



FINANCE &
MANAGEMENT
FACULTY

INVESTMENT APPRAISAL

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A Finance and Management special report

THE KEY ISSUES • CHECKLISTS • PRINCIPLES OF GOOD PRACTICE • FURTHER READING



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INVESTMENT APPRAISAL

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The aim of this series of special reports is to provide faculty members with a review of a topical theme within the subject areas of finance and management, offering both analysis of the relevant theory and review of the practical application of appropriate management techniques.

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The information contained in this and previous issues of this publication is available (to faculty members only) on the faculty website at www.icaew.com/fmfac.

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FOREWORD

MORE THAN THE NUMBERS



Chris Jackson
Head of faculty



Emma Riddell
Technical manager

Investment appraisal is a key area in most businesses. Decisions concerning capital expenditure, coupled with strategic planning, marketing and organisational design are frequently critical in determining the future success of the business. This document advises managers on how they can contribute effectively to decision making and control during the process of investment appraisal.

Investment appraisal should not be confined to financial appraisal and must take place within the overall strategy of the business. Managers should equip themselves to participate and contribute to all stages of the process. The investment appraisal process includes the generation of ideas, assessment and authorisation, implementation and control of the project. No appraisal technique can guarantee success. All investments involve risk and judgement. A disciplined approach helps management to make rational decisions based on the probable impact of an investment on the future of the business.

The presentation of the proposed investment to the decision makers is as important as the process of gathering and evaluating information. The way such a presentation is made often determines the extent to which the appraisal influences the decision.

This special report is based on a 'Guidance to Good Practice' booklet issued by a predecessor of the faculty in 1986. Remarkably most of the original text remains relevant. The economic theory on which the mathematics are based is little changed and still forms the basis for accountancy examinations. We have added a brief section summarising current issues in investment appraisal – we encourage debate on these issues in this magazine, in the Talk Accountancy online forum (available through the 'ICAEW Community' button on www.icaew.com) or in roundtable meetings (see page 26). These issues are:

- DCF and sustainability;
- the risk that financial tools can be innovation killers;
- credit crunch and the recession;
- globalisation; and
- theory and practice.

When learning investment appraisal, much time and effort is spent on understanding the mathematics. When applied in business, the finances are the bedrock but the management factors become much more important. Managing people, making them accountable for their actions and putting practices in place which, although technically imperfect, allow effective management of the process in a complex organisation are crucial issues. It is about much more than the numbers.

CHRIS JACKSON

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THE KEY ISSUES

THE ART OF INVESTMENT APPRAISAL

Finding the right approach to the appraisal of new investments by a business is crucial to each project's long-term success. Here, we assess the vital factors for the finance director to consider.

WHAT IS AN INVESTMENT?

An investment differs from current expenditure in that it is primarily intended to generate future profits and/or resources out of current revenues and resources. This deferral of revenues involves risk since it commits the business to a line of activity which may not be reversible.

An investment may involve the acquisition of a business, the purchase of fixed assets, the expansion of working capital and specific expenditures, such as set up costs. It may also release assets or working capital elsewhere within the business.

Not all investments are necessarily shown on the balance sheet of a business. Investments in such items as research and development, market development, salary, recruitment and major items of maintenance are commonly written off to the profit and loss account as they are incurred. A distinction should be made between investment appraisal (where the objective is simple value maximization) and what is included and disclosed in conventional financial reports which are governed by law and standards.

Significant investments may involve major commitments for items which are not included in the balance sheet, eg advertising. The principles in this document also apply to such revenue investments.

Capital investments can be categorised into three main groups, depending upon the reasons for the investment.

Replacement – a continuing business is required to replace equipment at regular intervals to maintain its operations following normal wear and tear. In many cases a replacement includes some enhancement to the equipment.

Enhancement – most investments aim to improve operating results, whether by volume increases, cost reduction or improvements in product quality. The investment may be in the acquisition or purchase of equipment, the research and development of new products or the training of people.

Obligatory – a business may be required to make investments to meet legal, contractual or environmental needs which do not apparently contribute to improved financial returns. A full review of the costs and implications should still be carried out to ensure that the investment is undertaken in a cost effective way. ■

Significant investments may involve major commitments for items which are not included in the balance sheet, eg advertising

DOES THE INVESTMENT FIT THE STRATEGY?

Responsibility for the search for new ideas lies with the owner-manager or, in larger concerns, with a specific executive or department. In practice, many new ideas will emerge from operating managers and employees.

Whatever the source of new ideas, some form of regular search should take place. It is important that any ideas which are generated fit into the strategy of the business.

The strategic context of an investment must be agreed before financial appraisal takes place. The strategy of the business determines the commitment of capital resources. Most capital commitments are not reversible without significant loss.

Similarly, investment in new IT systems, such as enterprise resource planning systems or customer relationship management systems, can quickly incur significant, irrecoverable costs before it is clear whether the system will deliver sufficient benefits.

It follows therefore, that all businesses should look at their investment programmes in the context of their business strategy over an appropriate timescale. This timescale is not the same for all businesses. In the long-term this will be governed by the lead time to introduce new products, plant or processes; in the short-term it needs to provide for sufficiently rapid response to competitors' moves.

Competitive strategy

All businesses should have strategies which are capable of being readily communicated internally and externally. The strategy should define the product/market segments which constitute separate strategic business units (SBUs). An SBU can be defined as consisting of a group of products with an identifiable set of customers and competitors not shared with other SBUs in a company's range. A company may have several separate SBUs, each requiring separate strategies.

An investment appraisal should address the following questions.

- To which SBU does the project relate? Is the SBU strategically attractive and strongly positioned?
- To what client problem or business opportunity is the investment a response? Is it a fully adequate response?
- What is the 'no action route', ie the consequences of doing nothing? If the SBU is in severe decline, even an attractive incremental return may fail to produce overall viability and further investment may result in 'throwing good money after bad'. The 'no action route' is important as the base line from which incremental cash flows should be measured at the financial appraisal stage.

IT IN INVESTMENT APPRAISAL

For many businesses, IT is one of the biggest areas of investment today. However, it is also one of the most difficult. While IT projects can promise high returns, they can be particularly risky. It is commonly observed, for example, that the anticipated benefits from IT investments are not fully achieved and the media continues to report high profile failures. Many businesses also struggle to articulate and quantify the benefits of IT systems, reducing the usefulness of the appraisal and investment management process.

What makes IT investment so difficult in practice is isolating the impact of IT from other influences and attributing changes in cash flow to IT systems. The benefits from IT projects, in many cases, are integrally linked with process changes, creating new customer services or providing more data to support decision-making. This makes the benefits often unpredictable, dependent on many other factors and impossible to separate. As a result, the usefulness of established techniques, such as ROI, can be reduced in practice. This also leads onto complex implementation projects which need to go far beyond technology and consider factors such as process change and competitive strategy.

For further information on IT investment, see the IT Faculty's report, *Measuring IT Returns*, details are on the reading list on page 27. ■

- What alternatives have been considered and rejected in favour of the proposal? If the proposal is aimed at removing a production bottleneck, is the investment necessary at all? Could the bottleneck be eliminated by a change in process route or working practices, or could it be designed out of the product?
- How will competitors react to the investment? To the extent that the investment adds to the industry's capacity, or where the aim is to use cost savings to increase market share, it is vital to assess likely competitor reaction. It is highly unlikely that they will do nothing. They may react on price, product quality or services in ways which will erode the gains from the investment. If the project stands or falls on volume gains or the retention of cost savings, the analysis must be very robust.
- How does the investment fit in with a 'winning' competitive strategy for the SBU? Where does it leave the SBU positioned relative to the competition, ie does the investment go far enough or is it an overkill?

Some types of investment depend almost wholly on strategic analysis. The decision to invest may be taken even though normal financial criteria have not been met. Such investments may involve the adoption of fundamentally new technology in a traditional product or range or production process where failure to adopt the new technology may be tantamount to a decision to exit from the business. However, a belated or inadequate technical catch-up programme from a weak competitive position is likely to fail and be a subsequent drain on cash resources.

Relationship with financial resources

The business must be able to provide finance for the investment without over-extending itself.

Since investment commitments are not normally reversible, they create charges on the income of the business whatever the actual form of financing. Where the investment is financed by additional borrowing interest is payable on the increased debt.

For a major investment a business may need to raise new finance or equity. In this case the prior charge on the income is not so readily apparent, but it is equally real. If the business raises new equity and fails to provide adequate dividends, future fund-raising capabilities may be damaged or restricted. Current shareholder control may also be diluted.

It is important to assess the impact of an investment programme on the financial capacity of the business, on a 'most likely', 'downside' and 'best case' basis. For

example, if the income is depressed by a simultaneous drop in volume and margin, and if the charges on the income rise because of higher interest rates, there could be a dangerous reduction in the amount of profit available for distribution or reinvestment. In such circumstances, any large investment which fails to perform to expectations could leave the company financially weakened or vulnerable to takeover.

A series of smaller investments, while intrinsically less risky, could have similar consequences in severely adverse circumstances. There should be flexibility to modify the scale and phasing of an investment programme according to changes in the investing company's financial position.

Where capital rationing applies, the business needs to focus its available resources on its most attractive opportunities (see Appendix 1, on page 19). Explicit criteria for investment priorities are therefore essential. ■

It is important to assess the impact of an investment programme on the financial capacity of the business, both on a 'most likely' and a 'downside' basis

THE PROCESS

Collection of investment information

It is usually the accountant/finance department's responsibility to bring together all the relevant information to enable an investment proposal to be approved, modified or rejected. The accountant should ensure that the information is put together as simply as possible so that the decision is made in accordance with the investment strategy.

The accountant needs input from management in sales and marketing, production, product development and personnel to enable a financial appraisal to be carried out. Subject to agreed levels of authority, the ultimate responsibility for the investment decision lies with the chief executive.

Governance

It is the responsibility of senior management to establish appropriate governance processes and procedures within their organisation. There are three parts of the governance process:

- ensuring the process is properly done and complete;
- ensuring accountability and responsibility, (eg sales changing their minds between making a request and it being delivered); and
- ensuring there is enough granularity in the business case that is approved and signed off to allow the post appraisal review to be done effectively. Post appraisal review need not wait until after completion and 'in-flight' reviews can be useful for larger projects. The process should include regular reviews. Do not wait until afterwards before reviewing progress. In the words of one manager "I want the walking wounded, not the dead". The granularity requires clarity about what you are going to deliver and the timescale, including milestones and no-go points.

An effective governance process filters out poor proposals if managers know they are going to be held accountable. A front page including the formal sign-off by each relevant party is found to encourage a responsible approach to governance.

The senior management team should ensure that progress on projects is regularly reviewed, and the longer term performance monitored against the original decision making criteria – for significant projects this reporting should be to the board. It is also important that clear authorisation limits, and ways of evidencing approval of a project are built into the systems appraising investments.

If things do not work out as planned you will not be finding too many volunteers coming forward as originally promoting and supporting the project. These authorisation levels are dependent upon the size of business and project – in small businesses the owner-manager would usually wish to approve, in larger organisations more sophisticated monitoring and approval processes would need to be put in place.

It is essential that all managers are aware of their own level of authority and do not exceed it. Control procedures should be established to ensure that all limits are strictly adhered to. Procedures should also ensure large projects are not broken down into smaller projects to avoid controls.

Real options

Some commentators have questioned how extensively real options are used and how well they are understood. A brief overview is included here. The faculty produced a Good Practice Guideline in 2002 on this subject*. We would welcome debate on their usage (see page 26 for more details).

Although not widely used, real options analysis makes managers think about why an investment is strategic and how best to structure it.

A real option is the right, but not the obligation, to undertake a business decision, such as capital investment – for example, the option to open a new branch is a real option. Unlike financial options, real options are not tradeable – for example, the company cannot sell the right to open another branch to a third party. While the term 'real option' is relatively new, businesses have been making such decisions for a long time.

This type of option is not a derivative instrument, in the same way as foreign currency and interest rate options. Real options pertain to physical or tangible options (that is, choice) – hence the name. For example, with research and development, firms have the option (choice) to expand, contract or abandon activities in a particular area in the future.

* If you want to follow this up and learn more, please refer to *Corporate Finance and Valuation* by Bob Ryan and the faculty's *Good Practice Guideline 40 'Real Options Techniques in Capital Investment'* – details are in the reading list on page 27.

It is essential that all managers are aware of their own level of authority and do not exceed it – control procedures should be established to ensure that all limits are strictly adhered to

Real options can have a significant effect on the valuation of potential investments but are typically ignored in standard discounted cash flow analysis, where a single expected net present value (NPV) is computed.

The various options embedded in projects are as follows.

Option to delay – when a firm has exclusive rights to a project or product for a specific period, it can delay taking this project or product until a later date. A traditional investment analysis just answers the question of whether the project is a ‘good’ one if taken at a particular point in time eg today. Thus, the fact that a project is not selected today either because its NPV is negative, or its internal rate of return (IRR) is less than its cost of capital, does not mean that the rights to this project are not valuable.

Option to expand – the option to expand exists when firms invest in projects which allow them to make further investments in the future or to enter new markets. The initial project may be found in terms of its NPV as not worth undertaking. However, when the option to expand is taken into account, the NPV may become positive and the project worthwhile. The initial investment may be seen as the premium required to acquire the option to expand.

Option to abandon – whereas traditional capital budgeting analysis assumes that a project will operate in each year of its lifetime, the firm may have the option to cease a project during its life. This option is known as an abandonment option. Abandonment options, which are the right to sell the cash flows over the remainder of the project’s life for some salvage value, are like American put options. When the present value of the remaining cash flows falls below the liquidation value, the asset may be sold. Abandonment is effectively the exercising of a put option. These options are particularly important for large capital intensive projects such as nuclear plants, airlines, and railroads. They are also important for projects involving new products where their acceptance in the market is uncertain and companies would like to switch to more profitable alternative uses.*

* This section on ‘Real options’ is based on the *Business & Finance* training manual, produced by the ICAEW as part of their ACA learning materials, see page 27 for more detail.

We may believe that our actions are based on reason, but in practice our ability to make complex financial decisions is limited

Behavioural finance

Financial decision making, including investment appraisal, is driven not only by rational considerations, but also by aspects of personal and market psychology. The following paragraphs are edited from an article on this subject written in 2001 for the faculty by Professor Richard J Taffler, formerly at Cranfield and now Edinburgh University.**

We may believe that our actions are based on reason, but in practice our ability to make complex financial decisions is limited. This is the arena of behavioural finance, which enables us to improve our performance by recognising the biases and errors of judgement to which all of us are prone.

There is a growing realisation that the theory of market efficiency beloved by financial theorists may be more complex than was originally believed. Also, more importantly, people do not necessarily act rationally as economists argue they should.

Finance professionals are now beginning to recognise that we need to learn from the psychologists about how we make judgements. By recognising that we are human and thus fallible and prone to bias, as opposed to homo economicus, we can significantly improve the decisions that we make.

Behavioural finance is a new discipline that seeks to apply the insights of psychologists to the financial behaviour of market participants and financial decision makers.

Its purpose is very practical. If we recognise our own decision errors and the biases in our judgements to which we are prone, and if we understand the reasons for these, we will be in a better position to avoid making mistakes in the future. Similarly, we ignore the decision errors of others at our peril.

Behavioural finance research is developing rapidly. It is now beginning to answer questions such as the following:

- Why is the premium on equity returns to bonds too high to be explained by risk alone?
- Why are acquisitions bad news, on average?
- Why do corporate managers find it so difficult to terminate loss making projects?

Psychologists teach us that, because of our cognitive limitations, all of us, however professionally well qualified or experienced, are prone to exhibiting key biases in our judgements.

An important behavioural pattern is overconfidence in our abilities. We systematically overestimate what

** ‘Behavioural finance and the finance director’, *Management Quarterly* 13 – this article was based on the book *Beyond Greed and Fear*, by Hersh Shefrin, see the reading list on page 27 for more information.

we can do in comparison with what the objective circumstances warrant. The more difficult the decision task is, and the more complex it is, the more successful we expect ourselves to be. The more information or data we have (the illusion of knowledge), and the more time and effort we put into making a decision, then the more control we feel we have over the outcome, and thus the more confident we are in its success. This is the illusion of control bias.

However, actual performance often has little or no relationship to confidence. Associated with the illusion of control is over-optimism. People are

generally predisposed to be excessively optimistic about the likelihood of particular desired outcomes.

We need to be aware of the psychological biases that are at work in the decisions we make, and as a result be rather less confident about their outcomes. On the other hand, it would be wrong to throw out all of finance theory, which is still a reasonable approximation of what happens in practice. If we exploit our understanding of human behaviour, we will be in a better position to gain competitive advantage. Also, probably more importantly, this will help us to avoid making many decisions that would have gone expensively wrong. ■

We need to be aware of the psychological biases that are at work in the decisions we make, and as a result be rather less confident about their outcomes

CONTENT OF AN APPRAISAL

The content of an investment appraisal can be as brief or detailed as the occasion demands, with the governance process in the previous section flexing accordingly. In certain cases the appraisal may be merely a matter of discipline to ensure that expenditure has been considered and approved at the agreed level of authority, eg the approval to replace salesforce cars (as an example of a routine and non-contentious decision).

More complex appraisals may require greater detail and information from the managers concerning why they

have made particular assumptions, the alternatives they have considered, the risks involved, the way the proposed investment fits into overall strategy and its likely impact on the business.

In the areas of production and engineering, technology and human resources, ensure you have built in some contingency costs.

Listed in the box 'Data to support decisions' (below) are the key items of data which should be considered in the appraisal of proposed investments. A checklist provides a template for a proposal for a major new project. ■

DATA TO SUPPORT DECISIONS

Sales and marketing

- Analysis of the total market by product volume and value; past and projected growth; market share of principal parties. Market research may be necessary for determining this information.
- Targeted niche within market; present and planned market share including impact of proposal on competitors; advantages and disadvantages of the proposed product.
- Historic and projected sales, together with assumptions made regarding price and market share.
- Advertising support required, both past and present.
- Profit generated on base sales assumptions, profit generated on alternative sales and price assumptions; downside risk if sales do not materialise as assumed.
- Consider the "why-us?" point. Is there a unique selling point to provide an advantage?
- Include a competitor analysis especially with a new market or a new product.
- Can any sales be pre-contracted to reduce the risk?

Production and engineering

- If considering a factory extension or move, full details of the required land and buildings, together with area covered, ownership and operating costs.
- Details of proposed equipment, including life-span and reason for choice; advantages over existing equipment and product cost savings.
- Performance guarantees from suppliers; servicing requirements; space available for machinery.
- Operating costs (labour, power, maintenance).

Technology

- The trade-off between cost of equipment and its technological benefits.
- Rate of technological obsolescence; major risks of new technology.
- Compatibility of proposed equipment with current and future development (eg computer equipment).

Human Resources

- Labour requirements for investment and its full cost including salary and pension costs.

- Availability of labour skills.
- Training needs.
- Support cost (eg housing on major construction projects).
- Impact on industrial relations.

Management resources

- Availability of management personnel, in numbers and skills, to implement the investment; impact of releasing managerial staff from an existing business.
- Training needs.

Fixed assets

- Costs of land, buildings, equipment, installation, transport and commissioning.
- Site preparation to accept equipment (eg computer room).
- Grants or subsidised finance available.
- Assessment of useful life.

Working capital

- Investment required in stocks and debtors to support the proposal, with offset of credit granted by suppliers.
- For replacement equipment, the cost of incremental working capital as compared to existing equipment.
- Security of supply of raw materials.

Economic and political factors

- Inflation; interest rates; exchange rates; growth of consumer spending; general economic background of the country.
- Ability to remit overseas funds; other political risks.

Taxation

- Tax treatment of the investment; some may only become viable after tax reliefs.

Alternative projects

- Consequences of not proceeding with the project, ie maintaining the status quo.
- Alternative projects considered and reasons for rejection.

Continued opposite

DATA TO SUPPORT DECISIONS – CONTINUED

Knock-on effects

- Immediate effects on other parts of the business, eg significant changes in overhead structure or the scrapping of a substantial asset.
- Commitment to follow-on investment or maintenance expenditure in the future.

Corporate social responsibility

- What are the financial impacts of energy usage and the carbon reduction commitment?
- What are the recycling costs?
- What impact will this have on the brand and reputation?
- What impact may this have on customers eg their energy usage?

Qualitative considerations

- Benefits from non-financial factors, eg improved employee relations or a better corporate image.
- The justification for social/environmental projects which have no direct financial return.

Section 172 of the Companies Act 2006 requires directors, when promoting the company's success for the benefit of members, to have regard to factors such as the interests of employees and business counterparties, and the company's impact on the environment and the community. Inclusion of relevant factors in an investment proposal provides evidence of such consideration.

CHECKLIST – A MAJOR NEW PROJECT

Checklist of items to be considered when appraising an investment proposal for a major new project. This checklist highlights the significant factors to be considered when appraising an investment proposal. Some of the headings may not be relevant in particular cases.

Project definition

- Proposal description.
- Fit with strategic plan.

Proposed method of financing project

- Sources unique to this project, including grants.
- Any need for major expansion of company's capital base.

Product/service definition

- Description of product/service – applications, technical attributes, product range.
- Patents, licences or franchises held.

Market definition

- Description of relevant markets.
- Market sizes and segmentation.
- Past and projected market growth rates.
- Market competition.
- Planned market share of product/service with reasons.

Marketing approach

- Methods of selling.
- Structure of selling organisation.
- Methods of distribution.
- Promotional activity.
- Pricing strategy.
- Likely reaction of competitors.

Constituents of investment

- Properties – offices, factories, warehouses, showrooms.
- Plant, vehicles, furniture.
- Working capital.
- Asset redundancies.
- Set up costs.

Production facilities

- Plant layout.
- Capacities and plant/labour utilisation.
- Room for future expansion.

Goods and services

- Raw materials.
- Components.
- Subcontracting.
- Packing materials.
- Utilities.

Management

- Skills needed.
- Organisation structure and key personnel.
- Recruitment and training programme.
- Remuneration and benefits.

Labour

- Direct and indirect labour requirements and availability.
- Training and skills needed.
- Trade unions and labour relations.
- Health and safety.

Corporate social responsibility

There should be a section which states that managers have considered the impact on and of sustainability. Bids to the public sector must have a statement demonstrating the business's green credentials.

Continued over the page

CHECKLIST – CONTINUED

Social and environmental considerations

- Emissions of carbon dioxide and other greenhouse gases.
- Emissions of potential local pollutants into the atmosphere.
- Effluents of potential pollutants into watercourses.
- Wastes generated, both hazardous and general.
- Possible impacts on local communities and other stakeholders.
- Potential effect on the local economy

Information systems

Effect on and need for:

- management accounting information;
- computer system; and
- procedures manual.

Financial projections

- Cash flow to end of project.
- Effect over first few years on:
 - profits; and
 - balance sheets.
- Key ratios.
- Financial evaluation (see Appendix 1, on page 18).
- As appropriate:
 - net present value;
 - straight payback;
 - discounted payback;
 - accounting rate of return; and
 - internal rate of return.

- Risk and uncertainty associated with projects.
- Include a reference to whether any element is flexible and could be cancelled later if necessary.

Proposed timetable

- Recruitment/training of key personnel.
- Availability of premises.
- Completion of production facilities.
- Availability of supplies.
- Recruitment/training of employees.
- Target date for normal operation.
- Product launch.
- Post appraisal audit date(s).

Risks

- Including risks and any mitigating actions allows for greater challenge and therefore a stronger case.

Key assumptions

- Be explicit about the base assumptions used to calculate key revenue and cost lines (drivers) and how they relate to the overall market – so no one is in doubt about what has been assumed. The approvers need to be able to assess whether the assumptions are reasonable based on their experience or alternative sources of information.

Be explicit about the base assumptions used to calculate key revenue and cost lines (drivers) and how they relate to the overall market – so no one is in doubt about what has been assumed

BUSINESS ACQUISITIONS

Much of what has been said in the previous sections relating to competitive strategy and the content of an investment appraisal applies equally well to business acquisitions.

For business acquisitions, additional risks and opportunities may arise because responsibilities for the commercial and personnel contracts may be difficult to quantify. Such difficulties demand careful attention to detail and may require the involvement of specialists. A list of key items for consideration is included in the checklist on page 14.

As with all investments, there should be a policy on business acquisitions. The following questions need to be considered.

- Can an acceptable rate of return, growth and earnings per share be maintained from the existing business? Could this be enhanced by acquisition rather than by organic growth or does it need both?
- Are there other businesses in areas in which your management team has some expertise and into which resources could be diverted from existing

businesses, thereby generating opportunities for improved returns?

- Conversely, are there existing businesses which are not earning sufficient return to justify the current and expected levels of expertise, scarce management time and effort and financial resources devoted to them?
- Is the acquisition a defensive move – to stop, for example, a competitor gaining market share, acquiring assets or expertise, or even establishing a foothold in the industry?

From the financial viewpoint, the main items to be evaluated are whether return on investment and earnings per share are likely to be better in the immediate and foreseeable future as a result of the acquisition than they would be if the status quo was maintained.

If the proposed acquisition affects existing share ownership by, for example, diluting earnings or altering levels of control, the effect on the existing business should be considered.

As indicated above, the special considerations involved in investment by business acquisition may require specialist advice. It is essential to have a well thought out approach to acquisitions in the context of the business's overall strategy. The opportunity for spontaneous acquisitions that make sound financial sense are rare.

Academic research shows that most acquisitions fail to achieve their intended goals. Synergy is invariably a stated aim. Based on Rappaport's seven drivers of value, Bender and Ward have created a synergy checklist, left. They state 'if more deals were subject to this kind of analytical rigour, fewer deals might be done!' The checklist provides a way to quantify the potential synergies from an acquisition. ■

SYNERGY CHECKLIST

1. Does this deal increase sales growth (eg by expanding distribution networks or product lines)? Over what period and by how much?
2. Does it increase the operating profit margin (eg by eliminating cost duplication, creating economies of scale, or transferring best practice from one company to the other)? Over what period and by how much?
3. Does this deal reduce our effective tax rate (eg by locating plants or profits in a more tax-efficient part of the world)? Over what period and by how much?
4. Does the deal mean that we can save on capital expenditure (eg by merging manufacturing facilities to improve utilization, or by getting rid of one of the head offices)? Over what period and by how much?
5. Does the deal lead to better working capital management (eg by pooling inventories, or transferring best practice in debtor management)? Over what period and by how much?
6. Does the deal extend our competitive advantage period (eg by extending the brand franchise)? Over what period and by how much?
7. Does the deal reduce our cost of capital? Why? (If both companies have the appropriate capital structure already in place, then their combination should not make a difference.)

Source: *Corporate Financial Strategy*, Ruth Bender & Keith Ward, 3rd edition, Butterworth Heinemann 2009.

For business acquisitions, additional risks and opportunities may arise because responsibilities for the commercial and personnel contracts may be difficult to quantify

CHECKLIST – AN OUTLINE ACQUISITION PROPOSAL

Checklist of items to be considered when preparing an outline acquisition proposal. This list should be read in conjunction with the checklist 'A major new project' on page 11. It is not intended to be fully comprehensive but gives an outline of significant items to be taken into account when considering an acquisition. Specialist advice may be necessary on financing and corporate structure, publicity and stock exchange requirements.

- Source of introduction.
- General description of proposal and how it fits in with business strategy.
- Perceived strengths and weaknesses of the target company.
- Ownership – what is being sold and why.
- Nature of consideration – cash and/or shares.
- Proposed method of financing.
- Description of product or services, patents, licences and franchises.
- Any long-term sales or purchase contracts.
- Market information:
 - size;
 - growth;
 - participation; and
 - competition.
- Production and supplier sources.
- Location and description of operation and assets.
- Details of management.
- Labour, unions and industrial relations.
- Details of pension fund.
- Basic financial data:
 - five year trading and profit and loss accounts and balance sheets;
 - profit projections (for at least two years);
 - financing facilities;
 - accounting policy differences;
 - ratios; and
 - contingent liabilities.
- Future opportunities for developing the business and profit improvements.
- Opportunities for disposal of surplus assets from acquired company or existing business.
- Initial financial appraisal including earnings per share, operating ratios, post tax return on investment and assets employed.
- Acceptable price range.
- Recommendation with reasons.

Specialist advice may be necessary on financing and corporate structure, publicity and stock exchange requirements

PRESENTATION

Presentation is fundamental. There is no point in carrying out a thorough appraisal which is then ignored because it is presented inadequately.

Presentation is a major topic in its own right, but the following suggestions should help:

- tailor any presentation to the needs of the decision makers;
- explicitly state key assumptions made about revenue and cost drivers. For example when acquiring a ship, the forecast may assume daily charter rates are £25,000. Experienced shipping executives may point out that the long term average daily charter rates are on £18,000 and as the ship will be owned for 15 years, using the current market rate is unrealistic; at least prompt them to ask for a sensitivity analysis;
- discuss the results of the appraisal with the relevant executives in advance of any formal decision date;
- use visual aids if appropriate;
- explain the project, not the appraisal technique;
- limit the material you present, but have comprehensive back-up information available;
- present a timetable for the project for all stages through to implementation. Identify individual responsibilities; and
- consider whether each element of the presentation will make a decision easier to reach.

Although each investment decision is unique the need to make such decisions recurs. The process is eased by making the participants familiar with the principles underlying appraisal techniques. General agreement should be obtained on the fundamental questions which the decision makers need to ask and the appraisers need to answer on all projects. ■

PRESENTATION CHECKLIST

- Description of the proposed investment in sufficient detail and at a level to satisfy the least-informed of the decision makers.
- Relationship of the proposed investment to existing corporate plans and budgets.
- Objective of the proposed investment.
- Assessment of effect on market share.
- Assessment of effect on competitors.
- Implications for commitment to further investment.
- Quantification of forecast financial outcome(s) of the proposed investment. The choice of financial measures will depend principally on the expectation of the decision makers.
- Indication of the variable factors in the financial assessment to which the proposed investment would be most sensitive, and the size of the variation necessary to make it unattractive.

The above checklist covers the bare minimum of information needed for significant profit-orientated projects. More information is often necessary.

General agreement should be obtained on the fundamental questions which the decision makers need to ask and the appraisers need to answer on all projects

IMPLEMENTATION CONTROL AND POST APPRAISAL AUDIT

Controls should be established to ensure that each project is implemented according to the investment plans. Controls should also enable management to be informed promptly where deviations arise so that remedial action can be taken.

One option that could be of benefit is that of 'stage gate approval'. This is the idea whereby a project is split into stages, where authority is granted to proceed up to the next stage but further authority is required before proceeding beyond that. For example, in a pharmaceutical or oil exploration company, authority is given for a feasibility study but to proceed on to the next stage, eg a test well, explicit approval is needed based on the new knowledge gained from the feasibility study. The benefit, where there is high uncertainty, is that the investment is subjected to formal reviews and can be killed off early if the latest knowledge indicates it is not promising.

Management may also wish to undertake a post appraisal audit on material projects to confirm that the expected benefits are being achieved.

Although control information can be obtained from the normal management accounts, it is often necessary to set up separate accounts to identify items specific to the individual project.

Deviations from plan may arise from deficiencies in the original appraisal. A comparison of actual with estimated results will help to identify errors of approach which can be avoided in future appraisals.

Implementation control

Project plans and cost estimates should provide a yardstick against which actual progress and costs can be assessed. Plans and cost estimates should be sufficiently detailed, eg by phase and by type of resource, to ensure that project overruns can be identified early enough for management to take action.

All significant changes in project specification should be properly costed, justified and authorised. In addition, regular site and management meetings should be held to assess any current or anticipated problems.

On major, long-term contracts, a system for recording and accounting for commitments and future costs should be established. This enables total costs to be compared against approved expenditure.

Management reporting should be at a frequency which is appropriate to the duration of the project. There is little point in reporting on a monthly basis if a project has a duration of only a few weeks.

Post appraisal and audit*

A post-completion review or audit of an investment decision should include an assessment of the decision-making process, and the results, benefits, and outcomes of the decision.

Post- (investment) completion reviews or audits facilitate organisational learning, and support continuous improvement in the investment and implementation process. They assess, after the fact, the efficiency and effectiveness of an investment appraisal, and management's decision and implementation. Learning is possible from apparently successful investments, as well as those that have not met their objectives. Typically post-completion reviews may consider whether:

- a decision to invest was sound in the first place, by comparing assumptions made in the appraisal with actual values experienced;
- the implementation of the decision was well planned, by considering what went well and what badly; and
- the plan was itself well executed in practice, by comparing both process and outcome with what was intended.

Given these different possible purposes of a review, and because the financial impact of an investment decision is typically felt over several years, a post-completion review of an investment decision may also be conducted in phases. These could include a more immediate assessment of the decision-making process itself, and subsequently a review of the results, benefits, and outcomes of the decision, if necessary broken up by meaningful phases of a project. Unless a review considers how well assumptions made during the decision-making process (for example on markets, technology, competition, wage rates, cost of capital,) were matched by reality, it is unlikely to help improve forecasting, assumptions in future investment cases, or the quality of decisions. Judgment is required on the timing of such comparison.

It is important that post-investment appraisal does not become an exercise in blame allocation – doing so, runs the risk of not receiving honest answers. ■

* For more in this area, please see *Good Practice Guideline 14* 'Post completion review' – details are in the reading list on page 27.

Learning is possible from apparently successful investments, as well as those which are already considered not to have met their objectives

CURRENT ISSUES

Investment appraisal and sustainability

Sustainability is rising up the agenda of many businesses. How does it impact investment appraisal? At the practical end, businesses are considering the impact of sustainability in investment proposals. Examples of typical issues are included in the box 'data to support decisions' on page 10. At the theoretical end there is an argument that DCF is incompatible with sustainability because DCF assumes that events and people in the future have less value than those in the present and that very long term projects may be discounted so much that the present value is insignificant. There is a lack of information on how sustainability is influencing decision making and we encourage debate on this issue. Professors Gray and Bebbington provide the following insight*:

'Just as there is no single method of evaluating investment opportunities, so can there be no single way of incorporating environmental considerations into investment decisions. The traditional investment appraisal techniques – typically, discounted cash flow (DCF), payback and, more recently, contribution to profit or earnings per share (EPS) – have a very real tendency to narrow the range of issues considered and encourage short-term, less risky options. Indeed, the widely acknowledged 'short-termism' of the Western capital markets can now be seen to be driving investment through reference to EPS (and related) criteria.

'The freedom for environmental initiative in such circumstances is limited. 'Payback' clearly and explicitly emphasises the short-term. Furthermore, DCF, which should encourage a longer-term perspective, tends to discourage large projects with an expected life of more than about ten years and, most importantly in an environmental context, inevitably places less emphasis on the events later in the project's life. Thus, for example, a conventional DCF calculation would take little account of a plant's reduced efficiency towards the end of its life (with potential increases in emissions and spills) and would, literally, discount abandonment and decommissioning costs or any other environmentally related problems (such as land contamination) which might then become apparent.

'So, in general, a longer-term and more environmentally sensitive attitude to investment is required but traditional investment appraisal discourages this.

'Accounts have a potentially important role to play here. First, if every investment must meet fixed, immutable, economic criteria under all circumstances then environmental considerations will continue to be marginalised and included by chance rather than by choice. It happens too often that accountants apply and maintain such criteria

and thus prevent wider (environmentally innovative) ones from being applied.

The first step, therefore, is for the accountant to bring this issue to the board's attention and have the guidelines changed in line with environmental policy. There is not much intrinsic (as opposed to PR) value in a policy that cannot be achieved because of conflict with other, more traditional criteria.

'The second step is to be more imaginative in assessing the relative merits and demerits of investment proposals.'

(Source: *Accounting for the environment*, 2nd edition, Gray and Bebbington. 0-7619-7136-X)

Financial tools can be innovation killers

Most companies aren't half as innovative as their senior executives want them to be (or as their marketing claims suggest they are). What's stifling innovation? There are plenty of usual suspects, but the authors finger three financial tools as key accomplices.

Discounted cash flow and net present value, as commonly used, underestimate the real returns and benefits of proceeding with an investment. Most executives compare the cash flows from innovation against the default scenario of doing nothing, assuming – incorrectly – that the present health of the company will persist indefinitely if the investment is not made. In most situations, however, competitors' sustained and disruptive investments over time result in deterioration of financial performance.

Fixed- and sunk-cost conventional wisdom confers an unfair advantage on challengers and shackles incumbent firms that attempt to respond to an attack. Executives in established companies,

Just as there is no single method of evaluating investment opportunities, so can there be no single way of incorporating environmental considerations into investment decisions

bemoaning the expense of building new brands and developing new sales and distribution channels, seek instead to leverage their existing brands and structures. Entrants, in contrast, simply create new ones. The problem for the incumbent is not that the challenger can spend more; it is that the challenger is spared the dilemma of having to choose between full-cost and marginal-cost options.

The emphasis on short-term earnings per share as the primary driver of share price, and hence shareholder value creation, acts to restrict investments in innovative long-term growth opportunities.

These are not bad tools and concepts in and of themselves, but the way they are used to evaluate investments creates a systematic bias against successful innovation. The authors recommend alternative methods that can help managers innovate with a much more astute eye for future value.

(Source: 'Innovation Killers: How financial tools destroy your capacity to do new things', by Clayton M Christensen, Stephen P Kaufman and Willy C Shih, *Harvard Business Review*, January 2008.)

Credit crunch and recession

Since the 2008 banking crisis there has been debate about changing risks, beta factors, interest rates and the availability of capital. Some commentators have questioned the efficient market hypothesis. In practical terms the major impact has been a need for greater diligence in appraising projects because of a shortage of capital. Good times have allowed less rigour to creep into the process.

The credit crunch has meant that markets perceived risks to be much higher than they had previously, so that risk premiums soared. The eventual increase in interest rates was limited only because central banks, under pressure from their governments, intervened in the markets to push down base rates to levels that, in normal times, would be unrealistically low. This helped to compensate for the increase in market rates that would otherwise have resulted from the increased perceptions of risk.

However, many companies found that in practice this made little difference, since they were now unable to raise any new finance at any price anyway (hence the term 'credit crunch'). In this situation the relevant discount rate cannot sensibly be based on any external cost of capital, which is now only hypothetical. What is now relevant instead is the company's opportunity cost of capital – ie the potential return on the most attractive potential project that has to be foregone because it cannot raise sufficient capital.

Globalisation

Case studies and examples of investment appraisal are usually projects undertaken within a company or group. New ways of working are more likely to involve joint ventures and less clearly defined boundaries between businesses. Costs and benefits split across organisations creates greater complexity in investment appraisal.

Globalisation also increases the need to be aware of global suppliers and global competitors when appraising investments.

Managers with international responsibilities should be aware of the diversity in use of strategic investment decision making techniques in different cultures as demonstrated in Table 1, left. ■

Table 1

	USA	UK	Germany	Japan
Number of companies interviewed	11	24	24	11
% using DCF at all on any investments	100	54	54	18
Number of company SIDs	14	26	26	13
% using DCF at all on SID	93	35	35	8
% using DCF as key SID measure	50	12	12	0
% using payback as key SID measure	14	69	69	69
% using ROCE as key SID measure	21	19	19	8
% using ROE as key SID measure	0	0	0	8
% using other key measure	14	0	0	15

This table is sourced from 'Context, culture and the role of the finance function in strategic decisions', by Chris Carr and Cyril Tomkins, *Management Accounting Research*, 1998.

The major impact of the banking crisis has been a need for greater diligence in appraising projects

APPENDIX 1

PRINCIPLES OF GOOD PRACTICE

The New York-based International Federation of Accountants (IFAC) has developed a set of good practice principles for investment appraisal – these are set out below.

The key principles underlying widely accepted good practice, issued by the Professional Accountants in Business Committee of IFAC are:

- A. When appraising multi-period investments, where expected benefits and costs and related cash inflows and outflows arise over time, the time value of money should be taken into account.
- B. The time value of money should be represented by the opportunity cost of capital.
- C. The discount rate used to calculate the NPV in the DCF analysis should properly reflect the systematic risk of cash flows attributable to the project being appraised, and not the systematic risk of the organisation undertaking the project.
- D. A good decision relies on an understanding of the business and an appropriate DCF methodology. DCF analysis should be considered and interpreted in relation to an organisation's strategy, and its economic and competitive position.
- E. Cash flows should be estimated incrementally, so that a DCF analysis should only consider expected cash flows that could change if the proposed investment is implemented. The value of an investment depends on all the additional and relevant cash inflows and outflows that follow from accepting an investment.
- F. At any decision-making point, past events and expenditures should be considered irreversible outflows (and not incremental costs) that should be ignored, even if they had been included in an earlier cash flow analysis.
- G. All assumptions used in undertaking DCF analysis, and in evaluating proposed investment projects, should be supported by reasoned judgment, particularly where factors are difficult to predict and estimate. Using techniques such as sensitivity analysis to identify key variables and risks can help to reflect worst, most likely, and best case scenarios, and therefore can support a reasoned judgment.
- H. A post-completion review or audit of an investment decision should include an assessment of the decision-making process, and the results, benefits, and outcomes of the decision. ■

A good decision relies on an understanding of the business and an appropriate DCF methodology

APPENDIX 2

TECHNIQUES OF FINANCIAL ANALYSIS

Analytical techniques suitable for assessing investment proposals have remained constant over recent decades, despite major changes in financial markets. We highlight these techniques here.

BASIC MATHEMATICAL TECHNIQUES

This section describes how the financial merits of various investment proposals can be assessed, assuming that estimates have been made of the future cash flows associated with a project and that management have decided upon appropriate decision criteria. The five basic approaches of payback, accounting rate of return, net present value, discounted payback and internal rate of return are briefly described below by applying each technique to the set of three proposals outlined in Table 1, below.

Table 1

	Proposal A	Proposal B	Proposal C
Initial investment	£300,000	£300,000	£300,000
Project life	5 years	5 years	5 years
Net cash inflows at end of:	£'000	£'000	£'000
Years 1	70	30	190
2	90	80	150
3	112	120	80
4	133	195	55
5	125	255	35
	530	680	510

Payback

The payback method involves the calculation of the payback period, ie the length of time taken by the project's net cash inflows to equal (and hence 'payback') the initial investment. If the payback period is less than that demanded for this type of project, then the project is acceptable (see Table 2, above right).

Using the payback method, proposal C would be preferred because the relatively large early cash flows ensure the cost of the initial investment is quickly recovered. Proposal C is least likely therefore to represent liquidity problems. However, whilst payback is quick and easy to calculate, it does have the disadvantage that it ignores the benefits arising

Table 2

	Proposal A	Proposal B	Proposal C
Initial investment	£'000 300	£'000 300	£'000 300
Net cash inflows:			
Years 1	70	30	190
2	90	80	110/150
3	112	120	–
4	28/133	70/195	–
	300	300	300
Payback period	3.2 years	3.4 years	1.7 years

after the payback period and it ignores both the timing and size of the net cash inflows.

Accounting rate of return

In this method, the accounting rate of return of a project is compared to the organisation's existing (or target) return on capital employed. Return is calculated as net profit after charging depreciation and either before or after deducting taxation. Capital employed is typically the cost of the initial investment net of any depreciation (net investment) plus associated working capital.

Net investment is used when calculating capital employed to be consistent with using net profit after depreciation for the return measure. Alternatively, the accounting rate return can be calculated using profit before depreciation and capital employed excluding any depreciation.

The accounting rate of return can be determined for each year of the project, but it is usually calculated as an average over the life of the project. Given below are the accounting rates of return for the three proposals, assuming a straight line depreciation policy, a zero scrap value for the investment and assuming additional working capital to be zero (see Table 3, opposite).

Proposal B has the highest accounting rate of return and would thus be preferred using this method. The advantage of the accounting rate of return is that it is readily understood and can be compared with accounting measures of performance. Its main

disadvantage is that the size and timing of the cash flows has been ignored so that any finance costs are omitted.

ARR can also be calculated using initial investment instead of average investment.

Net present value (NPV)

This method provides a quick and simple solution to the problem of allowing for the cost of capital associated with a project. In essence the NPV technique converts future cash sums into their present day cash equivalents. The method assumes that an individual should be indifferent to receiving the present day cash equivalent ('present value') or the future cash sum at the future date. For example, if an individual can lend and borrow money at 12% per annum, then he or she should be equally happy to receive £100 now or £112 in one year's time. If the individual wanted to spend £100 now, either alternative would make that possible, since the cash sum of £100 could obviously be spent immediately and if £112 were to be received in one year, the individual could simply borrow the required £100 now. The loan and interest would total £112 at the end of the year and could then be repaid using the £112 receipt. All future cash sums can be similarly converted into their present value equivalents using present value factors.

When using the NPV approach to assess a proposal, all relevant future cash flows should be determined including associated tax payments and reliefs and government investment incentives. A suitable discount rate should be calculated using the methods suggested in the section 'Estimating a company's cost of capital' on page 23 of this appendix. The discount rate should be calculated on an after-tax basis.

If it is assumed that the relevant cost of capital for the three proposals is 18%, then the discount factors in Table 4, above right, can be used to convert the future cash sums into present value equivalents.

If the cash flows of the three proposals are multiplied by the appropriate factor for that year, then the present values described in Table 5, above right, are obtained

All three proposals have positive net present values and are therefore acceptable, but proposal B has the highest net present value and would therefore be preferred using this method. The implication of a positive net present value is that the proposal is expected to achieve a return greater than that required.

A positive NPV implies a competitive advantage, and it should be clear what this is. A positive NPV without any idea why it is a competitive advantage is likely to be a misguided investment proposal.

Discounted payback

It is possible to combine the concepts of present value and payback to produce a measure known as the 'discounted payback period'. Cash flows are

Table 3

	Proposal A	Proposal B	Proposal C
	£'000	£'000	£'000
a) Total profit before depreciation	530	680	510
b) Total depreciation	300	300	300
c) Total profit after depreciation (a – b)	230	380	210
Average annual profit (c / 5)	46	76	42
Average investment:			
(value of initial investment) – (value of final investment)			
$\frac{= 300 - 0}{2}$	150	150	150
Accounting rate of return:			
average annual profit			
average investment	30.7%	50.7%	28.0%

Table 4

Year	1	2	3	4	5
18%	0.847	0.718	0.609	0.516	0.437

Table 5

Year	Proposal A		Proposal B		Proposal C	
	Cash flow	Present value	Cash flow	Present value	Cash flow	Present value
	£'000	£'000	£'000	£'000	£'000	£'000
0	(300)	(300)	(300)	(300)	(300)	(300)
1	70	59.3	30	25.4	190	160.9
2	90	64.6	80	57.4	150	107.7
3	112	68.2	120	73.1	80	48.7
4	133	68.6	195	100.6	55	28.4
5	125	54.6	255	111.4	35	15.2
Net present value		15.3		67.9		60.9

discounted before accumulating them to obtain the payback period. Hence in the preceding example the discounted payback periods would be calculated as in Table 6, below.

Table 6

	Proposal A	Proposal B	Proposal C
	£'000	£'000	£'000
Initial investment	(300)	(300)	(300)
Present values of inflows:			
Year 1	59.3	25.4	160.9
Year 2	64.6	57.4	107.7
Year 3	68.2	73.1	31.4/48.7
Year 4	68.6	100.6	
Year 5	39.3/54.6	43.5/111.4	
	300.0	300.0	300.0
Discounted payback period	4.7 years	4.4 years	2.6 years

The discounted payback approach takes into account when some of the cash flows arise and hence is superior to the normal payback method. However, it still ignores all the cash flows arising after the discounted payback period.

Internal rate of return (IRR)

One way of overcoming the problem of determining the appropriate discount rate is to find the IRR of the project. The IRR is that discount rate which produces a net present value of zero. It is therefore the 'break even' discount rate and shows the maximum value that the cost of capital can reach before the project becomes unacceptable (assuming the normal sequence of early cash outflows followed by later cash inflows). Unfortunately, there is no direct way of calculating the IRR and so either a computer program is used or various discount rates are tried until an estimate can be made of the discount rate that produces a net present value of zero. The IRRs calculated for the three projects above are as in Table 7, below.

	Proposal A	Proposal B	Proposal C
IRR	20%	25%	30%

The IRRs indicate that all three proposals are acceptable if the cost of capital is 18%. However, the IRR should not be used to rank projects, except in terms of their vulnerability to interest rate changes. The reason is that the value of the IRR has no practical significance, eg the IRR of 30% for proposal C signifies that if the initial investment were financed by a loan at 30%, then there would be no cash surplus or deficit at the end of the five years, as the calculation in Table 8, below, indicates.

However, it is extremely unlikely that the cost of capital will rise to 30% and so if interest costs are substantially less than 30%, then the significance of the 30% figure is lost.

Another feature of IRR estimations is that, occasionally, if there are large future negative cash flows, the internal rate of return can take more than one value.

Table 8

Financing proposal C by a loan of 30%

	Loan balance at the start of the year	Interest payable at 30%	Cash received from the project	Loan balance at the end of the year
	£'000	£'000	£'000	£'000
Year 1	300	90	(190)	200
2	200	60	(150)	110
3	110	33	(80)	63
4	63	19	(55)	27
5	27	8	(35)	-

It is a common misconception that if a project has two IRRs, then the method has ceased to work, whereas in fact such result merely implies that there is both an upper and lower bound to the range of acceptable discount rates. The result occurs because a large future negative cash flow can cause the net present value of a project to fall below zero at low discount rates.

Another important drawback of IRR is that it gives no indication of scale. A 20% return on £1,000,000 is better than a 25% return on £100,000, but just looking at IRR would take you in the wrong direction.

Summary

The five methods of investment appraisal outlined above can give conflicting results and so care is needed when using them. The rankings of the three proposals using each method are given in Table 9, below.

Table 9

	Proposal A	Proposal B	Proposal C
Straight payback period	2	3	1
Accounting rate of return	2	1	3
Net present value	3	1	2
Discounted payback period	3	2	1
Internal rate of return	3	2	1

Of the five methods only the NPV technique takes account of both the size and timing of all future cash flows. It is thus the only one of the methods to indicate by how much the economic worth of the business will increase as a result of accepting a project. The payback period gives an indication of how long the project will require finance and, hence, what demands the project will make on the liquidity of the business. The accounting rate of return provides some guidance as to the likely future effect of the project on capital employed. IRR indicates the maximum value that the cost of capital can reach before the project becomes unacceptable.

In practice it is not usual to calculate all five measures. However, the NPV method does indicate the best long-term investment, but short-term considerations may mean that the payback period and the accounting rate of return have some influence.

Accounting and finance textbooks frequently cite surveys which indicate that most companies use several methods for any significant project – if they all give the same signal to management then it is confirmation and there is nothing lost other than a little time number-crunching, if they point in different directions then it is worth asking why and use this to inform the final decision.

RISK AND UNCERTAINTY

A distinction should be made between the terms risk and uncertainty.

- Risk**
- Several possible outcomes.
 - Based on past relevant experience, assign probabilities to outcomes.
- Uncertainty**
- Future possible outcomes.
 - Little past experience, thus difficult to assign probabilities to outcomes.

A risky situation is one where we can say that there is a 70% probability that returns from a project will be in excess of £100,000 but a 30% probability that returns will be less than £100,000. If however, no information can be provided on the returns from the project, we are faced with an uncertain situation.

In general, risky projects are those whose future cash flows, and hence the project returns, are likely to be variable. The greater the variability is, the greater the risk. The problem of risk may be more acute with capital investment decisions than other decisions for the following reasons:

- estimates of capital expenditure might be for several years ahead, such as for major construction projects. Actual costs may escalate well above budget as the work progresses;
- estimates of benefits will be for several years ahead sometimes 10, 15 or 20 years ahead or even longer, and such long-term estimates can at best be approximations;
- an investment decision may be significant in scale compared to most operating decisions; and
- a major investment may be part of a new business strategy, or new venture, which may have more uncertainty than operating decisions which are part of an ongoing strategy.

Sensitivity analysis

Sensitivity analysis assesses how responsive the project's NPV is to changes in the variables used to calculate the NPV. One particular approach to sensitivity analysis – the certainty-equivalent approach – involves the conversion of the expected cash flows of the project to riskless equivalent amounts.

The basic approach of sensitivity analysis in the context of an investment decision is to calculate the project's NPV under alternative assumptions to determine how sensitive it is to changing conditions. An indication is thus provided of those variables to which the NPV is most sensitive and the extent to which those variables would need to change before the investment results in a negative NPV. The NPV could depend on a number of uncertain independent variables:

- selling price;
- sales volume;
- cost of capital;

- initial cost;
- operating costs;
- benefits;
- cost savings; and
- residual value.

Sensitivity analysis therefore provides an indication of why a project might fail. Management should review critical variables to assess whether or not there is a strong possibility of events occurring which will lead to a negative NPV. Management should also pay particular attention to controlling those variables to which the NPV is particularly sensitive, once the decision has been taken to accept the investment.

A simple approach to deciding which variables the NPV is particularly sensitive to is to calculate the sensitivity of each variable.

$$\text{Sensitivity} = \frac{\text{NPV}}{\text{Present value of project variables}} \%$$

The lower the percentage, the more sensitive is NPV to that project variable as the variable would need to change by a smaller amount to make the project non-viable.

The weaknesses of this approach to sensitivity analysis are as follows:

- the method requires that changes in each key variable are isolated. However, management is more interested in the combination of the effects of changes in two or more key variables;
- looking at factors in isolation is unrealistic since they are often interdependent;
- sensitivity analysis does not examine the probability that any particular variation in costs or revenues might occur;
- critical factors may be those over which manager have no control; and
- in itself it does not provide a decision rule. Parameters defining acceptability must be laid down by the managers.

Probability analysis

A probability analysis of expected cash flows can often be estimated and used both to calculate expected NPV and to measure risk. The standard deviation of the NPV can be calculated to assess risk when the construction of probability distributions is complex.

A probability distribution of 'expected cash flows' can often be estimated, recognising there are several possible outcomes, not just one. This may be used to do the following.

- Step 1** – Calculate an expected value of NPV
Step 2 – Measure risk, for example in the following ways:

- by calculating the worst possible outcomes and their probability;

- by calculating the probability that the project will fail to achieve a positive NPV; and
- by calculating the standard deviation of the NPV.

The standard deviation of the NPV

The disadvantage of using the expected value (EV) of NPV approach to assess the risk of the project is that the construction of the probability distribution can become very complex. If we were considering a project over four years, each year having five different forecast cash flows, there would be 625 (5⁴) NPVs to calculate. To avoid all of these calculations, an indication of the risk may be obtained by calculating the standard deviation of the NPV.

Problems with expected values

There are the following problems with using expected values in making investment decisions:

- an investment may be one-off, and 'expected' NPV may never actually occur;
- assigning probabilities to events is highly subjective; and
- expected values do not evaluate the range of possible NPV outcomes.*

INFLATION

Inflation affects both the cash flows to be estimated and the hurdle rate to be used. Consequently, there are two main ways of allowing for the effects of inflation.

Incorporate expected inflation into both the future cash flows and the hurdle rate

In the NPV calculation, a forecast is made of the actual (money) cash flows that are expected to occur (ie by building expected price increases into them) and then these money cash flows are discounted at the nominal (money) cost of capital. This is the safer of the two methods, because the forecaster has to make explicit assumptions about how the different costs and benefits will increase because of price changes.

Remove general price level inflation from both the future cash flows and the hurdle rate

Alternatively, the forecaster will evaluate the future costs and benefits in today's prices (real cash flows) and then assume that all the future price changes will be the same as the general rate of inflation (eg by using the Retail Price Index). In the NPV method, the real cash flows are then discounted at the real cost of capital (ie the cost of capital after removing the rate of general inflation). The potential problem is that some of the major costs and benefits could have a significantly different rate of price

* This section on 'Risk and uncertainty' is based on the *Business & Finance* training manual, produced by the ICAEW as part of their ACA learning materials, see page 27 for more detail.

change to the general rate of inflation and allowances should therefore be made for such relative price changes. A common error in the past was to discount real cash flows at the money cost of capital, which can dramatically reduce the number of acceptable projects in times of high inflation.

CAPITAL RATIONING

Capital rationing occurs when a business has more acceptable projects available for investment than can be financed from existing funds and is either unwilling or unable to raise the extra finance required to undertake all the acceptable projects. In such circumstances, a choice has to be made between projects, all of which are acceptable according to the normal appraisal criteria. One way of choosing projects is to compute the ratio of the NPV of each project per pound of its initial investment. The projects can then be ranked according to the size of this ratio, with the project having the highest ratio being the most acceptable; eg if projects X and Y require initial outlays of £100,000 and £150,000 and have respectively NPVs of £22,000 and £30,000, then project X would make better use of scarce capital funds with a ratio of 0.22 than would project Y with a ratio of 0.20.

LEASE vs BUY DECISIONS

The lease vs buy decision is always a separately evaluated to the capital project. The steps should be:

1. Determine the incremental cashflows around the project assuming that the capital asset is purchased and any tax benefits are claimed. These cashflows are discounted at the 'weighted average cost of capital' (WACC). The WACC represents the cost of capital and so the appraisal should exclude cashflows relating to financing costs (otherwise double counting occurs). This determines the benefit of the project to the company excluding any financing decisions – in theory you would not undertake capital expenditure that gave a negative NPV.
2. If the option to lease is available then the financing decision should be separately evaluated (as described below) using the after-tax cost of debt as this will in turn impact on the NPV.

In a financial lease, the lessee agrees to make a series of payments to the lessor for the use of the leased asset. The lessee is accordingly in an analogous position to an individual who purchases an asset with a loan and who repays the lender in a series of regular instalments. Each instalment consists of a partial repayment of the loan itself together with an interest payment on the outstanding loan balance. Leasing is therefore a form of debt financing and, in order to make the comparison between buying or leasing an asset, it is usual to assume that the purchase of the asset will be entirely debt

financed (if equity finance were assumed then the higher cost of equity finance would distort the comparison). Buying an asset with finance can be compared to leasing using the NPV method. The cost of buying is the purchase cost less the present value of future tax benefits. The cost of leasing is the present value of the lease payments less the present value of the tax relief from those payments. The discount rate, which is the same for both the purchase and lease calculations, is the after-tax interest rate that would be appropriate for a secured loan of the same duration as the lease agreement.

Whilst in the economic terms used above, it makes little difference whether a business owns or leases an asset, there may be effects on the balance sheet, the tax position and the borrowing powers of the business. Other schemes should be considered, eg hire purchase finance or simply renting the asset. Accordingly, specialist advice should be sought whenever a significant scheme is being considered.

ESTIMATING A COMPANY'S COST OF CAPITAL

A company's cost of capital will be used either as the discount rate in NPV calculations or as the minimum acceptable return when the IRR is calculated. Normally, companies raise finance from two sources:

- their shareholders (equity capital) either directly via share issues or indirectly via retained earnings; and
- lenders (debt capital) usually via bank loans or debenture issues.

In practice, a company's capital structure will usually contain a mixture of both equity and debt. The individual costs of each can be combined to obtain a WACC. This can be calculated as follows:

$$\text{WACC} = \frac{\text{(after tax cost of debt x value of debt)} + \text{(cost of equity x value of equity)}}{\text{value of debt and equity}}$$

The values of equity and debt used in this calculation should be based on market prices and when no market price is available, estimates should be made.

The cost of debt can be estimated by examining prevailing bank interest rates or by computing the IRR of debentures with a market price. The after-tax cost refers to the net interest cost to the company after allowing for tax relief on the interest payments.

The cost of equity to a listed company can be determined by two methods:

- dividend growth model – dividends are assumed to increase on average by a fixed rate (g). Estimates of g can be obtained by analysing the rate of increase of dividends in the past or by using company growth

projections. The approximate cost of equity can then be calculated as:

$$\text{Cost of equity (\%)} = \frac{\text{(next year's dividend)} \times 100}{\text{(current market price of one share)}} + \text{(expected annual dividend growth rate)}$$

Hence if the current market price of a company's share is 200p, the value of next year's dividend is 7p and the expected annual dividend growth rate is 8%, then the approximate after corporation tax cost of equity is given by:

$$\frac{7 \times 100}{200} + 8 = 11.5\%$$

- capital asset pricing model – a company's equity cost of capital can be assumed to be composed of two elements: the rate of return on government (gilt-edged) stock and the market risk premium relevant to a company with that particular level of stock market risk. The return on gilts can be found by examining published redemption yields.

The relevant market risk premium can be estimated once the company's beta factor is known. (Beta factors are published for listed companies by risk measurements services eg London Business School.) Assuming a beta factor of one equals a risk premium of 5%, the approximate cost of equity can be determined as:

$$\text{Cost of equity (\%)} = \text{redemption yield on gilt} + (\text{beta factor} \times 5\%)$$

Hence, if the current gross redemption yield on a gilt is 4% and the company's beta factor is 0.8, then the cost of equity is $4 + (0.8 \times 5) = 8\%$. This figure represents the approximate after corporation tax equity cost of capital.

Determining the cost of equity capital for a company whose shares are not traded is much more difficult, because there is no market valuation for the equity of the company and hence there is no observable measure of the shareholders' required rate of return. In order to assess the equity cost of such a company, it will be necessary, as a first step, to determine the cost of equity of a listed company whose business activities closely resemble those of the unquoted company.

The equity cost of capital of an unquoted company is, however, likely to exceed that of the comparable quoted company. The size of the unlisted company's risk premium depends on an assessment of the relative risks of investing in the unlisted, as compared to the listed company; an assessment which will inevitably be subjective. Specialist advice should be sought. ■

APPENDIX 3

ISSUES FOR FURTHER DEBATE

The faculty is keen to encourage discussion about the issues raised in this report and will host a debate in the near future. If you would like to contribute, please email chris.jackson@icaew.com.

Finance and management are practical skills. In the compilation of special reports we encounter differing perspectives on the topics we cover. We wish to encourage the exchange of views between members to support their careers and also to advance the theory and practice of financial management. To encourage this debate, the faculty would like to invite interested members to participate in a meeting to discuss these issues. If you would like to participate, please contact Chris Jackson on chris.jackson@icaew.com.

1. Investment appraisal and corporate social responsibility

Sustainability is rising up the agenda of many businesses. How does it impact investment appraisal? At the practical end, businesses are considering the impact of sustainability in investment proposals. Examples of typical issues are included in the box on page 10. At the theoretical end there is an argument that DCF is incompatible with sustainability because DCF assumes that events and people in the future have less value than those in the present and that very long term projects may be discounted so much that the present value is insignificant. There is a lack of information on how sustainability is influencing decision making and we encourage debate on this.

How is investment appraisal being influenced by corporate social responsibility?

2. Financial tools can be innovation killers

Most companies are not half as innovative as their senior executives want them to be (or as their marketing claims suggest they are). What's stifling innovation? There are plenty of usual suspects, but the authors finger three financial tools as key accomplices (see page 17).

How valid is this claim?

3. Credit crunch and recession.

The credit crunch meant that markets perceived risks to be much higher than they had previously, so that risk premiums soared. Central banks, under pressure from their governments, intervened in the markets to push down base rates to levels that in normal times would be unrealistically low. This helped to compensate for the increase in market rates that would otherwise have resulted from the increased perceptions of risk. However many companies found that in practice this made little

difference, since they were now unable to raise any new finance at any price. In this situation the relevant discount rate cannot sensibly be based on any external cost of capital. What is now relevant is the company's opportunity cost of capital – ie the potential return on the most attractive project that has to be foregone.

How has the credit crunch affected discount rates in practice?

4. Globalisation

Case studies and examples of investment appraisal are usually projects undertaken within a company or group. New ways of working are more likely to involve joint ventures and less clearly defined boundaries between businesses.

To what extent is globalisation affecting investment appraisal?

5. Theory and practice

In the preparation of this report differences were identified between the comments of practitioners and academics. Chartered accountants can find themselves caught between theory and practice. Three examples were identified.

- Which costs should be included in an appraisal calculation. Theory shows that incremental costs are the only relevant ones. It is not always easy to convince senior managers of this. How common is this issue? How is it addressed?
- The discount rate should be the corporate cost of capital, possibly adjusted for project-specific risk relative to the average risk of the rest of the company's business. In practice the discount rate is one of the easier fudges to make. In one large business we spoke to, all units were required to use the same discount rate, ensuring a level playing field at the approval stage.
- We have included a brief reference to real options. One practitioner questioned how widely these are really understood, commenting, "it would be very interesting to find out who actually uses these in practice as I've never met anyone who does."

To what extent is there a divergence between theory and practice and how is it resolved? ■

FURTHER READING

BOOKS AND JOURNAL ARTICLES

For readers interested in following up on the issues covered in this report, we offer a selection of books, articles and web references.

BOOKS

The following list is presented in order of their amazon rankings, at the time of publication.

*Principles of Corporate Finance**
by R Brealey, S Myers and F Allen, 2008
ISBN: 978-0071275613

Corporate Finance and MyFinanceLab MathXL: Decisions and Strategies
by R Pike and B Neale, 2008
ISBN: 978-0273721468

Finance and Accounting for Business
by B Ryan, 2008
ISBN: 978-1844808977

*Property Investment Appraisal**
by A Baum and N Crosby, 2007
ISBN: 978-1405135559

*Corporate Financial Strategy**
by R Bender and K Ward, 2008
ISBN: 978-0750686655

The Fundamentals of Investment Appraisal
by S Lumby and C Jones, 2000
ISBN: 978-1861526076

Capital Budgeting: Financial Appraisal of Investment Projects
by R Irons et al, 2002
ISBN: 978-0521520980

Corporate Finance and Valuation
by B Ryan, 2006
ISBN: 978-1844802715

Investment appraisal: a managerial approach

by R Pettinger, 2000
ISBN: 978-0333800591

Beyond Greed and Fear
by H Shefrin, 2000
ISBN: 978-0875848723

*Capital Investment & Financing: a practical guide to financial evaluation**
by C Agar, 2005
ISBN: 978-0750665322

FFM RESOURCES

These resources are free to faculty members at www.icaew.com/fmfac

Good Practice Guideline 40
'Real options techniques in capital investment', 2002
ISBN: 1-84152-143-4

MQ webcast
MQOnline webcast covering time value of money- interest, present value, calculation, PV using tables, NPV of a project, IRR of a project, decision rule, problems with IRR, and key learning points, 2001

Management Quarterly
Finance – the cost of equity:
Examination of the cost of equity, the theoretical derivations and use of the dividend discount model, 1999

Good Practice Guideline 14
Post completion review, 1996
ISBN: 1-85355-634-3

Technical Focus 6
Managing strategic investment decisions, 1995

Manager Update 3
Country risk and the cost of capital. A report on the ever-increasing set of choices which face investors when it comes to investing their money internationally, 2004

IT FACULTY RESOURCES

Measuring IT returns
This report addresses the theme of value and considers the challenges faced by many businesses in applying financial analysis to IT investment opportunities, 2008 (available at www.icaew.com/index.cfm/route/163187)

ACA LEARNING MATERIALS

The ICAEW produces a number of training manuals available to purchase at www.gillards.com/icaew.

IFAC RESOURCES

www.ifacnet.com and search on 'investment appraisal'

International guidance to good practice
Project appraisal using discounted cash flow. An international guidance to good practice, 2008
ISBN: 978-1-934779-39-2

Free download at www.ifac.org.

* These books are available through the ICAEW Library & Information Service, along with a further reading list on investment appraisal, available at www.icaew.com/index.cfm/route/167796.

SPECIAL REPORTS

The faculty special reports summarised here were published over the past 12 months and, along with previous issues, are available to members at www.icaew.com/specialreports. They comprise a range of in-depth reports on a single topic, sometimes by a single author, sometimes by a range of experts. They are a vital source of expertise on a variety of topics.



MANAGING PEOPLE

October 2009 (SR26)

Wrongful trading

When trading is tough, companies can become distressed. This special report, written with the help of several experienced professionals,

provides a thorough examination of 'wrongful trading', as well as its implications for directors. It offers a rundown of the legal aspects, including the roles and responsibilities of directors, and provides some practical examples of how cases have been interpreted in court. We look at

the role of third party advisors and interactions with auditors. Also covered is how to monitor performance in a business, to support decision-making and actions if trading becomes distressed. This report does not represent legal advice but offers some key points to be considered.



MANAGING PEOPLE

June 2009 (SR25)

Psychometrics in business

In business, people are often regarded as the most important asset. How then, do we get to understand our people better, and

ensure we have the best people for our business? This report, in association with international business psychology consultancy OPP, was written by Gareth English and Lucy McGee. Together they discuss the tools and applications for psychometric testing, as well as

how this information can help in business. Gaining an insight into someone's personality, or learning to understand their behaviour can take time but psychometrics are able to provide organisations with the human equivalent of due diligence.



MANAGING IDEAS

March 2009 (SR24)

Innovation

Innovation and new product development are often thought of as intensely creative and quite individual processes, making them

difficult to replicate. Whilst there is an element of truth in this – genuine moments of inspiration do happen – it is a myth that successful innovation is an activity for a gifted elite. Instinct with structured techniques and processes, allows creativity to be systematically unlocked and

exploited in what might otherwise look like the most unlikely places. This report by consultants Tony Powell and Rob Anderson describes in detail the methods, principles, and techniques of the innovation process, revealing the common pitfalls, and walking us through the key stages.



KNOWLEDGE

December 2008 (SR23)

The value blueprint

Companies all around the world are facing unprecedented challenges in the current economic crisis. Just as it is too soon to know how deep and

prolonged this downturn will be, it is also too soon to tell which companies will meet these challenges successfully and which will struggle to perform. In this special report, the Corporate Executive Board, the Washington-based organisation which provides research and decision-

support tools to its members, documents its enquiry into the 'value blueprint'. The report aims to pinpoint the vital ingredients determining long-term success in business, to identify which are the best-run companies and to explain how they reached that position.

INVESTMENT APPRAISAL

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