SYSTEMS JUSTIFICATION

Introduction

Systems development is expensive, and its objective is to produce systems which improve the profitability of the organisation. To improve the profitability, there must be benefits which outweigh the costs.

The analyst or designer does not normally carry out financial calculations for on which the organisation can make decisions. This is a task undertaken by Management accounting. However, the analyst and designer should be able to present the costs and benefit information of their project so that the accountants can use it.

In order to achieve this a few simple aspects of cost/benefit analysis is required to be understood by the analyst/designer.

Costs and Benefits

It is generally accepted that costs and benefits fall into one of two categories, once-only or recurring.

Once-only costs are those costs that will only be incurred during the development and implementation of the project, these may include:

- The analyst time during the fact-finding, analysis and design stages of the system.
- The costs of programming and testing the program suites, this may also include some portion of the users time as they are often called upon to assist in the testing.
- The creation of the files that are to be used by the system or the conversion of the data in the system to computer readable files. This again may involve the user or outside help.
- The training of the users to use the new system is often considered a once-only cost. This may include the purchase of be-spoke training to fit the system.
- Other once-only costs may include specialist services used during the development of the system such as O & M, building alterations or even redundancy payments.

Recurring costs will normally start when the systems is implemented, these will include:

- Manpower, for example more staff may be required, or a different type of staff.
- Materials, a number of consumables of different type will be required. This may include discs, tapes, continuous stationery
- Hardware maintenance, this may take in account leasing or rental costs, it can also include such expenses as electricity or even CPU time.
- Software maintenance, it is often the case that the cost of maintenance of the software of a

system is greater than the development cost. Hopefully, with structured methods being practised, this will reduce considerably.

- Data Preparation and Data Control costs will also be incurred as a running cost of the new system. The amount of this will depend on the nature of the system.

Benefits from the new system will again be classed as once-only or recurring. It may not always be possible to identify whether a benefit is once-only or recurring. For example, the reduction in stock holding may reduce an overdraft or loan, this may be considered as once-only; alternatively, the saving of the interest payable could be considered as recurring.

Benefits may also fall into the category of non-quantifiable benefits. These are the benefits to which a monetary value cannot be fixed. Improved customer service will certainly be of benefit to an organisation but cannot be quantified by a cash value. This can be assessed by asking what is this particularly benefit worth to the company.

A cost/benefit report should follow the same reporting structure as any other report. It should start with a summary of the costs and benefits, perhaps only showing the totals. This should be followed by the body of the report, detailing how the figures were arrived at. The cost/benefit report should list individually, in detail, once-only costs, recurring costs, once-only benefits, recurring benefits and the non-quantifiable benefits.

Representing the findings

Cost and benefit information can be shown in a number of ways. One method is to simply show all values in such a way as to ignore the time factor on money. Alternatively Net Present Value (NPV) and Discounted Cash Flow (DCF) techniques can be used.

Discounted Cash Flow - Definition

The discounted cash flow (DCF) technique is used to establish and compare the return on investment in projects by discounting future cash flows to establish their present value. It focuses on cash inflows and outflows rather than on net income as computed in the accrual accounting sense. The DCF return is the true annual rate of return on the capital outstanding in the investment.

Basis of the Technique

The DCF technique recognises that £1,000 receivable in one year's time is worth less than £1,000 receivable now. If, for example, the rate of interest is 15%, the £1,000 receivable in one year's time is worth £870 now. The £870 could be invested at 15%, which would represent a total of £1,000 in one year's time. On these terms, the company would not want to pay more than £870 today for the investment.

This process of expressing future inflows in present values is known as discounting and is, in effect, compound interest in reverse. A DCF calculation matches cash out against cash in over the life of the investment and relates the cash flow back to the initial outlay. The return from a project is calculated before any depreciation charges are deducted.

Taxation is an important factor in investment appraisal and must be deducted in the year in which it is paid, not the year in which it is incurred. This will incorporate all taxation allowances on the capital equipment, as this is a tax saving which increases the actual cash inflow of the project.

A DCF calculation works out the present value of an investment over a period of years at an assumed rate of interest. The present value is compared with initial cost and the actual rate of return is the discount rate required to equalise the present value with the original cost. This rate of return is compared with target rates of return to see if the investment is viable. Alternative investments can be evaluated by comparing their respective rates of return.

The DCF Technique

The DCF technique comprises three elements:

1 Calculation of present value
2 Calculation and use of net present value
3 Calculation and use of the internal rate of return.

Calculation of present value -

The first step in DCF is to calculate the present value. This is the current discounted value of the cash flow expected in a future year. A present value can be calculated by using the basic discounting equation:

$$PV = \frac{CF}{(1 + r)^n}$$

Where: PV stands for present value
CF stands for cash flow in the year concerned
r stands for the annual interest rate expressed as a decimal, not a percentage
n stands for the year number concerned.

Alternatively, present value table can be used which are set out as shown here.

Sample of present value table

Discount rate			
Year	8%	9%	10%
1	0.9259	0.9174	0.9091
2	0.8573	0.8417	0.8264
3	0.7938	0.7722	0.7513

Using this table, the present value of £50,000 received in year 2 and discounted at 10% is 50,000 X 0.8264 = 41,320.

Net present value -

The net present value (NPV) technique assumes some minimum desired rate of return (discount factor), adds the present values for each year of the project of all the cash inflows, and deducts from this figure the sum of all the present values of the cash outflows for each year of the project. In other words, having selected a target minimum rate of return, the NPV's for each year (the present value of inflows minus the present value of outflows) are added to produce a total NPV for the whole project. An example of this calculation is shown in the table below:

Sample of NPV table

Year	Inflow	Outflow	Net Cash Flow	Discount Factor	Net Present Value
	£k	£k	£k	10%	£k
1	10	70	-60	0.9091	-54.55
2	30	80	-50	0.8264	-41.32
3	90	60	30	0.7513	22.54
4	10	50	50	0.683	34.15
5	110	40	70	0.6209	43.46
				Total net present value	4.28

If, having worked out the NPV, the result is positive, the project is desirable, and vice versa. When choosing among several investments the one with the largest NPV is the most desirable.

The internal rate of return (IRR) -

The internal rate of return is the discount rate that makes the NPV of a project equal to zero. Expressed another way, the internal rate of return can be defined as the discount rate that makes the present value of a project's expected cash inflows equal to the present value of the expected cash outflows, including the investment in the project. The higher the IRR the more attractive the project.

The IRR can be found by trial and error. For example, in the NPV table above a discount factor of 10% gave a positive NPV of 4.28. If the discount factor were 14%, the NPV would be minus 4.89. A discount factor of 12% gives a minus 0.5, so the IRR is just under 12% (11.98%).

The IRR is computed on the basis of the investment tied up in the project from period to period instead of solely the initial investment. The IRR in the above example is just under 12% of the capital invested during each year. If money were borrowed at the same effective interest rate, the cash inflow produced by the project would exactly repay the hypothetical loan plus the interest over five years.

The IRR is used to ensure that the project will at least achieve the target rate of return set by the company, which will be related to the cost of capital. If there is more than one project to evaluate then clearly, the higher the IRR, the more advantageous the project.

Benefits

The discounted cash flow technique, including the use of NPVs and the IRR, is the only capital appraisal method which indicates the value of a project after accounting for the opportunity cost of money. Because it explicitly and automatically weighs the time value of money, it is the best method to use for long-range decisions where the overriding goal is maximum long-term net cash inflows. It has to be remembered, however, that the DCF is based on two fundamental assumptions: first, that the predicted cash flows will occur in the amounts and at the times specified; second, that the original amount of the investment can be looked upon as being either borrowed or loaned at some special rate of return.

Doubts about the uncertainty of forecasts lead many companies to rely more upon the tradition payback or accounting return techniques. But these also have assumptions about future inflows built into them. While these methods have their uses, only DCF properly measurers the return on cash flows over time. To minimise the problem of uncertainty, risk analysis techniques can be used.