

Exposure Draft

November 2012

Comments due: February 28, 2013

*Professional Accountants in Business
International Good Practice Guidance*

Project and Investment Appraisal for Sustainable Value Creation



International
Federation
of Accountants



IFAC's mission is to serve the public interest by: contributing to the development of high-quality standards and guidance; facilitating the adoption and implementation of high-quality standards and guidance; contributing to the development of strong professional accountancy organizations and accounting firms and to high-quality practices by professional accountants, and promoting the value of professional accountants worldwide; and speaking out on public interest issues.

The PAIB Committee serves IFAC member bodies and professional accountants worldwide who work in commerce, industry, financial services, education, and the public and not-for-profit sectors. Its aim is to promote and contribute to the value of professional accountants in business. To achieve this objective, its activities focus on:

- increasing awareness of the important roles professional accountants play in creating, enabling, preserving, and reporting value for organizations and their stakeholders; and
- supporting member organizations in enhancing the competence of their members through development and sharing of good practices and ideas.

REQUEST FOR COMMENTS

IFAC's International Good Practice Guidance (IGPG) covers management accounting and financial management, as well as broader topics in which professional accountants in business, sometimes in conjunction with professionals from other disciplines, are likely to engage. By setting out principles for each topic, the documents create a contextual background for the more detailed methods and techniques used by professional accountants in business. A significant feature of the IGPG series is its explicit grounding in principles that are generally accepted internationally and apply to organizations of all sizes in commerce, industry, financial services, education, and the public and not-for-profit sectors. The [Preface to IFAC's International Good Practice Guidance](#) further sets out the scope, purpose, and due process of the Professional Accountants in Business (PAIB) Committee's IGPG series.

This Exposure Draft, *Project and Investment Appraisal for Sustainable Value Creation*, was approved by the PAIB Committee.

The proposals in this Exposure Draft may be modified in light of comments received before being issued in final form. **Comments are requested by February 28, 2013.**

Respondents are asked to submit their comments electronically through the IFAC website, using the Submit a Comment button in the [Publications & Resources](#) section. Please submit comments in both a PDF and Word file. Also, please note that first-time users must register to use this feature. All comments will be considered a matter of public record and will ultimately be posted on the website.

The approved text is published in the English language. The PAIB Committee welcomes translation of its publications in other languages. Please contact permissions@ifac.org.

Professional accountants in business work in diverse roles and serve their employers and the public in many ways. Their roles are covered in more detail in [Competent and Versatile: How Professional Accountants in Business Drive Sustainable Organizational Success](#) (2011), which is available on the IFAC website (www.ifac.org/paib).

INTERNATIONAL GOOD PRACTICE GUIDANCE
PROJECT AND INVESTMENT APPRAISAL FOR SUSTAINABLE VALUE
CREATION

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1. Introduction

- 1.1 In the interest of facilitating stronger economies and sustainable economic growth, decisions on resource allocation in organizations require a systematic, analytical, and thorough approach, as well as sound judgment. Project and investment appraisals and capital budgeting, which involve assessing the financial feasibility of a project, should use Discounted Cash Flow (DCF) analysis as a supporting technique to (a) compare costs and benefits in different time periods and (b) calculate net present value (NPV). NPV utilizes DCF to frame decisions—to focus on those that create the most value. Techniques such as real options analysis can be used to enhance NPV as part of managing risk, as well as return for projects, where there is uncertainty and greater flexibility is required.
- 1.2 This International Good Practice Guidance (IGPG) applies to professional accountants in business evaluating investments to support long-term decision making focused on sustainable value creation. Achieving sustainable value creation aligns directly with IFAC's vision: *Recognition of the global accountancy profession as a valued leader in the development of strong and sustainable organizations, financial markets, and economies*. In advocating fundamental principles, this IGPG establishes a benchmark that can help professional accountants deal with the complexities of practice and ensure that their organization's approach and processes are aligned with widely accepted and emerging practices.
- 1.3 Investments include major capital spending and strategic investments, such as product development, and acquisitions and divestitures that shape the future of an organization, or in the case of the public sector, large infrastructure projects (see [paragraph 2.1](#)). Investments generally include all expenditure for future benefit and include staff training and development, research and development, marketing and revenue enhancement activities, and other intangible expenditures. Decision making regarding significant projects in all these areas is enhanced by systematic financial and sustainability analysis.
- 1.4 Organizations with good records in sustainable value creation tend, in the long run, to have better access to capital and a more motivated and productive workforce. Professional accountants in business should be in a position to promote (a) disciplined financial management in organizations and (b) the generation of sustainable value that allows organizations to focus on decisions that maximize expected economic value. To facilitate sustainable value creation, they should also take into account sustainability considerations.¹ Many decisions involve sustainability elements, whether from a technical, economic, environmental, or social perspective, that may need incorporating into project appraisal and investment decision.
- 1.5 In the public and not-for-profit sectors, delivering sustainable value involves ensuring that public funds are spent in the most effective and efficient way and consistent with long-term objectives, and that services provide the desired benefits to society.
- 1.6 This IGPG promotes the need for project and investment appraisal to facilitate long-term decision making and to incorporate sustainability-related considerations. Organizations with explicit sustainable value-creating strategies typically emphasize techniques such as DCF and real options and downplay the role of other short-term measurement criteria, such as payback and earnings per share (EPS) growth. Research shows that a significant number of organizations do not prioritize

¹ See the IFAC [Sustainability Framework 2.0](#) for definitions relating to sustainability.

such techniques when perhaps they should, especially in assessing strategic investment decisions and taking a long-term view. This applies to smaller organizations where their use of such techniques is particularly variable as many rely on relatively simple approaches, such as payback criteria and informal rules of thumb. More sophisticated approaches are needed where a decision is large relative to the business and covers a longer term than most of the organization's decisions.

- 1.7 Organizations should place investment appraisal in a wider strategic context in terms of how an investment supports the achievement of strategic objectives, goals, and targets and responds to opportunity and/or risk. For example, determining whether acquisition or internal growth is most effective in reaching an organization's strategic objectives requires an understanding of the business environment and an organization's specific situation. A wider strategic analysis might include an assessment of (a) market economics, (b) economic profitability across markets, products, and customers, (c) determinants of sustainable profitable growth and competitive position, and (d) alternative options.

The Role of the Professional Accountant in Business

- 1.8 The importance of the role of professional accountants in business in supporting communication of information within organizations and to its outside stakeholders is highlighted in the International Ethics Standards Board for Accountants (IESBA) *Code of Ethics for Professional Accountants* (the IESBA Code). Paragraph 300.2 of the IESBA Code states:

“Investors, creditors, employers, and other sectors of the business community, as well as governments and the public at large, all may rely on the work of professional accountants in business. Professional accountants in business may be solely or jointly responsible for the preparation and reporting of financial and other information, which both their employing organizations and third parties may rely on.”

- 1.9 To this end, it is important that professional accountants in business:

- apply high standards of analysis;
- establish safeguards against threats to the integrity of information flows; and
- bring to bear the fundamental ethical principle of objectivity where conflicts of interest could influence a decision.

In this context, professional accountants in business both challenge and contribute to decision making.

- 1.10 Professional accountants in business play a crucial role in promoting and explaining the key principles of project and investment appraisal in their organizations, both to encourage long-term decision making and to manage uncertainty and complexity. Two key challenges can arise that require their professional judgment.

- Confusion often occurs in understanding a technique's theoretical basis and practical application. Professional accountants in business might find themselves needing to advise on where the connections between the application of financial principles and related financial theory are not easily understood or applicable in a current context, such as when financial markets are in a period of instability.
- Evaluating projects and investments is inherently complex and involves many subjective factors that can affect the outcome of a decision-making process, and ultimately the viability

of an organization. Professional accountants in business can help provide a strategic and operational context, and to estimate the many variables, such as if forecasted cash flows and the cost of debt and equity are being used to fund any project.

1.11 As well as conducting the necessary analysis, and ensuring the quality of information flows, to support the appraisal of the investment, professional accountants in business can play a central part in:

- recognizing the investment opportunity and subsequent assessment of the strategic impact and economic rationale of a potential investment;
- determining the alternatives (many organizations require consideration of at least three alternative investment options in making decisions of any materiality);
- ensuring that information is used in a way that leads to the selection of the best alternative;
- aligning decisions with assessments of subsequent managerial performance. For example, management incentives based on accounting profit could encourage actions that do not support sustainable value generation to shareholders and other stakeholders. A potentially good project (based on NPV criteria), supported by a wider assessment of its strategic importance, could result in poor accounting returns in its early years. Managing sustainability issues could also help prevent future costs or to avoid limitation or constraints to the organization's strategy; and
- subsequent checking to establish whether anticipated benefits have been realized.

1.12 Professional accountants in business who work in a finance and accounting function of an organization may participate in interdisciplinary teams, whether at a marketing, research and development, environmental, health and safety, or other functional interface, that assess the effectiveness of investments. For example, marketing expenditures with longer-term effects, such as product launch advertising and promotions, could be evaluated using DCF to analyze expenditures and earnings. Organizations with significant brand investments often develop DCF-based and other tools to provide insights into the effectiveness of these investments. A typical role in this context is helping to (a) frame the decision(s) and the purpose of the analysis, and (b) select the most appropriate approach and tools given the context of the decision and the end user's information requirements. External experts outside finance and accounting might equally provide data for use in the appraisal, for example, environmental managers might use techniques such as marginal abatement cost curves.

1.13 The professional accountant in business could also help to facilitate integrated governance, management, and thinking by addressing disconnects that can occur across organizations. For example, in improving environmental performance, decisions about purchasing and operating and maintaining assets need to be connected.

2. Key Principles of Project and Investment Appraisal

Scope of This IGPG

2.1 Project and investment appraisal refers to evaluations of decisions made by organizations on allocating resources to investments of a significant size. Typical capital spending and investment decisions include the following:

- Make or buy decisions and outsourcing certain organizational functions

- Acquisition and disposal of subsidiary organizations
- Entry into new markets
- The purchase (or sale) of plant and equipment
- Developing new products or services, or discontinuing them, or decisions on related research and development programs
- The acquisition or disposal of new premises or property by purchase, lease, or rental
- Marketing programs to enhance brand recognition and to promote products or services
- Significant programs of staff development or training
- Restructuring of supply chain
- Revision of distribution networks
- Replacing existing assets.

2.2 Definitions of terms used in this IGPG are at [Appendix A](#). The purpose of this IGPG is to support decisions in organizations for managerial purposes. Where DCF and NPV are used in connection with financial reporting, professional accountants in business should refer to International Financial Reporting Standards or local GAAP requirements. Making investment decisions based on financial reporting criteria rather than value based criteria can be a way of destroying significant economic value for an organization.

2.3 A commonly recognized feature of Islamic Finance is the prohibition of interest. While this may affect the use of corporate finance tools and the approach to investment project appraisals, corporate finance deals with rates of return and not interest rates. Provided conditions of Sharia are met, use of such tools can be compatible with Sharia Law. For example, the estimation of the timings of future cash flow and estimating the value of a proposed project can be used as a reference or benchmark to support decisions undertaken that will be supported by Islamic finance.

The Key Principles in Project and Investment Appraisal

2.4 The key principles underlying widely accepted good practice 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 a DCF analysis should properly reflect the systematic risk of cash flows attributable to the project being appraised, and not the systematic risk of the organization undertaking the project.
- D. A good decision relies on an understanding of the business and should be considered and interpreted in relation to an organization's strategy and its economic, social, 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 changes to potential cash inflows and outflows that follow from accepting an investment.

- F. 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 helps to reflect worst, most likely, and best case scenarios, and, therefore, can support a reasoned judgment.
- G. 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.

3. Application Guidance on Implementing the Principles

PRINCIPLE 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.

- A1. DCF analysis considers the time value of money, based on the premise that (a) people prefer to receive goods and services now rather than later and (b) investors prefer to receive money today, rather than the same amount in the future, i.e., one dollar (or other currency) today is worth more than one dollar tomorrow. An investor demands a rate of return even for a riskless investment, as a reward for delayed repayment. The “risk-free” rate of return is normally positive because people attach a higher value to money available now rather than in the future.
- A2. DCF analysis is appropriate for multi-period investments, that is, where the expected benefit and costs do not all arise within one period. For such investments, DCF supports decision making better than evaluating an investment using payback period or accounting (book) rate of return. DCF recognizes that an investment may have cash flows throughout its expected life and that cash flows in the early periods of an investment are likely to be more significant than later cash flows. Many organizations use several methods for evaluating capital investments, an acceptable practice as long as they only supplement a DCF approach.
- A3. Both the NPV and internal rate of return (IRR) methods discount cash flow, although NPV is theoretically preferable. IRR indicates a potential project’s annual average return on investment in percentage terms. For this reason, it can be useful in communicating an analysis of investment choices to entrepreneurs and employees without financial expertise, and facilitating decisions where the discount rate is uncertain. However, it can provide misleading results in certain contexts. Comparing the IRR with the target rate of return on an investment can be useful in deciding whether to proceed, but it does not reflect the increase in a company’s monetary value flowing from accepting an investment. Furthermore, the NPV approach can incorporate different discount rates for different periods, and cash flow streams of different systematic risks. This allows a proper reflection of changing macroeconomic conditions, such as inflation and interest rates, and the systematic risk of all projected cash flows.
- A4. For a listed company, using NPV as an aid to making decisions is typically consistent with the creation or maximization of shareholder value (or the market price of shares). Maximizing shareholder value implies that projects should be undertaken when the present value of the expected cash inflows exceeds the present value of the expected cash outflows. Any investment that demonstrates a positive expected NPV could contribute to shareholder value because the risk- and time-adjusted expected cash inflows outweigh the expected cash outflows. Where an organization is cash constrained or the range of projects available is constrained by a non-cash

factor, maximizing the expected NPV of the portfolio of projects to be undertaken is the preferred financial decision criterion.

- A5. Many decisions will involve sustainability elements, whether from an economic, environmental, or social perspective, that may need incorporating into project appraisal and investment decisions. Where economic, environmental, and social impacts are important to decision making, information flows, particularly on costs and resulting impact, should be explicitly required where possible. A project or investment evaluation process should identify and incorporate such impacts where they give rise to costs and benefits, which are often not viewed as being a component of direct investment or operational costs. Therefore, these impacts are often referred to as “externalities” but their inclusion with other relevant information enables an organization to better manage these impacts and internalize the costs and benefits.
- A6. As with all decisions in an organization, investment appraisal decisions and DCF analysis rely on good quality information. The characteristics of good information include: accuracy, relevance, reliability, consistency, completeness, and timeliness. All of these can be important in DCF analysis, but usually not all can be included in decision making. Therefore, professional accountants in business are often faced with deciding which of these characteristics could be the most important, given a specific context, and judging the trade-offs between characteristics. One of the more difficult issues to deal with is bias (typically optimism bias) affecting information flows. Bias can be inherent in information that various parts of the organization feed into a DCF analysis and, therefore, can influence decisions. It is important first to recognize bias, then to consider necessary adjustments in a DCF analysis to remove it where possible. Possible bias in forecasts is better addressed by adjusting cash flow estimates rather than the discount rate.
- A7. Completeness of information about a possible project is unusual, and the information available may itself be unreliable. Professional judgment is required where accurate valuation studies would be overly costly or difficult to undertake. Testing the assumptions/estimations and the potential consequences of errors and doing more work on the key items are an important part of project evaluation. These aspects should be exposed to decision makers and not concealed in appraisals.

Public and Not-for-Profit Sector Application

- A8. Governments in some jurisdictions provide guidance on how to appraise proposals, using cost-benefit analysis, before committing significant funds. For example, the governments of Australia, New Zealand, the United Kingdom, and the United States provide guidance on the issues and techniques that should be considered when assessing new regulatory, revenue or capital policies, programs, and projects (see [Appendix B](#) for relevant resources). Such guidance advises public sector departments and authorities on how to undertake conventional DCF-based analysis to calculate NPV, and usually states that most assessments of potential investments require an NPV calculation. As in a commercial setting, the appropriate monetary yardstick for accepting an investment is normally based on a positive NPV, and/or an expected NPV that is higher than or equal to the expected NPV of mutually acceptable alternatives. However, such guidance can offer advice on a broader economic cost-benefit analysis that can be more valuable to the public interest, and in which NPV is only one tool.
- A9. Cost-benefit analysis is broader than financial analysis, because it considers the potential benefits that flow outside the implementing organization or agency. As well as considering the strategic, financial, and economic case for a proposed investment, a cost-benefit analysis could include a number of assessments that consider the potential impact on various stakeholder groups, such as

society, the environment, consumers, and employees. This helps to establish the total welfare gain over the whole life of an investment. Non-monetary qualitatively based information can help to outweigh a negative NPV in a project assessment allowing a proposal to proceed.

- A10. Investments to improve welfare usually generate benefits that (a) do not have a market price and (b) are not easily measurable in monetary terms. Therefore, cost-effectiveness measures can be non-monetary units supported by the use of ratios to link a financial appraisal to the non-monetary benefits arising from an investment. An economic analysis will also involve accounting for costs and benefits from the point of view of society as whole, and, therefore, may include monetary estimates of equivalent environmental costs and benefits.

PRINCIPLE B

The time value of money should be represented by the opportunity cost of capital.

- B1. The opportunity cost of capital is fundamental to investment decisions, and is a significant input to a DCF analysis. Small changes in the discount rate may have a significant impact on the NPV, and IRR, of a project. If the selected discount rate is too high, potentially sound investment projects appear flawed, and, if too low, bad investments look attractive. For example, a project with an initial investment of \$800,000 with annual cash flows of \$500,000 over a 6-year period and a discount rate of 15% will have an NPV of over \$52,000—lower than if the project was considered with a discount rate of 14%. The impact on the portfolio of approved projects is potentially much more damaging from an underestimate of the cost of capital than from an over-estimate. Therefore, organizations should generally try to ensure that there is no bias to underestimating the cost of capital.
- B2. Discounting cash flows reflects the time value of money, which assumes that (a) people generally prefer to receive goods and services now rather than later, even in the absence of inflation, and (b) the promise of money in the future carries risk for which an issuer of security will require compensation. To calculate present value, estimated future cash inflows and outflows should be discounted by a rate of return (commonly referred to as the discount rate) offered by comparable investment alternatives. In applying the cost of capital, professional accountants in business should consider the most appropriate method for determining present value. For risky cash flows, it is typical to discount expected value using a risk-adjusted discount rate (i.e., adjusted for time and risk). However, an alternative approach is to use a certainty equivalent method that makes separate adjustments for risk and time (see [Appendix A](#)).
- B3. In calculating an organization-wide cost of capital, a rate of return is usually required for each form of capital component, whether it is derived from shareholders (equity) and/or lenders (debt). The cost of capital associated with investment and capital budgeting decisions is typically a weighted average of the various components' costs—the weighted average cost of capital (WACC). Determining the cost of equity capital can be particularly difficult, as the application of techniques such as the Capital Asset Pricing Model (CAPM) can be complex, and subject to a number of challenges and limitations.² For example, where there is not an open market for securities, CAPM is not a useful approach to assess and measure risk because of the difficulties of estimating beta (i.e., the measure of an organization's volatility and correlation with the market as a whole). Furthermore,

² For additional information, see [The Final Report of the Kay Review of UK Equity Markets and Long-Term Decision Making](#) (UK Department for Business Innovation and Skills, 2012) for a useful analysis of economic issues relating to market efficiency.

“unlevered” equity betas used to estimate “asset” betas, which are then used to estimate project risk, can overestimate project risk.³

- B4. To provide organizations flexibility in applying and estimating the cost of capital, International Accounting Standard 36, *Impairment of Assets*, issued by the International Accounting Standards Board, suggests that an organization could also take into account its incremental borrowing rate and other market borrowing rates. As an entirely debt-funded organization would be of high risk, there is always an implied equity (i.e., risk absorbing capital) element and this concentrating risk will have a higher implied cost. Therefore, professional accountants in business should be aware of the disadvantages associated with these methods and apply them appropriately given the organizational context. For example, depending on the debt-equity ratio, the cost of debt, the nominal borrowing rate, and the WACC will provide varying values. Thus, for a lowly-leveraged organization, the use of the incremental borrowing rate as the cost of capital could lead to an inappropriately low estimate for cost of funds in use.
- B5. When using CAPM or alternative techniques to estimate the cost of equity, professional accountants in business should be familiar with the financial theory that underpins them, and their implications for determining the cost of capital. The application of CAPM as a measure of risk can be particularly problematic as it is based on portfolio theory, which assumes that markets are efficiently priced to reflect greater return for greater risk, and that investors are perfectly diversified. This suggests that investors should only be compensated for systematic risks that affect their whole portfolio of shares (see [Principle C](#)). Although CAPM might be used as a basis of understanding the relationship between expected risk and expected return, the assumptions upon which it is based should be understood and challenged. Various approaches could be used to enhance the application of CAPM and its beta coefficient (see [Appendix A](#)). Consideration should also be given to sustainability-related risk, or other forms of diversifiable risk, that might be priced by the market despite their omission from asset pricing models.
- B6. Sustainability-related risks without an intergenerational dimension can be estimated and ranked, and expected benefits and costs incorporated into the appraisal in the form of cash flows. Incorporating sustainability into the cash flow analysis ensures that cash flows account for the expected costs of not investing in a sustainable path. However, the choice of cost of capital becomes more critical to a valuation decision the longer the time period for which the cash flows occur. A criticism of discounting is that it places lower importance on the needs of future generations and, therefore, has implications for intergenerational equity. For example, if seeking to take account of environmentally linked deaths, to attribute a value today of 100 per death, a discount rate of 10% would effectively mean that 10 deaths in year 25 were equivalent to one death today. Certain benefits and synergies relating to improved sustainability performance might be penalized in a DCF analysis, particularly with larger outlay and longer payback periods.
- B7. An approach to deal with an project investment proposal involving potential substantial and irreversible intergenerational wealth transfers, which can be the case with environmental issues, such as global climate change or biodiversity that have potentially significant impacts on future generations, is to use declining or variable discount rates so that future values are increased. This can be achieved by using the certainty-equivalent discount factor or a hyperbolic discounting model, which assigns greater importance to the distant future by making the per-period discount

³ Antonio E. Bernardo, Bhagwan Chowdhry, and Amit Goyal, “Assessing Project Risk,” *Journal of Applied Corporate Finance*, Summer 2012, <http://onlinelibrary.wiley.com/doi/10.1111/j.1745-6622.2012.00393.x/abstract>

rate change over time rather than using a constant discount rate. A pragmatic approach is to apply several discount rates to test the sensitivity of the outcome (see [Principle F](#)) and incorporate sustainability risk and constraints into the wider decision-making process by ensuring that undesirable environmental and social effects are adequately understood and managed within a project and not obscured by an inappropriate approach.

Public and Not-for-Profit Sector Application

- B8. The discount rate used by governments in evaluating projects and policies over time is often referred to as the social discount rate, which is typically based on the social rate of time preference. The social rate of time preference is defined as the value society attaches to present, as opposed to future, consumption. Some governments, such as in the United Kingdom with *The Green Book: Appraisal and Evaluation in Central Government*, stipulate the use of lower discount rate for the longer term (defined as beyond 30 years) where the appraisal of a project proposal depends materially upon the discounting of effects in the very long term. A schedule of declining discount rates is provided. Social discount rates can be set in line with the risk-free market rate of return, although it might be argued in some cases that it needs to be lower to reflect that society tends to be more concerned about the future than individuals are.
- B9. Lowering the discount rate used in a cost-benefit analysis can help environmental projects that require large investments today and that are expected to only reap benefits far into the future. However, the purpose and effects of lowering the discount rate need careful consideration as such an action can increase the overall risk of such an investment. Furthermore, in some cases, low discount rates may speed up the overall level of investment and demand for natural resource inputs and increase the waste outputs from production, leaving fewer resources available and a more polluted environment to be inherited by future generations.

PRINCIPLE C

The discount rate used to calculate the NPV in a DCF analysis should properly reflect the systematic risk of cash flows attributable to the project being appraised, and not the systematic risk of the organization undertaking the project.

- C1. The discount rate an organization uses to assess an investment opportunity should be calculated separately, and should not necessarily be the same as the overall cost of capital for the organization. A potential investment with a high systematic risk will always be risky, irrespective of the investor or the organization. An organization with a perceived lower risk should not use its overall cost of capital to appraise an investment that is potentially more risky or more certain. For example, a simple cost-saving project that has no other effects, such as on customer's value perception, may be of relatively low risk. Entry into a new market with a new product may have relatively high risk. Although an organization-wide cost of capital could be the starting point for considering discount rates for project risk, it can only be considered an appropriate discount rate for projects that have the same risk (and hence the same required rate of return) as an organization's existing business.
- C2. Organizations considering an investment with high specific risks often use a high investment hurdle rate rather than using the organization's discount rate, therefore departing from a lower cost of capital that is calculated using the portfolio approach. There is no theoretical basis for setting a very high hurdle rate to compensate for high specific risk or a risk of failure. It is a matter of judgment, which can be supported by calculating the probability-weighted expected value of cash flows of an

investment. This could be achieved by developing several scenarios and assigning them probabilities of realization, including a probability of a project failure if applicable (see [Principle F](#)). Organizations should be aware of the potential behavioral issues that can arise where an investment hurdle is higher than the cost of capital for a project. In some situations, it could encourage bias in projections.

- C3. Where a risk adjustment takes place as an adjustment to the discount rate or to expected cash flows, or combination of both approaches, it is important to avoid double counting or miscounting risk. The danger of building up “additive models” for a variety of risk factors is over discounting for risk. Risk can also be considered and analyzed in a post-valuation adjustment through a sensitivity analysis (see [Principle F](#)), for example, with the adjustment taking the form of a discount for potential downside risk or a premium for upside risk.

PRINCIPLE D

A good decision relies on an understanding of the business and should be considered and interpreted in relation to an organization’s strategy, and its economic, social, and competitive position.

- D1. Decisions, especially those taken in a relatively high-risk environment, involve cash flow estimates based on judgment. Hard and fast cash flows rarely exist. An investment and DCF analysis should probe behind cash flow estimates to understand both the nature of a positive NPV and the source of value over the opportunity cost of capital. Various aspects relating to environmental and social performance can be particularly difficult to quantify, such as the valuation of ecosystem services. However, opportunities and risks, and impact on strategy arising from issues such as climate change, can be determined using estimates and qualitative criteria. In reality, the idea that ecosystems might be of financial or economic value has conventionally been given little attention in the “hard” measures that are used to assess and report on company performance. In the worst case, undervaluing ecosystems may have served to undermine business performance by failing to identify new cost-saving or revenue-generating opportunities, or to highlight potentially costly liabilities.⁴
- D2. The NPV is only one criterion that supports an evaluation of a potential investment. It should be coupled with a review of (a) the investment’s strategic importance or (b) its alignment with the strategic themes and objectives that have been outlined in a strategic plan. Strategic imperatives and goals, such as achieving particular environmental or social goals, can influence the qualitative and quantitative data that is incorporated into the project appraisal. [Figure 1](#) shows that the DCF model and analysis is only one part of the decision-making process, which starts with a strategic context, followed by a process of incorporating the relevant data, constructing the DCF model, interpreting results, and followed by a post decision review.

4 World Business Council for Sustainable Development, Corporate Ecosystem Valuation: Building the Business Case (2009) www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=13554&nosearchcontextkey=true

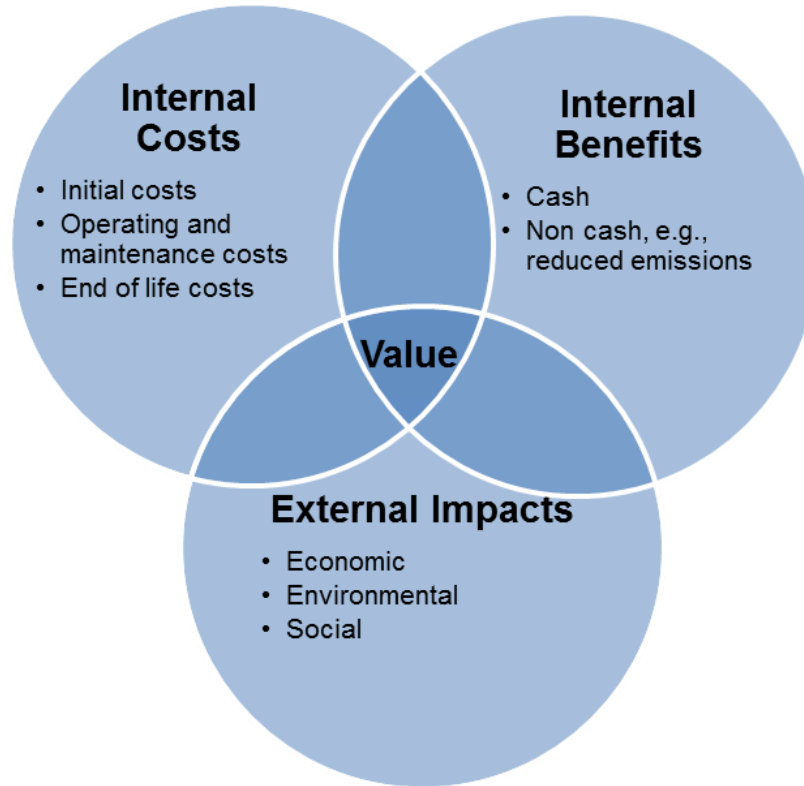
Figure 1: The Project and Investment Appraisal Decision Process

Strategic context	Incorporating data	DCF model	Interpret results	Post decision review
<ul style="list-style-type: none"> • Strategic objectives • Goals and targets • Risk management • Competitive position • Stakeholder engagement 	<ul style="list-style-type: none"> • Internal costs • External costs • Benefits 	<ul style="list-style-type: none"> • Identify cash flows • Determine forecast assumptions • Forecast horizon • Estimate cost of capital 	<ul style="list-style-type: none"> • Sensitivity analysis • Scenarios • Real options • Review of project alternatives 	<ul style="list-style-type: none"> • Review costs/benefits • Review assumptions • Review process

- D3. In a strategic context, professional accountants in business could encourage consideration of a range of stakeholders in assessing potential investments and conducting their analysis. Stakeholders include employees, managers, communities, customers, suppliers, the industry, and the general public. For example, discussing sustainability issues with stakeholders helps to gauge their importance and magnitude. Stakeholder interactions can be a critical part of enabling, validating, and quantifying monetary and non-monetary benefits and costs. These lead to a better understanding of the impacts of making strategic and operational changes, such as in terms of customer spending, supplier relationships, and employee productivity and motivation.
- D4. Discussions and judgments on an organization’s competitive environment and position could contribute to an understanding of whether an asset might be more valuable in the hands of another, as well as highlighting significant forecasting and assumption errors. A DCF and investment analysis is particularly useful in evaluating an organization’s strategic position so that sources of competitive advantage can be better understood. Improving the quality and relevance of financial forecasting can be achieved by identifying drivers of sustainable competitive advantage, for example through product attributes and price.
- D5. In its simplest form, NPV as a decision criterion is not flexible in handling follow-on investments linked to an initial investment. Real options analysis however can be a useful enhancement to a DCF analysis as part of managing risk as well as return. Used for several decades in some industries, it is now an emerging and evolving area of practice, more widely in valuation and investment appraisal. It can be seen as an extension of DCF analysis, and complementing techniques such as Monte Carlo Simulation that enables the identification of uncertain variables and how they behave (see [Principle F4](#)). Options analysis accommodates real-life scenarios in which cash flows often depend on decisions that will only be made after resolving uncertainties. The use of options can enhance DCF analysis by incorporating uncertainty and flexibility. Both are often important aspects of managerial decision making, for example, by being able to up-scale investments if demand warrants. Real options that typically represent adjustments that can be made to projects following a decision to invest include the options to abandon, expand, scale-back, delay, or outsource.

- D6. Real options analysis can be useful in evaluating decisions for investments whose value lies in their providing the organization with future investment opportunities that would otherwise not be open to it. Where a project is planned to start sometime in the future, a real options approach can help evaluation where there is a need to safeguard or make good use of resources or rights necessary for the project, if it goes ahead, in the meantime. Because of the potential additional complexity, real options analysis is often applied to significant investments that warrant the additional costs of analysis, and can be particularly useful in managing projects with a large sustainability component as well as those with high technical or market risks. It can also be useful to consider the way options are communicated and expressed to managers, such as the potential opportunity value approach.⁵
- D7. When to make investments remains an important decision that, in every case, requires careful analysis. The benefits of a potential investment could exceed its costs, but postponing it or undertaking it in a phased way could change the project risks and the time profile of benefits and costs and, therefore, the investment's or project's NPV. Projects generally have some mutually exclusive alternatives (e.g., invest now or later) or there may be options that could be exercised at different stages (e.g., make or buy, or make now, buy later). Additional costs at an early stage to preserve such options for a later stage may be worthwhile.
- D8. Key inputs into a project and investment appraisal process (as depicted in [Figure 2](#)) include those costs and benefits that are external to the organization (i.e., those that accrue to society or to identifiable third parties). External impacts can be internalized by incorporating appropriate costs and benefits into the decision-making process. Complementary tools and techniques, such as environmental management accounting, full cost accounting (FCA), lifecycle assessment, and costing or whole life costing, and wider enterprise risk management can help to identify and quantify costs and benefits, and risks and opportunities related to both current and future strategies and operations. These tools and techniques help to bring into the project appraisal additional forms of analysis, including evaluations of external impacts, social impacts (e.g., health and safety or labor practices), economic impacts of decisions (e.g., for communities and suppliers), and environmental impacts (e.g., biodiversity and pollution). External impacts will relate to the identification and quantification of cash and non-cash costs and benefits accruing to both the organization and to society as a whole arising from the project or investment being appraised.

⁵ Stephen Jenner, "Business Change: Capturing All Forms of Value" *Insight*, April 2010 (CIMA 2010), www.cimaglobal.com/Thought-leadership/Newsletters/Insight-e-magazine/Insight-2010/Insight-April-2010/Business-change-capturing-all-forms-of-value/

Figure 2: Key Inputs into a Decision Analysis

Through a better understanding of these wider impacts and externalities, relevant costs and benefits can be incorporated into the appraisal to give a more complete picture of sustainable value creation. FCA can also be used to help represent an income statement to show stakeholders how sustainability-related costs and benefits directly impact financial performance, and to highlight the external costs and benefits to the environment, society, and the economy.⁶

- D9. The analysis of risk, costs, and benefits related to social and environmental factors can be more complex because of their uncertain nature and timing. Difficult to estimate variables increase the complexity of the investment decision-making process, such as changing technologies, future regulation, and changing expectations of stakeholders. However, expected costs could be incorporated in the decision-making process if legislation can be foreseen that internalizes external costs for certain waste, emissions, materials, or externalities. For example, this could be the case for carbon taxes or new environmental controls, which is typically the case for utility companies, such as American Electric Power that invested more than \$7 billion on environmental upgrades and controls since 2000.⁷ Cash benefits of increased environmental performance include reduced energy costs and reduced waste disposal costs, and costs can include capital expenses, disposal costs, and operating and maintenance cost increases.
- D10. Opportunity costs should be considered in an investment appraisal and DCF analysis. The opportunity cost reflects the best alternative uses to which goods and services could be put.

⁶ One example of this is PUMA's Environmental Profit and Loss Report (<http://about.puma.com/puma-completes-first-environmental-profit-and-loss-account-which-values-impacts-at-e-145-million/>)

⁷ Katherine W. Parrot and Brian X. Tierney, "Integrated Reporting, Stakeholder Engagement, and Balanced Investing at American Electric Power," *Journal of Applied Corporate Finance*, Spring 2012

Proposed investments could divert resources from other projects, possibly in parts of the organization other than those taking the immediate decision, and the loss of cash flows from these other projects are opportunity costs that should be considered in decision making. Typically, opportunity costs are difficult to estimate, especially when they arise internally in an organization. In such a case, wide consideration of the issue is desirable where the point is material, which could well involve different corporate functions or otherwise unaffected fellow subsidiaries in a group. When a resource is freely traded, its opportunity cost is equal to its market price. Therefore, the amount an organization pays for process input or receives for a process output is based on actual prices. An example of relevant opportunity costs in making investment choices in the provision of transport is a (a) choice between method of transport or different routes for road and rail links, (b) engineering choice, for example, between tunnels and bridges, (c) choice between approaches to improving transport, such as infrastructure investment versus improved maintenance options, and (d) choice between public and private provision, or a mixture of both.

PRINCIPLE E

Project 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.

- E1. Organizational strategy and business planning typically produce a range of investment options, some of which could need consideration and review. Each option can be appraised by establishing a base case that reflects the best estimate of its costs and benefits, and from which incremental cash flows can be estimated. These estimates can be adjusted by considering different scenarios, or the option's sensitivity to changes can be modeled by changing key variables. It is usually helpful to determine which variables may lead to a different outcome for a base case and each option, and it could be useful to invest time to quantify these. Incremental cash flows allow, for example, an analysis of the effect of a make or buy decision. In deciding whether to make or buy components or replace machinery, for example, the increased costs associated with the purchase and installation of new machinery/technology should be weighed against the savings.
- E2. Three major variants of DCF evaluation are available, depending on the nature of the project. In an *ungeared* analysis, the project cash flows are discounted at the WACC (the company's target gearing) before any financing but post tax (these flows are the free cash flows to the company). This is the generic approach most often used to evaluate projects. It assumes that project gearing is stable over time and that all parties have free access to the cash from the project. In a *geared analysis*, the project cash flows, including those attributable to debt financing (and so "geared") but post tax (these flows are the free cash flows to equity), are discounted at the cost of equity, which should be flexed as project gearing changes. This approach is better suited to projects with dedicated and variable funding requirements, such as leveraged structures and project finance or those using funding from official sources, local development schemes, or international development organizations that are not accessible to the organization generally but only for the particular project. The geared approach is also valid in situations where an investor is seeking a particular return, for instance, private equity investors. A final sophistication is the *shareholder* approach, which deals with cases where the shareholder may not have free access to the cash, as might be the case in analyzing overseas investments, and when a project's financing structure, applicable regulation, exchange controls, or tax constraints affect the project's ability to remit cash back to equity

investors. In this approach, the cash flows actually expected to be made and received by the shareholder (post tax) are discounted at a WACC appropriate to that shareholder.

- E3. DCF analysis commonly models after-tax cash flows arising from the investment, with such cash flows discounted at a post-tax rate of required return. Only cash flow is relevant in DCF analysis, not accounting net income. If working from projected forecast profit and loss accounts, these should be converted into cash flows (earnings are usually reported on an accrual basis according to generally accepted accounting principles). Adjustments to profit to derive cash flow include (a) adding back depreciation, (b) reflecting changes in working capital, (c) deducting future capital expenditures, and (d) reflecting particular tax allowances or accelerations or deferrals applicable to the project. For example, the cash flow effect of investment in inventories can be measured by considering whether additional cash has been required at the beginning or end of a year. If cash was released by depleting inventory, the resulting cash flow effect is positive. Working capital is usually a cash outflow at the beginning of a project, as more cash is required at the beginning of a new investment project. Liquidating working capital at the end of an investment project usually produces a cash inflow but the disposal value may be more or less than the book value.
- E4. At any decision-making point, only cash flows that arise in period 0 (the period of initial investment); in subsequent periods they should be considered relevant in appraising projects. Incremental cash flow equals cash flow for an organization with the project less cash flow for the organization without the project. Comparing a potential investment against the option of not investing facilitates an understanding of the benefits from making the investment.
- E5. 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. Past events and expenditures (often referred to as costs of goods and services already incurred, or “sunk costs”) should not affect a decision whether to pursue a potential investment. Therefore, they should generally be ignored in decision making. Investments do not necessarily need to be completed solely because of significant past expenditures.
- E6. Inflation should be considered in investment appraisal and DCF analysis. It affects cash flows, reducing the purchasing power of net cash flows over time. Inflation should be properly reflected in the nominal discount rate and in the projected cash flows, because projecting cash flows in real terms (i.e., excluding inflation) will make it difficult to properly state cash outflows related to tax payments. A real discount rate should be used to discount real cash flows (and a nominal discount rate used with nominal cash flows). Inflation assumptions in the forecast cash flows, which may vary from item to item in the analysis, should be consistent with the overall inflation assumptions inherent in the discount rate.
- E7. DCF analysis using nominal prices usually requires inflation forecasts, although forecasting inflation over a long period is not usually reliable. In this case, the impact of different inflation rates on expected cash flows, and on debt service, can be modeled in a sensitivity analysis. Where the discount rate is used in nominal terms, cash flows should also be expressed in nominal terms. If inflation is not very high and is consistently applied to nominal cash flows and nominal discount rate, the difference between actual and projected inflation rates should not materially affect the NPV. Inflation rates for various variables such as rents, labor, different materials, energy, and sales could also be different. In some trades, purchase or sales contracts may contain price variation clauses as certain costs change and care is needed in such cases.

- E8. Cash flows should be measured after corporate tax. Where a proposed investment changes the tax liabilities of an organization, the tax effects should be included in a DCF analysis, and incorporated into the cash flow at the correct time. Cash received, and cash paid or committed, have an immediate effect on the amount of cash available to the organization; this immediate impact is referred to as the *direct effect*. An event or transaction can change an organization's tax obligations; this impact on an organization's tax payment for the period is referred to as the *tax effect* or *indirect effect*.
- E9. Terminal, or residual, cash flows should be considered where plant, buildings, and other assets deployed during the investment project have a residual value or cost. Assets could have an alternative use within an organization, in a second-hand market or as scrap. In other cases, their disposal or recycling, perhaps relating to environmental legislation, attracts a cost. Where the terminal value in a project is significant, particular attention should be paid to the assumptions underlying it, to ensure that they are reasonable and sustainable. The costs of de-commissioning, making safe, or guarding of premises, installations, or workings may continue, sometimes for long periods after the project ends.
- E10. The additional effects of a proposed investment on the rest of an organization should be considered. This involves considering the effects on after-tax cash flows elsewhere. For example, a new investment might affect sales of other products—positively or negatively. It is usually unlikely that cash flows will be “normalized” from period 0. Incidental effects should be considered in the context of overall strategy, so that investment decisions support strategic objectives. Set against a scenario of a competitor purchasing a site to establish a store, a retailer could open a second store in a town, which could detract sales at its first store, or invest in internet sales that could decrease earnings at all its stores. This loss elsewhere becomes a relevant cash flow in appraising the new investment. However, although this investment could be out-ranked in terms of potential NPV by another opportunity, the retailer could decide to acquire a second site elsewhere for strategic and competitive reasons.

Public and Not-for-Profit Sector Application

- E11. In the public and not-for-profit sectors, the DCF analysis is made from the perspective of the implementing organization or agency. It identifies net money flows of an investment to the implementing organization or entity. Organizations in this sector may receive goods and services free of charge, through donations or volunteer labor, such as parents performing services for schools. This is a genuine advantage to the local entity, but donated resources still represent a true cost to society. They should therefore be included (valuing them at market price where possible) when evaluating proposed investments for policy-making from society's perspective. However, in most local decision making, viewed from within an organizational unit, only cash costs should be included. Nevertheless, there may still be an opportunity cost in using volunteers because all resources are limited.
- E12. The public nature of a product or service sometimes creates market distortions. For example, the value to society of clean water is greater than the price people pay. In economies characterized by price distortions, market prices can poorly reflect opportunity costs. Price distortions can be compensated for by using shadow prices that more accurately reflect the opportunity costs and benefits of a potential investment; this can be a common approach in assessing an investment project's contribution to society's welfare. In considering whether to set shadow prices, the cost of their calculation should be weighed against the benefit to the investment appraisal. For investments

by donor agencies, for example, typical adjustments are made to the prices of tradable goods, the exchange rate, and the wage rate.

PRINCIPLE F

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 helps to reflect worst, most likely, and best case scenarios, and therefore can support a reasoned judgment.

- F1. The quality of a DCF analysis is better judged on (a) the reasonableness of the assumptions and judgments made at the time of the analysis, and the degree of discussion and support it received in the organization, rather than on (b) whether a financial forecast was realized.
- F2. Assessing uncertainty involves understanding how future risks and uncertainties can affect cash flows and, therefore, the choice between potential investment options. The most common way of assessing uncertainty is *sensitivity analysis*, which tests the vulnerability of options to potential events. It assesses risks by identifying the variables that most influence a potential investment's cash inflows and outflows, and by quantifying the extent of their influence. It is one of the best methods to (a) gain consensus on the underlying variables most critical to success, (b) help determine what further information could be useful in the investment analysis, and (c) help expose inappropriate projections. The usefulness of sensitivity analysis depends as much on how it is presented as on how it is conducted. It can help facilitate discussion between key stakeholders and improve communication between managers involved in the decision. A frequent monitoring and review of key assumptions and variables can also help to respond to changes in the wider competitive business environment. It is important to appreciate the interactions between factors which are the subject of different assumptions. For example, when considering the potential effect of a change in price of energy on costs, consideration should be given also to the effects of the change on suppliers and customers that may cause changes in the wider project outcome.
- F3. Distinguishing between fixed, variable, semi-variable, and semi-fixed costs helps to enhance sensitivity analysis. Therefore, thorough cost information and an understanding of the cost dynamics (e.g., understanding that a cost that is fixed relative to one factor may change with another) are required to support a DCF analysis and investment appraisal. Similarly, an increase in the cost of an input may cause a switch of supply, for example, from aluminum to plastic moldings, or other changes in behavior of the organization, suppliers, or customers.
- F4. Risk modeling techniques such as the *Monte Carlo Simulation* allow consideration of multiple combinations of variables. Investment options are typically affected by a range of variables, for example, market share and size, wages, revenues, prices, and assumptions about the transfer of risks. These variables are usually interrelated, so that understanding their interconnectedness can be more useful than isolating the impact of only one variable (as is the case in sensitivity analysis). Often used in simulating research and development investments, the Monte Carlo Simulation models the potential investment, specifying probabilities for forecast errors and simulating cash flows. The complexity of such tools requires an understanding of the required data, how it is to be used in the model, and how results will be presented and used.
- F5. *Decision trees* facilitate the analysis of investments involving sequential decisions. They are useful in assessing situations where the probability of occurrence of particular events depend on previous events. This helps managers identify and present (a) links between today's and tomorrow's

decisions and (b) a strategy that could support the highest NPV. Decision trees are also widely used to support real options analysis. If a project goes ahead on the basis that some decisions will be taken later, it is important that these decision opportunities are monitored and followed up.

- F6. *Scenarios* help decision-takers to consider a range of future possibilities, particularly for “state of the world” assumptions, including prosperity, social, or technological change or economic downturn. Scenario planning helps to envisage several possible futures and key uncertainties and trends in the business environment as well as consider their implication for an organization. Modeling variables within scenarios allows for the consideration of the impact on each component of cash flow, such as revenue and expenses. For example, in assessing investments in emerging markets, macroeconomic variables, such as inflation and interest rates, foreign-exchange rates, and growth in gross domestic product, can be modeled. An infinite range of scenarios can be created, but much can be learned at the decision stage from only a few cases and they can later inform contingency planning for managers.
- F7. A “premortem” meeting at the beginning of a project can help project stakeholders to identify and discuss key project elements at the outset, such as strategic context, risks and uncertainty, assumptions, and other crucial elements of a project decision. Such a meeting helps to facilitate the involvement and ownership of project stakeholders, and should also consider if some stakeholders have been overlooked and should be involved. Project risk management should be directed at both avoiding and reacting to risks as well as identifying and capturing opportunities.

PRINCIPLE G

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.

- G1. Post-investment completion reviews or audits facilitate organizational 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 are already considered not to have 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 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 down by meaningful phases of a project. Unless a review specifically considers how well assumptions made during the decision-making process (for example on markets, technology, competition, wage rates, or cost of capital) were matched by reality, it is

unlikely to help improve forecasting, assumptions in future investment cases, and the quality of decisions. Judgment is required on the timing of such comparison.

- G2. Post-completion reviews and audits can be expensive both in terms of the cost of information systems that support the review as well as the cost of the review itself. Therefore, professional judgment is required on the choice of projects to be reviewed, and the criteria used to support a cost-benefit analysis of a potential review will depend on organizational circumstances, the expected opportunity for learning lessons, and the nature of the project, especially its strategic and financial scope. The larger and more strategic the investment, the more important it is that the investment is shown to be sound and well managed, and the more likely it is that the costs of a post-completion review will reveal insights that will benefit the whole organization. Furthermore, investments at an operational level could be subject to alternative control mechanisms, such as routine reporting that covers key performance metrics (e.g., capacity utilization of an investment).
- G3. A review of the decision-making process could involve (a) reviewing all the assumptions and the process(es) that led to their formulation, (b) comparing actual resources consumed by the project with forecasts made at the assessment period, and (c) reviewing the procedures used to obtain an effective and efficient project management process. Above all, a post-completion review/audit should provide an overview of the way in which the decision-making process can be improved.
- G4. A post-completion review monitors and evaluates the progress of capital investment through comparing actual cash flows and other costs and benefits with those originally projected. Where a review cannot measure all cash flows generated by an investment project (for example, where it is not possible to separate the impact of a project from the remainder of an organization), relative success should be judged on a wider set of business processes, initiatives, or program. In such cases it is good practice to make clear how the evaluation will be conducted at the time the investment is made (i.e., what will be expected to define success for the project).
- G5. A DCF analysis is undertaken on a marginal basis, which assumes that economic activity should be continued as long as the marginal benefit of one more unit of the activity is greater than or equal to the marginal cost. However, a post-completion review or audit should not necessarily ignore sunk costs related to an individual project and should consider all appropriate historic costs and benefits on a full-costing basis, particularly where the post-completion review or audit is undertaken for the purposes of stewardship.
- G6. For a long project, review may be appropriate several times in its life, providing useful learning opportunity for the organization and an opportunity to improve its future capabilities in project identification, evaluation, and execution.
- G7. It is useful periodically to re-examine some of those projects rejected—both those rejected at early screening stages as well as after full analysis. Brainstorming sessions on the projects never identified or evaluated that, with hindsight, the organization now wishes it had undertaken, can improve the practice of searching for viable projects.

Appendix A: Definitions

- **Assessment period:** the phase during which information to enable the investment project decision is compiled and the decision is made.
- **Beta:** the factor used in the Capital Asset Pricing Model to reflect the risk associated with a particular equity. Beta is a proxy for the market risk that shareholders bear. Changing capital structures can affect expected returns and beta.
- **Capital asset pricing model (CAPM):** a tool to estimate the cost of equity capital using several empirical inputs: the risk-free rate represents a return an investor can achieve on the least risky asset in a market; equity beta captures the systematic risk of an investment; and an equity market risk premium is the premium that a perfectly diversified equity investor expects to obtain over the risk-free rate. This model predicts that the expected risk premium for an individual stock will be proportional to its beta. CAPM is represented by the formula $R_i = R_f + \beta_i (R_m - R_f)$, where: R_i represents expected rate of return on asset i ; R_f is rate of return on a risk-free asset; R_m represents expected rate of return on a market portfolio; and β_i is a beta coefficient of an asset defined as $\text{Cov}(R_i, R_m) / (\text{Var}_m)$. Various approaches could be used to enhance the application of CAPM and its beta coefficient, such as altering the period over which to measure beta, the frequency of observation, comparator analysis with industry sector betas, and choice of data provider. Comparator analysis, which averages betas across a selection of comparator/peer companies, can sometimes help estimate betas for organizations not listed on a stock exchange.
- **Certainty equivalent method:** adjusts for the time value of money by using the risk-free rate to discount future cash flows, after converting uncertain cash flows into their certainty equivalents. In the process, the uncertain expected cash flows are replaced with the certainty equivalent cash flows, using a risk adjustment process akin to the one used to adjust discount rates. This approach can be useful when risk varies over time, as it allows each period's cash flows to be adjusted for their specific risks (see paragraph B.7), but this method does not involve a market-derived risk element.
- **Cost-benefit analysis:** the comparison between the costs of the resources used (plus any other costs imposed by an activity, such as pollution) and the value of the financial and non-financial benefits.
- **Discounted cash flow (DCF) analysis:** a financial modeling tool that uses projected cash flows generated by an investment. DCF analysis calculates value based on all expected cash flows related to (a) the investment or project, (b) the life of the investment, and (c) the opportunity cost of investing in a project of similar risk profile (represented by the discount rate).
- **Discount rate:** a rate that represents the opportunity cost of capital. A discount rate is a desired return that could be represented by (a) the specific return an investor expects for an alternative investment, (b) the interest rate on debt, or (c) another interest rate. The discount rate reflects the time value of money, and uncertainty and risk.
- **Ecosystem services:** (also referred to as “environmental services” or “ecological services”) the benefits that people obtain from ecosystems. Examples include freshwater, timber, climate regulation, protection from natural hazards, erosion control, and recreation. Corporate ecosystem valuation is where both ecosystem degradation and the benefits provided by ecosystem services are explicitly accounted for with the intention of informing and improving business decision making.

- **Environmental management accounting (EMA):** a technique to identify, collect, and analyze, for internal decision making, (a) physical information on the use, flows, and destinies of energy, water, and materials including wastes; and (b) monetary information on environment-related costs, earnings, and savings. In practice, EMA can be termed environmental accounting or environmental cost accounting, among other variations.
- **Internal rate of return (IRR):** the average annual percentage return expected for a project, where the sum of the discounted cash inflows over its life is equal to the sum of the discounted cash outflows. The IRR therefore represents the discount rate that results in a zero NPV of cash flows. In certain circumstances, such as in multi-period projects where net negative cash flows are followed by net positive cash flows, and then again by net negative cash flows, there may be more than one IRR for which NPV will be equal to zero. Therefore, using the criterion of $NPV > 0$ as a decision-making tool is better than using the criterion of $IRR > \text{cost of capital}$.
- **Lifecycle analysis and lifecycle costing (LCA):** a technique to facilitate the inclusion of all costs and benefits of a capital investment from “cradle to grave.” The assessment goes beyond the typical “useful-life” methodology frequently used in accounting. All impacts of a capital asset are summed up along the whole life-cycle in order to give a complete understanding of the entire impact of owning a capital asset. LCA will involve the recognition and analysis of all costs and cash outflows as well as the benefits and cash inflows. Cash inflows (e.g., energy savings, rebates, tax-savings, depreciation, productivity improvements) and outflows (e.g., costs of buying, financing, installing, maintaining, operating, repairing, replacing and disposing of an asset) are projected over the life of the asset, adjusted for inflation and anticipated uncertainty, to determine the NPV of each project.
- **Marginal abatement cost curve:** represents the relationship between the cost-effectiveness of different abatement options and the total amount of abated pollution.
- **Nominal cash flows:** the cash flow that an organization generates or is expected to generate during a given period, without adjustment for factors such as inflation or the time value of money i.e. cash flows expressed in real terms represent the purchasing value as of the time of occurrence, nominal cash flows are expressed in currency of purchasing value as of the day of the investment evaluation.
- **Net present value (NPV):** a single value that represents the difference between the sum of the expected discounted cash inflows and outflows attributable to a capital investment or other project, using a discount rate that properly reflects the relevant risks of those cash flows.
- **Opportunity cost:** the value of the benefit sacrificed when one course of action is chosen over an alternative. The opportunity cost is represented by the foregone potential benefit from the best rejected course of action that has a similar relevant risk profile.
- **Projection:** an estimate of value in a future time period.
- **Real options:** represent the right, but not the obligation, to take different courses of action with respect to real assets (rather than financial instruments). Where DCF is based on a deterministic cash flow projection, with little allowance for management flexibility, real options introduce flexibility to defer, abandon, scale back, or expand investments. They can be considered as part of an evolutionary process to improve the valuation of investments and the allocation of capital.
- **Risk-free discount rate:** The risk-free rate is typically taken as that of appropriate government backed securities as being the lowest risk alternative available to investors. It is easiest to estimate

in deep and liquid markets where securities, which are index-linked to general retail price inflation, are also traded. In other markets, it can be more subjective and may rely on comparators in other linked markets.

- **Sunk or irrecoverable cost:** cost that has been irreversibly incurred or committed and cannot be considered relevant to a decision, such as pre-project market research and development costs.
- **Systematic risk:** the risks associated with holding a market portfolio of stocks and which affect all firms, for example, interest rate increases, rate of inflation, and oil price changes. Systematic risk represents the variability in a security or stock's total returns that are directly associated with overall movements in the general market or economy. An investor can construct a diversified portfolio to eliminate "specific" risks, i.e., those particular risks associated with an individual stock. Therefore, a well-diversified investor investing in additional stocks is exposed only to those risks that contribute to the overall riskiness of the portfolio.
- **Terminal value:** the residual value of a business or project at the end of the discrete period for which a detailed cash flow projection is prepared.
- **Value in use:** the present value of the future cash flows expected to be derived from an asset or cash-generating unit.
- **Weighted Average Cost of Capital (WACC):** the opportunity cost to all capital providers (debt and equity) of investing in an alternative project of similar relevant risk profile, weighted by the project's relative contribution to a company's total capital, and calculated using market values of debt and equity.
- **Working (net) capital:** current assets (cash, accounts receivable, and inventory) less current liabilities. Cash is only included as a working capital item to the extent it is required to operate the business.

Appendix B: Resources

This list of resources is not intended to be exhaustive. Use the IFACnet at www.ifacnet.com and the [IFAC website](#) to search IFAC and many of its member organization websites.

Selected Reference Material

[Sustainability Framework 2.0](#) (IFAC 2011), www.ifac.org/publications-resources/ifac-sustainability-framework-20

[International Guidance Document: Environmental Management Accounting](#) (IFAC 2005), www.ifac.org/publications-resources/international-guidance-document-environmental-management-accounting

[Integrating Governance for Sustainable Success](#) (IFAC 2012), www.ifac.org/publications-resources/international-guidance-document-environmental-management-accounting

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