Increasing convergence between the recognition of an intangible asset for financial reporting purposes and strategic management accounting and project management techniques

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Abstract

New management techniques such as 'just-in-time', 'lean manufacturing' and 'Six Sigma' allow management accountants to shift their focus from the management and control of production processes to the management of strategic issues. This paradigm shift resulted from shorter product life cycles, due to technological advances and a more competitive business environment. Recent revisions to the *International Accounting Standards* which are particularly supportive of life cycle costing and project management are likely to increase the focus on strategic management accounting further.

This article describes developments in management accounting and the recent convergence of financial reporting in terms of International Accounting Standards with strategic management accounting and project management techniques. Strategic management accounting (particularly life cycle costing) involves applying project management techniques and using the calculus of investment to manage the project as a whole. This contrasts with managing only costs and revenues during the manufacturing phase of a project. The article demonstrates that project management techniques and the calculus of investment provide the information needed to account for the value of a project in terms of *IAS 38: Intangible Assets*. This will ultimately give rise to both improved decision-making and more relevant financial reporting.

Key words

Deferred taxation
Intangible assets
Investment calculus
Life cycle costing
Project management
Research and development
Strategic management accounting

1 Introduction

The fairly recent introduction of and revisions to the *International Accounting Standards (IASs*) in 2004, notably *IAS 36: Impairment of Assets* (IASB 2004d) and *IAS 38: Intangible Assets* (IASB 2004e), by the International Accounting Standards Board (IASB), has resulted in increasing convergence between financial accounting and management accounting and also in greater alignment between financial accounting and finance. The balance sheet values of annual financial statements increasingly reflect forward-looking market-related values for assets and liabilities, while management accounting is rapidly moving towards providing strategic management information. This shift in emphasis is a response to changes in production techniques brought about by rapid technological changes and increasing competition due to globalisation and the lifting of trade barriers. It is therefore to be expected that strategic management accounting information will increasingly satisfy both management accounting and financial accounting requirements. This article demonstrates one aspect of such convergence: the financial accounting requirements for reporting the value of intangible assets and the strategic management accounting principles of what is called life-cycle costing and project management.

2 The increasing irrelevance of some management accounting conventions

The advent of 'just-in-time' (JIT) and 'lean manufacturing' techniques, together with the current sharp focus on 'Six Sigma' quality management techniques (General Electric 2006) has significantly diminished the relevance of many traditional management accounting techniques.

JIT (purchasing) is described by Horngren, Bhimani, Datar and Foster (2002:897) as 'the purchase of goods and material such that delivery immediately precedes demand or use'. Horngren *et al.* (2002:897) define JIT (production) as 'production systems in which each component on a production line is produced immediately as needed by the next step in the production line'.

'Lean manufacturing' is defined as 'a business performance improvement tool that focuses on enhancing quality, cost, delivery and people' (SMMT Industry Forum 2006).

'Six Sigma' (General Electric 2006) is a statistical term that measures how far a given process deviates from perfection. Only 3.4 defects per million opportunities are permitted for each product or service transaction ('Six Sigma' is discussed in more detail in Section 3 of this article).

Paragraph 10 of *IAS 2: Inventory* (IASB 2004c) states the following:

> *The cost of inventories shall comprise all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.*

This article demonstrates that the 'other costs incurred in bringing inventories to their present location and condition' include the pre-production costs of a product, and that the recognition and amortisation of these costs is consistent with *IAS 38: Intangible Assets* (IASB 2004e), as well as with *IAS 36: Impairment of Assets* (IASB 2004d).

Paragraphs 12 and 13 of *IAS 2: Inventory*, also requires both fixed and variable production overheads incurred in the conversion process to be allocated to finished goods on a systematic basis. This allocation is based on the normal capacity of the production

facility concerned. The normal capacity (or activity) of a production facility is defined as 'a measure of capacity required to satisfy average customer demand over a longer-term period of, say, approximately three years, after taking into account seasonal and cyclical fluctuations' (Drury 2004:240). In this article, it is shown that normal capacity, as envisaged in *IAS 2*, is also aligned with the amortisation method proposed by life cycle costing for pre-production costs.

With the application of 'just-in-time' and 'lean manufacturing' systems, the allocation of overheads to finished goods inventories is becoming increasingly irrelevant. Even if the entity had small quantities of finished goods inventories on hand at the end of its reporting period, it would be a simple matter to allocate an appropriate portion of fixed overheads to inventories retrospectively at the close of the reporting period in order to comply with Generally Accepted Accounting Practice (GAAP). On the basis of this argument, the need for an integrated overhead absorption cost accounting system becomes questionable, at least from a financial reporting point of view. Simplified accounting procedures can be adopted to allocate costs, dividing them between the cost of goods sold and inventories. This simplified procedure, known as 'backflush costing' (Drury 2004:124), is designed to eliminate detailed accounting transactions. Instead of tracking the movement of materials through the production process, a backflush costing system focuses first on the output of the organisation and then moves backwards to allocate costs between the cost of goods sold and inventories, with no separate accounting for work-in-progress.

There continues to be a need, however, for cost and management accountants to monitor closely any amounts spent on fixed overheads, to monitor production throughput and to take corrective action to pare back fixed overhead expenditure and unused capacity if throughput declines below the budgeted levels. Similarly, those who are involved in pricing need to be mindful of the fully absorbed cost of individual goods and services, or the company will not fully recover its fixed overhead costs or make a profit in the long term.

The importance of standard costing would also seem to be declining. In a standard costing environment, one of the main accounting and auditing issues is how to determine what portion of the variances arising from the conversion process should be pro-rated to finished goods and work-in-progress at end of a financial year in order to comply with GAAP. With JIT purchasing methods, where no meaningful levels of inventories are held, the pro-rating of a portion of these variances to inventories is no longer a problem and all of these variances would accordingly be treated as period costs. With the advent of 'Six Sigma', the incidence of use and efficiency variances would also be greatly reduced as a result of the expectation of a near zero defect production process, anticipating only 3.4 defects per million opportunities. Accordingly, the need to monitor such variances as a form of output or feedback control is significantly reduced. The disposition of these variances at the end of a financial reporting period (by pro-rating such variances), is either no longer required or the extent of these variances is immaterial.

As described above, the importance of allocating of overheads to inventories for valuation purposes is declining. The focus has shifted to allocating overheads for pricing purposes, where an activity-based costing (ABC) system comes to the fore. Traditional costing systems trace overheads to products using either labour hours (in a labour-centric environment), or machine hours (in a machine-centric environment). With activity-based costing, a number of overhead cost pools, together with the appropriate activity cost drivers, are established; and overheads are allocated to products based on their demand for

the activities which give rise to the costs within the various pools. Accordingly, a sophisticated ABC system should generate more accurate product costs, than a conventional system, which is particularly relevant in the present environment where a greater proportion of technologically advanced machinery and equipment is used and a far smaller proportion of labour is used than hitherto. With more accurate product costs, better pricing decisions can be made than before, which is also of paramount importance in the current competitive environment.

3 Modern management accounting techniques

3.1 *'Six Sigma'*

'Six Sigma' (General Electric 2006) is a statistical term that measures how far a given process deviates from perfection, with only 3.4 defects per million opportunities for each product or service transaction. 'Six Sigma' is a systematic methodology that uses tools, training and measurements to facilitate the design of products and processes that meet customer expectations. The central idea behind 'Six Sigma' is that if one can measure how many defects there are in a process, one can work out systematically how to eliminate them and get as close to 'zero defect' as possible. Basically, 'Six Sigma' revolves around the following key concepts, articulated by General Electric (2006):

- **Critical to quality**: Attributes most important to the customer
- **Defect**: Failing to deliver what the customer wants
- **Process capability**: What your process can deliver
- **Variation**: What the customer sees and feels
- **Stable operations**: Ensuring consistent, predictable processes to improve what the customer sees and feels
- **Design for 'Six Sigma'**: Design to meet customer needs and processing capability.

General Electric (2006) postulates that customers feel the variance, not the mean, and that customers judge a company not on its average performance, but on each of their individual transactions with the company. Customers value consistent, predictable business processes that deliver world-class levels of quality.

The advent of 'Six Sigma' means that the expectation is a near-zero defect environment. This implies that non-essential waste and defective products are practically eliminated, resulting in a fundamental change in the deployment of cost and management accounting resources away from the production process to the pre-production process, adding further impetus to the need for life cycle costing.

3.2 *The concept of life cycle costing*

According to Drury (2004), traditional management accounting control procedures disregarded pre-manufacturing costs (such as product design and research and development), as well as post-manufacturing costs (such as abandonment and disposal costs). These older costing systems therefore focus primarily on the costs incurred in the manufacturing stage; while pre-manufacturing costs and post-manufacturing costs are treated as period costs. These costs are not included in the calculation of product cost or

subjected to conventional management accounting control procedures. Life cycle costing, on the other hand, takes the product's entire life cycle into account in estimating and accumulating costs, in order to determine whether the profits earned during the manufacturing phase will cover the total costs incurred during all the manufacturing stages. Life cycle costing has been described by the New South Wales Government Asset Management Committee (2006) as

> *… a process to determine the sum of all the costs associated with an asset or part thereof, including acquisition, installation, operation, maintenance, refurbishment and disposal costs. It is therefore pivotal to the asset management process.*

'Terotechnology' is another term often regarded as synonymous with life cycle costing. The term is defined in the Australian Standard (*AS/NZS 4586*) of 1999 (cited in Ballesty & Orlovic 2004) as

> *… the pursuit of the optimum technical and economic cost of ownership of a facility over its whole life span.*

Identifying the costs incurred during the different stages of a product's life cycle also provides an understanding of and the capacity to manage the total cost of a product incurred throughout its life cycle. Life cycle costing helps management to understand the cost consequences both of developing and of making a product and, by so doing, helps management to identify the most effective potential cost reduction areas.

Drury (2004) adds that most accounting systems monitor and report product costs and profits on a period-by-period basis, rather than over their entire life cycle. Product life cycle reporting involves tracing costs and revenues on a product-by-product basis throughout the products' life cycles, covering several calendar periods. Failure to do so prevents management from understanding product profitability, because a product's actual life-cycle profit is unknown; and inadequate feedback information is available on the success or failure of new product development. Because a significant proportion of costs are incurred in the product planning and design phase, cost management can be most effectively exercised at this early stage rather than at the manufacturing stage, when the product design and production processes have already been determined and costs have already been incurred. At the manufacturing stage, the focus is more on cost containment than on cost management.

4 The research problem

The impetus for this study came from the observation that there appeared to be a convergence between the recognition and impairment of intangible assets for financial accounting purposes on the one hand, and the techniques and methods used for project management, which incorporate the management of the costs of a project throughout its life cycle, on the other hand. The research problem can be expressed in terms of the following research question: if a company decides not to treat pre-manufacturing costs as period costs, but rather to amortise such costs over the life cycle of the product for the purposes of project management and management accounting, would this give rise to any conflict with GAAP and, in particular, with *IAS 38: Intangible assets*?

5 Research method and design

The study was conducted by means of a conceptual analysis of the provisions of selected international accounting standards and modern strategic management accounting principles and practices used to manage capital investment projects and to account for their total costs. The analysis was carried out in order to demonstrate the growing convergence between the two. Key provisions, particularly, in *IAS 38: Intangible assets* (IASB 2004e), and the techniques and methods applied in life-cycle costing and project management were compared and contrasted.

A large proportion of the costs involved in long-term projects are incurred in the initial stages, even before the project starts to generate returns; and many of these costs are similar to costs recognised as intangible assets. In order to assess the degree of alignment between the two, the mathematical models used in the course of project management and control to evaluate investment projects at various stages of their life cycles were compared with the financial accounting requirements for the recognition and impairment of an intangible asset. The criterion used in the decision to continue with an investment project is its ability to generate a positive net present value (NPV) in future; and the study sought to ascertain whether this measure could also be used to assess the possible impairment of the related intangible asset. Finally, a hypothetical example was used to calculate the effects on the NPV of the project of the amortisation schemes permitted by *IAS 38* (IASB 2004e) and to ascertain whether the NPV would also be acceptable for project management purposes.

6 Life cycle costing and GAAP

The life cycle costing system as described above, in its application for management accounting purposes, seeks to trace all the costs involved in manufacturing a product to the units produced over the entire life cycle of the product. These costs include pre-production and development costs, costs incurred once manufacture commences and post-production costs. As was stated earlier, according to *IAS 2: Inventory* (IASB 2004c), fixed and variable production overheads incurred in the conversion process must be systematically allocated to finished goods. This allocation is based on the normal capacity of the production facilities.

Pre-production costs are overhead costs which may, and usually do, give rise to an intangible asset. Paragraph 9 of *IAS 38: Intangible assets* (IASB 2004e) states the following:

> *Entities frequently expend resources or incur liabilities on the acquisition, development, maintenance or enhancement of intangible resources such as scientific or technical knowledge, design and implementation of new processes or systems, licences, intellectual property, market knowledge and trademarks (including brand names and publishing titles). Common examples of items encompassed by these broad headings are computer software, patents, copyrights, motion picture films, customer lists, mortgage servicing rights, fishing licences, import quotas, franchises, customer or supplier relationships, customer loyalty, market share and marketing rights.*

The expenditure that is usually incurred in developing a new product incorporates many of the items described above.

Paragraph 21 of *IAS 38* states the requirements for recognition of an intangible asset as follows:

> *An intangible asset shall be recognised if, and only if:*

> *(a) it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity; and*
>
> *(b) the cost of the asset can be measured reliably.*

A project would only be undertaken if the value of the future economic benefits, less the costs of the project, achieves a satisfactory NPV over its estimated life span. An intangible asset (pre-production expenses) relating to a new product that is not expected to achieve an acceptable NPV would be written off as a period cost. In terms of paragraph 22 of *IAS 38*,

> *[a]n entity shall assess the probability of expected future economic benefits using reasonable and supportable assumptions that represent management's best estimate of the set of economic conditions that will exist over the useful life of the asset.*

This is exactly the process followed in project evaluation for management accounting purposes.

Paragraph 57 of *IAS 38* deals with the criteria for the recognition of an intangible asset as follows:

> *An intangible asset arising from development (or from the development phase of an internal project) shall be recognised if, and only if, an entity can demonstrate all of the following:*
>
> *(a) the technical feasibility of completing the intangible asset so that it will be available for use or sale;*
>
> *(b) its intention to complete the intangible asset and use or sell it;*
>
> *(c) its ability to use or sell the intangible asset;*
>
> *(d) how the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset;*
>
> *(e) the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset;*
>
> *(f) its ability to measure reliably the expenditure attributable to the intangible asset during its development.*

All of these aspects are considered when making a decision to accept or reject a project to introduce a new product. Again, life cycle costing principles, project management techniques and financial accounting requirements are reconcilable.

In terms of paragraph 97 of *IAS 38*, an intangible asset must also be amortised over its expected lifetime:

> *The depreciable amount of an intangible asset with a finite useful life shall be allocated on a systematic basis over its useful life. Amortisation shall begin where the asset is available for use, i.e. when it is in the location and condition necessary for it to be capable of operating in the manner intended by management. … The amortisation method used shall reflect the pattern in which the assets' future economic benefits are expected to be consumed by the entity. If that pattern cannot be determined reliably, the straight line method shall be used. The amortisation for each period shall be recognised in profit and loss unless this or another standard permits or requires it to be included in the carrying amount of another asset.*

Life-cycle costing seeks to amortise and recognise the pre-production costs over the life cycle of the product on a systematic basis that matches the pattern of estimated future earnings generated by the product, commencing when sales of the product begin. In line with project management, the anticipated future benefits flowing from the marketing of the product are reviewed at regular intervals, and the necessary adjustments are reflected in

future amortisation patterns. This again complies with *IAS 38*, and specifically with paragraph 104, which states the following:

> *The amortisation period and the amortisation method for an intangible asset with a finite useful life shall be reviewed at least at each financial year-end. If the expected useful life of the asset is different from previous estimates, the amortisation period shall be changed accordingly. If there has been a change in the expected pattern of consumption of the future economic benefits embodied in the asset, the amortisation method shall be changed to reflect the changed pattern. Such changes shall be accounted for as changes in accounting estimates in accordance with IAS 8.*

Finally, paragraph 111 of *IAS 38* refers to the impairment of an asset, including an intangible asset, and prescribes the application of *IAS 36: Impairment of assets* (IASB 2004d) in such a case. In terms of the principles of life cycle costing, pre-production expenses that are unlikely to be recovered due to a decline in market demand for the product would be treated as a period cost.

There would therefore appear to be nothing in *IAS 38: Intangible assets* which precludes an entity from capitalising pre-manufacturing costs and amortising such costs to the income statement over the expected life of the product. However, in terms of *IAS 38*, the carrying cost of the asset would have to be reviewed annually to determine whether an impairment loss should be recognised.

In terms of paragraph 96 of the *Framework for the Preparation and Presentation of Financial Statements* (IASB 2004b), expenses are recognised in the income statement on the basis of a direct association between the costs incurred and the earnings on specific items of income. This process, which is commonly referred to as the matching of costs with revenues, involves the simultaneous or combined recognition of revenues and expenses that result directly and jointly from the same transactions or other events; for example, the various components of expense making up the cost of goods sold are recognised at the same time as the income derived from the sale of the goods. It must be noted, however, that 'the application of the matching concept under this Framework does not allow the recognition of items in the balance sheet which do not meet the definition of assets or liabilities' (IASB 2004b: paragraph 95). The treatment of pre-production costs as described above would therefore also be in line with the Accounting *Framework*.

7 Life cycle costing, *IAS 38* and project management and control

In this section of the article, it is demonstrated that capitalising pre-manufacturing costs and amortising such costs to the income statement over the expected life of the product is not only in line with the Accounting *Framework*, but that *IAS 38* is almost an invitation by the IASB to companies to carry out proper project management and investment evaluations in the process of creating intangible assets within the life cycle of products. Paragraph 9 of *IAS 38* refers to 'the acquisition, development, maintenance or enhancement of intangible resources such as scientific or technical knowledge, design and implementation of new processes' and these are typical costs directed towards putting a new product on the market. These pre-production costs can definitely be classified as part of a project and should be managed as such. Paragraph 57 of *IAS 38* also lists aspects, as discussed above, which are treated under the headings of scope management, time management, cost management, risk management and economic appraisal, in project management.

A company will only embark on a project if there is a good chance that the project will make money. This is stated as a condition for an intangible asset to be recognized in paragraph 57 of *IAS 38*. Paragraph 22 of *IAS 38* also gives general prescriptions on how to carry out the evaluation. These prescriptions are in common use in project management.

7.1 *The calculus of investment*

It is common practice to apply the calculus of investment to important projects with a life cycle of several years and to control the time series of payments related to such projects. This results in the 'ability to measure reliably the expenditure attributable to the intangible asset during its development', as required by paragraph 57 of *IAS 38*. The calculus of investment is oriented towards a valuation of the projects it is applied to. The project should increase the value of the firm. In terms of the calculus of investment, the NPV of the project should be positive. The first equation is used to calculate the increase in the value of the firm, measured in terms of NPV of an innovation project.

$$\mathrm{NPV}(t=0) = \sum_{t=0}^{n} \frac{(pi_t - po_t)}{(1+r)^t} > 0 \qquad \text{(Equation 1)}$$

Where:

NPV: Net present value

pi_t: Payments going in, in period t

po_t: Payments going out in period t

r: Discount rate (the entity's cost of capital)

In perfect markets (which today's highly competitive markets very nearly are), no enterprise will earn a profit simply by applying what is common knowledge. Therefore the acquisition of proprietary scientific or technical or market or organisational knowledge is a precondition for producing and marketing products with an internal rate of return (IRR) which is higher than the market rate of return. For various reasons, many companies have costs of capital which are well above the market rate of return. If the NPV of an innovation project is positive, this can be attributed to some competitive edge of the company. This competitive edge is an intangible asset and it will have been created in the pre-manufacturing stage of the product's life cycle[1].

In the pre-manufacturing stage, there are only outgoing payments for the project (on balance for each period). The NPV of a project can thus be split into two parts, the pre-manufacturing investment part (the first summation in the first line of equation 2) and the manufacturing and earnings part or marketing part (the second summation):

[1] For the sake of brevity, little detail is included here – the argument is simplified. It is true that a competitive edge is not only created in pre-manufacturing stages of isolated products. It is contained in the entire body of knowledge and rights of the entity. For the sake of simplicity it is assumed that all the prior achievements are taken into account in the discount rate of the entity, which is higher than the market rate of return.

$$NPV(t=0) = \sum_{t=0}^{n1} \frac{-po_t}{(1+r)^t} + \sum_{t=n1+1}^{n} \frac{(pi_t - po_t)}{(1+r)^t} > 0$$

$$\Rightarrow \quad \sum_{t=n1+1}^{n} \frac{(pi_t - po_t)}{(1+r)^t} > \sum_{t=0}^{n1} \frac{po_t}{(1+r)^t} \qquad \text{(Equation 2)}$$

Where

n1: Last period of the pre-manufacturing phase.

The second line of equation 2 indicates that the value of the manufacturing and post-manufacturing phases must be greater than the (cost) value of the pre-manufacturing phase for a project to be carried out by a rational investor.

A project is progressively elaborated. This implies the following:

> *Progressive elaboration is a characteristic of projects.... Progressive elaboration means developing in steps, and continuing by increments. For example, the project scope will be broadly described early in the project and made more explicit and detailed as the project team develops a better and more complete understanding of the objectives and deliverables (Project Management Institute 2004:6).*

When a project is launched the scientific, technological, marketing and organisational knowledge has been acquired, there is perfect knowledge about the costs of the acquisition: these costs have already been incurred. There is also (normally) much better knowledge about the further economic prospects of the project. For a start, it is assumed that the project has met expectations exactly: the time series of payments then stays unchanged, compared to the original calculation at t=0. Equation 2 is still valid, but it has to be rearranged to reflect the change in reference time from t=0 to t=n1, with its corresponding change in discounting. All items are discounted for n1 periods less, compared to equation 2. The result is expressed as in equation 3, which represents the NPV at the end of the pre-marketing phase.

$$NPV(t=n1) = \sum_{t=n1+1}^{n} \frac{(pi_t - po_t)}{(1+r)^{t-n1}} > \sum_{t=0}^{n1} \frac{po_t}{(1+r)^{t-n1}} > \sum_{t=0}^{n1} po_t$$

(Equation 3)

$$> \text{Value of IntangibleAsset created in project}$$

The first summation in equation 3 is the NPV of all cash flows in the manufacturing and post-manufacturing phase, discounted to the end of the pre-marketing phase (t=n1). This is the true value of the project at launch date in the economic context of the entity carrying out the project. The second summation is the end value of all cash flows of the pre-manufacturing stage at n1. Interest is compounded for all periods prior to the new reference period. The third summation is the undiscounted sum of all cash flows belonging to the pre-manufacturing stage. The inequality between the first and the second summation follows directly from equation 2. If the project adds value to the firm at the start of the project – which it is assumed to do – then it will add value to the firm at the launch of the resulting product. It will create more value in the future than it consumes during the pre-marketing phase. The last inequality follows from the fact that $1/(1+r)^t$ is greater than 1 for all t smaller than zero. But the third summation is the upper limit of the value attributable to the intangible asset built up during the pre-manufacturing stage, as permitted for financial accounting purposes (historical values). This means that the value of the project at launch

(the first summation) is normally – taking into account the usual costs of capital – considerably higher than the value of the intangible asset, according to the Accounting *Framework* (the third summation). This may make the *IAS 38* valuation a more conservative measure of value.

Moving on in time, passing through the manufacturing stage, the NPV of the remaining cash flows will at first continue to increase. This NPV is called NPVR(m) and can be calculated using equation 4, which represents the NPV of the remaining payments beginning from Period m.

$$NPVR(m) := NPVR(t_0 = m; 0 \le m \le n) := \sum_{t=m}^{n} \frac{(pi_t - po_t)}{(1+r)^{t-m}} \qquad \text{(Equation 4)}$$

NPVR(n1+1) will be greater than NPVR(n1), because the effect of discounting future payments from n1 to the end of the life cycle n for one period less increases NPV; and losing one period with net cash outflows (n1) in the calculation of the NPV acts in the same direction. NPVR (n1+2) will also normally be greater than NPVR(n1+1), because the reduced discounting of the bulk of net cash inflows is bigger than losing one period with small net cash inflows (n1+1) to 'sunk payments'. Towards the end of the life cycle, the NPVR decreases, because the discount effect fades out and the negative effect of losing periods with net cash inflows dominates. This argument renders the valuation of intangible (project) assets according to *IAS 38* even more conservative, at least at the beginning of the production stage. At later stages in the project, however, in terms of *IAS 38* (paragraph 75), the intangible asset is carried at the re-valued amount: its fair value at the date of revaluation, less accumulated amortisation and any impairment losses.

7.2 *Amortising the project*

Amortisation in terms of paragraph 97 of *IAS 38* has not yet been considered. Paragraph 97 treats the systematic allocation of the depreciable amount of an intangible asset over its useful life. In terms of paragraph 97, depreciation must start in period n1+1. It ends in period n. 'The amortisation method used shall reflect the pattern in which the assets' future economic benefits are expected to be consumed by the entity' paragraph 97. The future economic benefits of the asset are the net cash inflows following its creation. Therefore the time series of amortisation suggested by *IAS 38* can be expressed as in equation 5, which calculates amortisation in time as calculated in period n1+1 (when amortisation starts).

$$A(t = m) = \sum_{t=0}^{n1} po_t * \frac{(pi_m - po_m)}{\sum_{t=n1+1}^{n} (pi_t - po_t)} \qquad \text{(Equation 5)}$$

Amortisation would thus distribute the cost value of the intangible asset as a charge to all the periods of the manufacturing stage of the life cycle according to the proportion of the total cash surplus earned in this period. This would correspond perfectly with the matching principle.

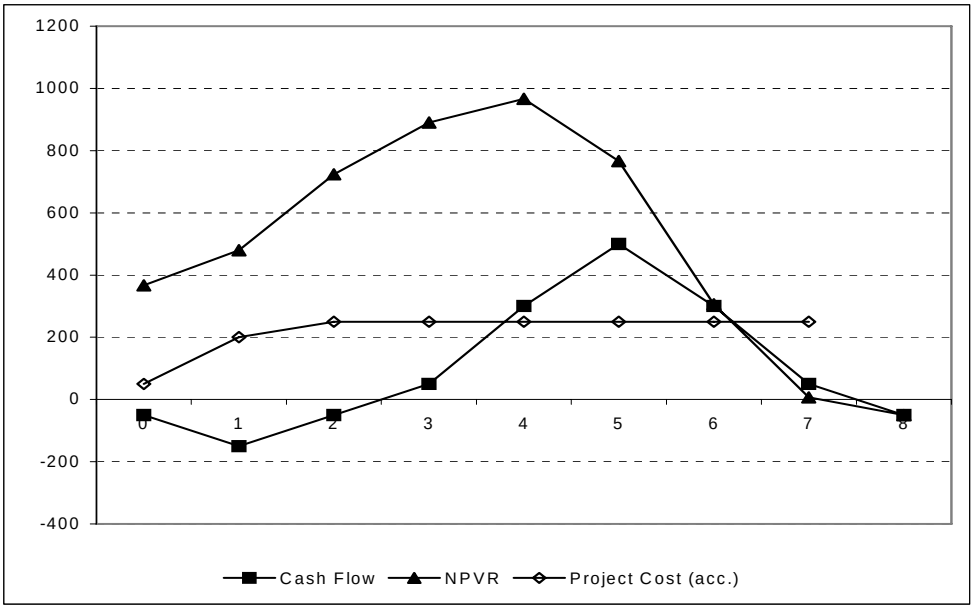
Paragraph 104 of *IAS 38* requires entities to update their expectations of future cash flows of projects regularly in order to adapt amortisation periods and amortisation rates to changing expectations concerning the length of the life cycle or the cash flow pattern. In effect, *IAS 38* thus suggests the extension of project management and control over the entire

life cycle of an innovation project. But it does not compel entities to do so. If entities are not yet managing research and development projects over the entire life cycle of the resulting product(s) and they extend their research and development projects only to the end of the pre-manufacturing phase, then *IAS 38* permits the use of straight line depreciation instead of a depreciation following the pattern of future economic benefits. The message implicit in *IAS 38* is that if the life cycle measured in net cash flows is approximately symmetric around its maximum, the effect of both amortisation schemes on the value of the firm will be nearly identical.

Amortisation is the distribution of sunk costs over present and future periods. It is relevant for the value of the organisation only because of the tax effects. The undiscounted tax effect is identical for all amortisation schemes. Differences can only arise if the (time) centre of gravity of the different amortisation schemes differ. As this difference is not significant with the amortisation schemes permitted in terms of *IAS 38*, the effect on the value of a firm of the amortisation method that the firm adopts is almost irrelevant. This can be demonstrated by means of an example.

Figure 1 Project cash flow, NPVR and accounting costs, before amortisation, of a sample project

Period	0	1	2	3	4	5	6	7	8
Cash Flow	-50	-150	-50	50	300	500	300	50	-50
Project Cost (acc.)	50	200	250	250	250	250	250	250	
NPV	367	422	485	558	642	738	849	976	1122
NPVR	367	479	724	890	966	766	306	7	-50



Periods 0, 1 and 2 are the pre-manufacturing stage, in which the total costs of 250 of the project are accumulated. Periods 3 to 7 are the manufacturing phase with positive net cash inflows. In Period 8, post-manufacturing activities with net cash outflows of 50 have to be carried out. The project illustrated in Figure 1 is highly profitable with an IRR of nearly 50%. NPV has been calculated at a discount rate of 15%.

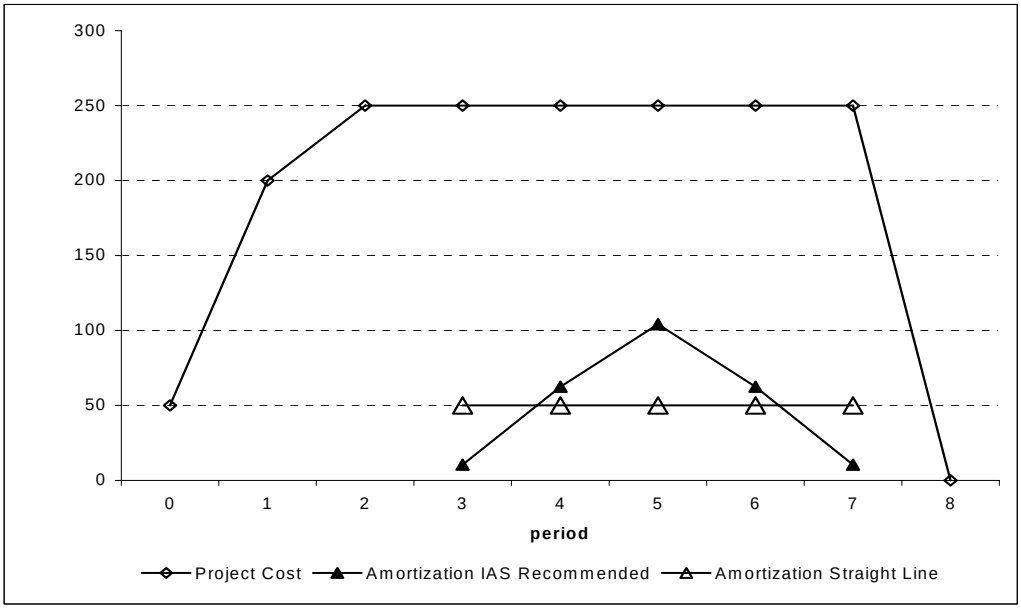
NPVR, the NPV of the remaining cash flows, is the time value of the project for the entity. It is the value at which it makes little difference to the firm whether it will carry on with the project, or sell it to a third party (use or sell the intangible asset according to paragraph 57(b) of *IAS 38*). This value increases from Period 0 to Period 1 because the net cash outflow of Period 0 has already been incurred (+50) and the remaining cash flows are discounted for one period less (+62). From Period 3 onwards, there are counteracting forces. Net cash inflows of the actual period are lost to 'sunk revenues' when moving to the next period (-50 moving from Period 3 to Period 4). But all the net cash inflows of the following periods are discounted for one period less (+126 moving from Period 3 to Period 4). From Period 4 to 5, the diminishing effect of 'sunk revenues' is greater than the value-increasing effect of a shorter discounting period. In Period 6, the time value of the project decreases to its cost value.

In this example of a very profitable project, it is demonstrated that the cost value of a project (the upper limit of the value of the intangible asset created by research and development according to *IAS 38*) is a very conservative measure of the economic value of the project.

Amortisation according to Equation 5 complies with paragraph 97 of *IAS 38* and, through this, to the matching principle of accounting. If estimates of future revenues are collected on a systematic basis, these dates should be used to allocate amortisation. With regard to a true and fair view of the economic situation of the firm, it is of minor importance whether the amortisation method used reflects 'the pattern in which the assets' future economic benefits are expected to be consumed by the entity' or whether straight-line depreciation is used. If the base value for amortisation is systematically less than the true economic value (NPVR), then the method of amortisation can only partially correct a fundamentally biased valuation. Another argument is that the economic benefits derived from both amortisation methods are practically identical.

Figure 2 Amortisation rates according to IFRS

Period	0	1	2	3	4	5	6	7	8
Project Cost	50	200	250	250	250	250	250	250	0
Amortization IAS Recommended				10,417	62,5	104,17	62,5	10,417	
Amortization Straight Line				50	50	50	50	50	
NPV(t=3) for Amortization IFRS				190,58					
NPV(t=3) for Amortization Straight line				192,75					



Although the amortisation schemes suggested by International Financial Reporting Standard (IFRS) and the straight-line scheme allowed by IFRS are significantly different, due to the symmetry in the difference, the NPV of the amortisation rates differs only by about one percentage point.

7.3 *The tax consequences*

The tax consequences of the costs involved in developing a project are regulated by the *Income Tax Act, Act 58 of 1962* (South Africa 1962), in terms of the following sections:

- Non-capital pre-production expenses, other than research and development costs and the cost of acquiring certain intangible assets, are deductible in terms of section 11(a), provided that the organisation is already trading; if it is the first project to be undertaken by an organisation which has not yet commenced trading, the pre-production expenses would be deductible once trading has commenced (section 11A).
- The cost of acquiring an invention, patent, design, or property of a similar nature to be used for the project, is deductible in terms of section 11(gC); if the cost exceeds R5000, it is written off using the straight-line method at 5 per cent of cost (inventions, patents or similar property) or at 10 per cent (designs or similar property).

- Research and development costs are written off in terms of section 11B: non-capital research expenses are deducted in full when they are incurred (section 11B(2)) and capital expenses are deducted at the rates of 40 per cent on cost in the first year and at 20 per cent in the succeeding three years (section 11B(3)).

These deductions and allowances apply irrespective of the amortisation method used for project management or in terms of *IAS 38*. Any difference arising between the amounts deducted for tax purposes and the amortisation amounts would be accounted for, for accounting purposes, as a temporary difference between the tax base of the intangible asset and its carrying amount, by way of a deferred tax liability (*IAS 12*). It is interesting to note that *IAS 38* does not permit the recognition (capitalisation) of an intangible asset arising from research (paragraph 54), but does recognize one arising from development costs (paragraph 57). Section 11B of the *Income Tax Act* does not differentiate between the two. 'Blue sky' research obviously does not give rise to an intangible asset, unless it results in a viable product or project, and would therefore not be capitalized.

7.4 *A change in profit expectations*

Up to now it has been assumed that the project follows exactly whatever the initial expectations were. This is unlikely to happen. If the project turns out to be more profitable than initially expected, nothing will change in the argument above. The cost value of the project is then an even more conservative measure for the value of the project but, because IAS 38 provides for a revaluation, it will nonetheless be the relevant starting point and subsequent amortisation will follow the updated incoming cash flow pattern and will be calculated exactly according to the rules outlined above. If the project turns out to be considerably less profitable than expected, which in reality happens to many innovation projects, then *IAS 38* is fairly vague about what method should be followed. Even more precision has been suggested than is required by IAS 38. If NPVR(n1+1) is lower than the cost value of the project, then the value of the intangible asset must instantaneously be impaired to the lower future value of the project. Due to the discount incorporated in it, NPVR will again be a conservative measure of the value of the intangible asset. NPVR will normally increase for the near future after launch and thus be greater than the value of the intangible asset, which will also be written down from the initial value of NPVR(n1+1).

8 Conclusion

Management techniques such as JIT, lean management and Six Sigma are significantly reducing the level of current assets (inventories) and of the production variances which have to be allocated to such assets. The valuation of finished goods and work in progress is therefore no longer an important accounting or auditing issue. The introduction and adoption of activity-based costing marked a significant shift in the focus of management accounting. Accounting for fixed overheads concentrated on the question whether these overheads were well adjusted to the volume of processes and were justified by the economic success of products related to these processes. Activity-based costing still concentrates on the adequacy of allocating existing fixed overheads to current processes.

Life cycle costing represented a further significant development, moving management accounting away from the 'profit and period' focus towards a 'strategic and value' focus. Strategy is primarily implemented by means of new offers to the market – in other words,

new products. Value is created by offering these products effectively and efficiently. This can be controlled effectively and efficiently using project management techniques.

It has been demonstrated in this article that the move to life cycle costing is supported by *IAS 38: Intangible assets* (IASB 2004e). The valuation concepts of management accounting and financial accounting are therefore converging. As could be expected, financial accounting stands firmly on the conservative side. But the ongoing valuations required by *IAS 38* can best be obtained by means of life-cycle oriented project management. Thus *IAS 38* is an accounting regulation contributing not only to appropriate accounting disclosures, but also to better management of innovation processes.

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