research is not well suited to 'best guess' analysis; the end results are just too unpredictable. Given the relatively modest sums involved, one needs instead to take a sensitivity and scenario viewpoint. While the most likely outcome - as one predicts it at this early stage - may be not cost-effective, perhaps there is a low but finite probability of the technology becoming an unbelievable success - and with UK Limited owning the basic patents. In financial analysis terms the correct measure is not the NPV associated with the most likely outcome but the sum of all possible NPV outcomes, weighted by their probabilities of occurrence. With such a criterion it is our opinion, admittedly made with a mere fraction of the data available to the committees, that the money needed to keep going with research on deep-sea possibilities could well have been justified.
6 Measuring strategic performance and success

Measuring the success of an organization can be a tricky operation. We have already talked about effectiveness and the achievement of goals. At one level we can think about the profit or surpluses generated as being a good indicator of success, but should ask how this translates across the various sectors of the economy. Do not-for-profit (NFP) or public service organizations have different measures? We also discussed some of the limitations of accounting and/or financial measures in Unit 6. However these measures are based, they can be imperfect or deficient in several important respects. We will discuss some of these in relation to measuring strategic success. We will also look at market measures in terms of both hard numbers and how satisfied stakeholders are. Finally we will look at some alternative, multivariate measures of performance - performance profiles.

The main thrust of discussion in this section is for you to read and reflect on articles in the Reader which consider various ways of measuring strategic performance and thus success.

Activity 17
Think back to your earlier studies of accounting and, if necessary, quickly look back through Section 2 of Unit 6. Reflect on the ways in which 'conventional' accounting measures of performance may produce a distorted picture of performance.

One crucial issue is that accounting-based measures reflect only history and not potential. Another view is that they purport to measure performance for a very specific group of stakeholders - the shareholders. This has implications for the ways in which they are designed and puts important limits on use. Few people would regard organizations' published audited reports alone as sufficient data from which to produce comprehensive and meaningful measurements of strategic performance.

In the introduction to the Reader article on measuring strategic performance, Balaji Chakravarthy argues that, while the topic has been discussed and written about, there really appears to be little agreement on how it should be measured and even whether it should be measured at all. The author does make the point, however, 'that without a performance referent managers cannot objectively or consistently evaluate the quality of their strategic decisions' - the decisions they make to close the gaps between intent and actuality.

Activity 18
Why would your organization want to measure its strategic performance? How would you set about doing it now? Reflect on this using the material presented so far in the course. (This activity provides a useful opportunity to clarify your thoughts about strategic performance, for TMA 04.)

Activity 19
At this point please read the article 'Measuring strategic performance' by Balaji Chakravarthy in the Reader. You will have skimmed through it as part of your study of Unit 6. It is rather long and involved but it does deal comprehensively
with the topic. Do not be put off by the rather complex statistical analyses that he uses; instead focus on the outcome of the research and the robustness of his conclusions. If you are interested in the analyses we suggest that you can follow this through by consulting either Chakravarthy’s references or obtaining a text on multivariate analysis, for example Stevens (1986).

You will find that Chakravarthy develops several classes of performance indicators. What are they? Do they work? What are their weaknesses or limitations? Can you compute them for your own organization?

Commentary

Although the article is by now rather old, and indeed some of the excellent companies identified have since experienced severe problems (see Unit 6 for one possible reason), the approach Chakravarthy outlines is still valid. We will be returning to the issue of making comparisons in a later section.

So Chakravarthy is essentially using a comparative methodology and seeks to account for strategic performance of excellent as opposed to ‘non-excellent’ companies and, as you may have noted, the final discriminant function comes the closest to achieving this objective.

Conventional measures

Profitability

This was measured by Return on Total Capital (ROTC) and Return on Book Equity or Return on Investment (ROI) and Return on Sales (ROS).

By now you should be able to point out the limitations of these. Chakravarthy identifies five:

1. scope for accounting manipulation
2. undervaluation of assets
3. distortions due to different depreciation policies, stock valuation, etc.
4. different consolidation methods
5. differences in international accounting conventions.

He concludes from his analysis that none of the profitability criteria is capable of distinguishing differences in the strategic performance of his sample in any consistent manner.

Financial-market measures

Market to book value (M/B ratio)

The data suggest that this reflects more the industry rather than an individual company’s position within it, but when the ratio of a company relative to the industry is used some patterns do emerge (see the discussion of Table 6). However, it did not discriminate too well and, anyway, the book value of a company is also subject to accounting distortions.

There are three over-arching limitations to these measures:

1. the assumption that a single performance criterion can assess excellence
2. they focus only on outcomes
3. they ignore other stakeholder claims.
They might also be very difficult to compute for some organizations in the public or NFP sector.

**Alternative measures**

**Composite methods**

The Z factor, used to predict bankruptcy, can indicate a company's well-being. The lower the Z value is beyond the threshold of 3, the less healthy is the organization.

This method does discriminate quite well but it is really more an empirical artefact than a measure that can be related to theories of organizational success. It seems to us that it is rather like a horseshoe – it seems to bring good luck whether you believe in it or not. It may be a necessary but not a sufficient condition for strategic success. It may be a measure more of short-term viability than long-term strategic impact, although this is not to say that long-term success will not follow. Again it is difficult to see this measure being useful for public sector and NFP organizations.

**Multiple stakeholders**

Measuring stakeholder satisfaction is difficult without conducting your own survey but it does put the stakeholder and not the stockholder back into the frame.

How would you now design a stakeholder survey for your organization?

**Transformation**

There are two broad categories of transformation – adaptive specialization and adaptive generalization – which are pursued concurrently for overall success. The former are more short-term concerns, the latter the investment of slack to generate future income streams.

Are transformation processes difficult to assess? Yes, if strategic options are hidden from stakeholders but there are some publicly reported data that can be used.

1. Profitability: measured by cash flow to investment ratio.
2. Productivity: sales per employee and sales by total assets.
3. Ability to raise capital: two measures – market/book value ratio and debt/equity ratio.
4. R&D expenditure: as a percentage of sales.
5. Working capital to sales ratio.
6. Dividend payout ratio.

The main contribution of the study is that it identifies the slack variables as contributing to the strategic success of the various companies. It is the long-term rather than the short-term decisions that have the major impact.

**Activity 20**

What does the summary table of misclassifications at the bottom of Table 12 tell us? That excellent firms are not always excellent?
Chakravarthy's article also raises some other issues such as: how can we translate these kinds of measures across sectors? What is actually being measured: is it effectiveness or efficiency? Is measuring the extent to which goals are attained a measure of strategic success? It leaves issues of whose goals are they anyway and are they 'legitimate' undiscussed. What happens when the goal is efficiency? Providing an efficient welfare service may not be compatible with providing an effective one.

Strategic success, then, cannot be just a function of one or two measures but an assessment of the capacity of an organization to function in the long rather than just the short term.

Another, more recent writer, John Kay (1992), is also interested in explaining corporate or, more specifically, industrial success. He argues though that the key measure is added value and derives some interesting data from both Glaxo, a pharmaceutical company, and the UK supermarket chains to support his argument.

**Activity 21**

Read the article 'Foundations of corporate success' by John Kay in the Reader. Evaluate the concept of added value as a measure of corporate success.

You may wish to reflect for a moment on how you are going to do this activity. What are the steps in the analysis that your reading so far would suggest you take?

You may wish also to reflect on the applicability of value added. How generalizable is it? Will it hold across public and NFP sectors? Will it work for service industries such as banking and insurance? Try working out the value added for an organization in one or all of those sectors. Does it work? By this we mean can the method be applied and, if so, are the results meaningful?

**Activity 22**

Return to your answer to Activity 18 in which we asked you to devise strategic performance measures for your organization. To what extent have they changed and in what ways or in what ways would you change them now?

Implicit in the work that we have reviewed in this section is the notion of comparison. Balaji Chakravarthy compares excellent companies with non-excellent companies. John Kay leads us, almost inexorably, into making comparisons of organizational performance. It seems that almost any performance measure, whether it be how high an athlete jumps, unemployment rate, batting averages, profit, earnings per share or whatever, invites us to make some comparison about the relative positions of each person, organization, etc. It is to this that we now turn our attention.
7 Making comparisons

Why do we make comparisons? Do we do it to see who is best, for instance, or who wins, or are there less competitive motivations? In the case of the organizations we looked at in Section 6 the work of both Chakravarthy and Kay enabled systematic comparisons to be made between firms. On 9 June 1993 The Independent newspaper produced a special report with the lead article entitled ‘Scoreboard reveals teams with a durable game plan’. This is not a comparison of soccer or rugby teams but an examination of the R&D spend of companies. The table of the top 10 British companies (Table 2, p. 14) revealed that the pharmaceutical companies ICI, Glaxo and Smith Kline Beecham spent the most and the analysis, while suggesting that there is no link between R&D and profits – R&D spending rose while profits fell – it does point to a link between R&D and dividends. Dividends of R&D spenders rose by 7% last year, when they stood still for listed companies as a whole’ (p. 28).

Remember that R&D spend and dividend payout were used by Chakravarthy as indicators of strategic success.

Moreover, the Independent report analysed R&D within and between sectors and found that, while the difference between sectors is large, ‘For example R&D is only 0.34 per cent of sales for conglomerates but 7.68 per cent for health care. But companies within an industry tend to spend the same amount as each other’ (p. 28).

The commentator added that ‘there seems to be an optimal percentage which most companies in an industry tend to approach.’

What we should ask now is how useful is this kind of comparison? This overarching question contains a number of subsidiary questions. How reliable and valid are the data, and are there any qualifications on its use? To do this we need more information on source and, perhaps, the models and assumptions used. The report does give some of the information we need in its instruction on how to read the tables:

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(The Independent, 9 June, 1993)

Activity 23

Try to uncover the assumptions underlying the data and make a statement about the qualifications you would put on its utility.
Another question that one might ask would be 'What could one use the data for?'. A simplistic interpretation suggests that, if our company was, say, in the chemical industry, and we were to spend the as yet undefined 'optimal amount', we would be on the road to long-term success.

There are several major problems with this seductive line of reasoning. What is the 'optimal amount'? If we knew what it was, could we afford it, and if we could, how would we actually spend it? (Your work on Unit 5 may make you aware that this is a pretty complex area.)

To take these questions in order, how could we calculate the optimal amount? We might work out and use some simple statistics like the mean and argue that if we spent above that our performance would be above average. Again this would be easy (see Table 3, p. 42): for the chemical industry it is £53,472,930 but how useful is that?

To take a more extreme example, the Boston Chamber of Commerce once chose its 'American Women of Achievement' and proudly proclaimed that the 16 it chose could boast 60 degrees and 18 children between them: an average of 3.75 degrees and 1.125 children. It failed to reveal that two of them, Virginia Gildersleeve and Lillian Gilbreth, accounted for 20 of the degrees between them and that the latter had 12 of the children.

So the mean may just be a measure of the central tendency of a set of data and nothing more than that (in the Independent case R&D expenditure of 15 companies in the chemical industry). To what extent is it optimal? Probably not at all. We are given four sets of measures and four rankings. Could we do anything with that?

We can make comparisons but as they stand they tell us little that we can use to resolve our related management problems of how much we need to raise and how to spend it in the search for long-term success. So we could look, as Chakravarthy did, at the differences between excellent and non-excellent companies. We could look at the expenditure per head, for example, of the successful companies in the data set. We thus have to define successful, get the data on added value or whatever, and get on with the job.

The next question – 'Could we raise the money?' – would need some material from a financial strategy course so let us make a heroic assumption and say it would be no problem. The question then becomes how to spend it? We know it must go on R&D but on what type of R&D and what projects, people, facilities (whatever that might mean), etc.? We know what the gap in performance is but how do we fill it?

Of course, this question was pitched at the stupid end of naïve. If we were actually working within an industry we would know, or be able to make some pretty informed guesses about, what the competition was doing, who were the organizations to watch. We would probably have an ongoing industry analysis under way. Who are the competition? What are they doing? We would be aware of any 'industry recipes' or 'paradigms'.

A recent survey of a sample of the Times top 1000 UK companies (Clark et al., 1993) revealed that all of the sample did some form of competitor analysis. Unfortunately, the data do not reveal how they did the analysis.

So data are available for us to make systematic comparisons. There is also the technique of benchmarking, which we discussed in Unit 3. Using this one can not only look at the competition but also look at and learn from 'best practice' in other kinds of organization. Indeed, this concept underpins Chakravarthy's article and to some extent Kay's argument.
At this point it would be useful to skim again through Roger Dence's article 'Best practices benchmarking' in the Reader.

The six steps for successful benchmarking seem to us to be so crucial that we will repeat them.

1. Decide on the key performance areas and standards.
2. Identify the most relevant organizations to compare with.
3. Measure regularly and objectively.
5. Specify and implement programmes to close the gap.

However, as with all good things, benchmarking has its drawbacks. It can be time-consuming. Collecting data can be difficult, particularly on how competitors do things. It can be costly, and so on. For us, however, the most significant weakness is its lack of predictive power. Just because organization A does this and seemingly because of it gets results, would we get the same result?

This question seems to us to be crucial when making comparisons of any sort. It has its roots in the notion of incrementalism or the science of 'muddling through' (Lindblom, 1959, for example) in which the outcomes of a decision process produce only incremental shifts rather than major movements in policy.

Using Lindblom's (1959) propositions it is impossible to understand or account for policy outcomes in any comparative way without an understanding of how the organization (or even country) actually arrived at that point. This might be very difficult to uncover as it demands a longitudinal approach in which data are taken over time. Some good exemplars of this approach, particularly in the corporate strategy field, have come from the projects undertaken by the Centre for Corporate Strategy and Change at the University of Warwick (see Pettigrew, 1990, for a thorough discussion of this methodology).

As you will no doubt appreciate, this not only puts a different complexion on doing comparisons within industries and countries but also makes international comparisons even more problematic.

For example, Calori et al. (1992) found that managers in different European countries, while employing some common concepts to make sense of the structure and dynamics of their industries, do have different ways of understanding the industry. In fact they found that there were both similarities and differences. A subsequent paper by Daniels et al. (1993) found that managers within the same industries, and in some cases in the same organization and with the same function, have different views on the competitive structure of their industry. We hypothesize that the differences stem from the different 'cultural heritage', institutional arrangements and evolution of the industry structure. The different institutional structures also have an impact on the indicators that the various nations use to measure financial performance as we outlined in Unit 6.

The Independent article also provides some international comparisons on R&D spend (see Table 4, p. 43). Why do we bother to make them? The answer has something to do with the growth of global companies, the reduction of trade barriers and the consequent need to understand the relationship with competitors within the single market or global markets.
Table 2  Top 10 British companies by R&D expenditure

(Source: The Independent, 9 June 1993, pp. 28-29)
Table 3   UK chemical companies ranked by R&D expenditure

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(Source: The Independent, 9 June 1993, pp. 28-29)
Table 4  International ranking of the top 24 companies by R&D expenditure

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(Source: The Independent, 9 June 1993, pp. 28-29)
So all our caveats about the use of accounting data and financial measures apply at the international level of comparison. Does it lead towards the use of non-financial measures or to ways of ameliorating differences?

An example that we found to illustrate this idea is printed in the Reader. It is the case of the global airline industry and in the article Michael Schefczyk gives us some data as well as a methodology for making comparisons. He suggests that we can indeed make comparisons but by using non-financial measures and focusing attention on more operational measures.

**Activity 25**

Please read the article 'Operational performance of airlines'. Do not get too involved (unless you want to) in the section on data envelopment analysis. Instead try and evaluate this as a comparative piece of performance management research. You might want to consider what the policy implications of Schefczyk's conclusions are for an airline. Is such an approach useful and how could we do it for other industries or sectors? (If you are interested in finding out more about DEA, Norman and Stoker (1991) provide a useful introductory text.)

After completing this activity you should then listen to the first part of Audio 5 on which Andrew Barker, a transport analyst with Warburgs, discusses why and how he compares airline performance. The why is dictated by his 'customers', but the how is an interesting blend of operational and financial measures to arrive at some value for the business. He also goes on to discuss how he looks at strategy.

Could you build similar performance models for your industry? Ones which remove distortions due to accounting or institutional differences? Your ideas here could provide useful inputs to your mini-project.

You should now listen to the second part of the audio tape on which John Patterson of Cathay Pacific discusses the performance measures that they use. There are some interesting similarities and differences to those used by Andrew Barker. Can you account for them?
8 Flying solo: The Tate St Ives Case Study

To complete this unit we ask you to try to apply some of the ideas and methods discussed to the video case study 'Performing Art', which concerns the setting up and initial operation of the Tate Gallery 'branch' in St Ives, Cornwall. Filming took place a few months after the project opened to the public in the summer of 1993. There is an associated audio track (Audio 6) that expands on some of the material in the video.

The case was chosen as it represents a situation where it is important to find ways of measuring success (or failure) in a field traditionally regarded as not easily amenable to such analysis. Furthermore there are, as you will see, important stakeholder groups that have very different – although probably not incompatible – aims for the gallery. How can it satisfy all simultaneously? How can it know whether or not it is doing so? And how can it make its performance explicit?

These are the questions that the project poses for itself and that you will be asked to address in the final activity. We feel that it is important for you to have a go at one case 'solo', that is without hinting notes here in the text. For this reason, we – for once – do not impose our ideas upon you by giving our view of how to 'answer' the case. If you are interested, your tutor will have some notes from us giving our opinions, but he or she will have been asked to withhold them until after you have come to your own conclusions about 'whodunnit!'

Activity 26

Watch Video 4 'Performing Art' and listen to the associated Audio 6 'Tate St Ives - more of the story'.

(a) Identify the major stakeholders and analyse each one's objectives for the Tate St Ives. How will the gallery be able to show its performance towards satisfying each of the interested parties?

(b) Consider the implications for the gallery, its stakeholders and any other 'players' of the first year variance from plan. Think about three main scenarios:

(i) visitor numbers in Year 2 and beyond match initial predictions
(ii) visitor numbers in subsequent years continue at the level set in Year 1
(iii) visitor numbers settle down about halfway between prediction and Year 1 outcome.

We hope that you find the Tate case interesting and illuminating – perhaps it will even induce you to visit St Ives to make your own assessment.
References


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Text


Table


Cover

Photo: Adrian Meredith Photography.