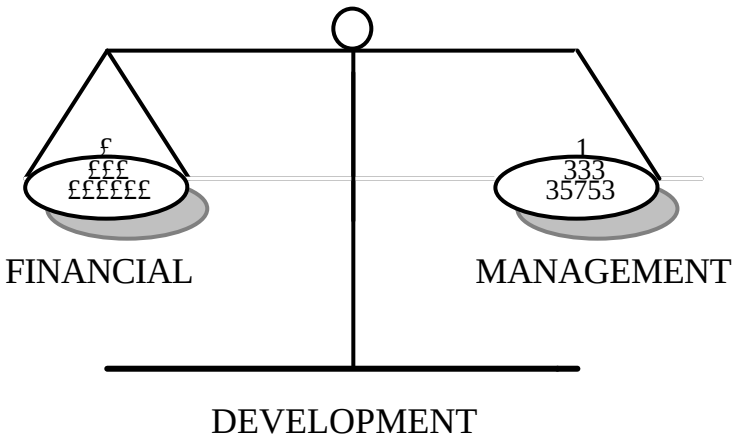
FINANCIAL MANAGEMENT DEVELOPMENT

Decision Making

Capital Expenditure

NO 339

THE ANNUAL EQUIVALENT COST



ONE OF A SERIES OF GUIDES FOR

FINANCIAL MANAGEMENT DEVELOPMENT

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THE ANNUAL EQUIVALENT COST

The Problem

If you were asked which is better:

To buy new lorries and replace them every four years or to buy second hand lorries and replace them every two years; you would probably take the choice which gave you the lowest annual cost based on a simple average.

A Simple Approach

> Assume that a new lorry costs £40,000; it lasts four years and can then be sold for £8,000; while a second hand lorry costs £18,000; it lasts two years and can then be sold for £2,000.
>
> Lorry 1 costs (£40,000 - £8,000) divided by 4 = £8,000 p.a.
> Lorry 2 costs (£18,000 - £2,000) divided by 2 = £8,000 p.a.

Ignoring repairs etc. the cost appears to be the same.

However, consider the timing of the cashflows over a four year period.

Year	0	1	2	3	4
Lorry 1	(£40,000)	-	-	-	£8,000
Lorry 2	(£18,000)	-	(£16,000)	-	£2,000

Using Discounted Cashflow

Using a Discounted Cashflow approach the two alternatives are:

	Lorry 1	Lorry 2
NPV at 10%	(£34,536)	(£29,857)
NPV at 20%	(£36,142)	(£28,147)
NPV at 30%	(£37,199)	(£26,767)

Thus in Net Present Value terms the second option is the cheaper - always assuming that the figures quoted were the cash costs in the future. If by year 2 the second hand lorry were to be £20,000 due to inflation the second option would be worsened - but it would still be better than option 1.

Problems arise when the cycles of replacement are not the same e.g. Replace every five years or every eight years. The easy answer is to carry out a Discounted Cash Flow analysis over the shortest period divisible by both cycles. (As was done above). However, a 40 year cashflow analysis is not necessarily the quickest method.

Using Annual Equivalent Cost

It is easiest to calculate the NPV for one replacement cycle under each alternative and then divide the NPV by "The cumulative Present Value Factor for the number of years in the cycle". The reason for using this is that to use the number of years in the cycle would artificially reduce the NPV per year. Since the NPV is a product of cashflows weighted for each year's discount factor the total must be divided by the total of the discount factors.

Thus comparing the two options above at a 10% discount factor:

Option 1 (4 years) NPV £34,536 divided by 3.169 = £10,898 p.a.

3.169 being the sum of 0.909;0.826;0.751 and 0.683

Option 2 (2 years) NPV is £16,347 divided by 1.735 = £9,422 p.a.

Thus option 2 is shown to be the cheaper with an **Annual Equivalent Cost** of £9,422 compared to £10,898 for Option 1.

This approach can be adopted for replacement decisions on a similar or non-identical basis provided the cashflows for each approach are identified.

Note: It is important to use inflated i.e. future cash costs and inflows and then use an appropriate discount rate.

In Summary:

FOR REPLACEMENT DECISIONS INVOLVING DIFFERENT CYCLES CALCULATE THE ANNUAL EQUIVALENT COST AS

THE NPV FOR ONE REPLACEMENT CYCLE
THE CUMULATIVE PRESENT VALUE FACTOR FOR THE NUMBER OF YEARS IN THE CYCLE

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David is an experienced financial professional who has devoted his skills to management training in practical understanding and utilisation of financial information. A Graduate, Chartered Accountant, and Associate of the Institute of Taxation, he is also a Member of the Chartered Institute of Personnel and Development.

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He is married with one grown up daughter and his outside interests include being The Treasurer of the Hospice of St. Francis (Berkhamsted), and a member of the Catholic Alpha Training Team (Promoting the Alpha course on Basic Christianity). He was a Governor of Luton University for nine years and a school Governor for four years.

This series of papers is designed to help managers by providing a basic understanding of key financial concepts to assist them in their work. It is provided at no cost since this knowledge is a Gift from God and thus to be shared (Matthew 10:8).

