Chapter 7: Methodologies to incorporate environmental sustainability into the project appraisal process

7.1 Introduction

In the staged project management framework, project performance and key deliverables are reviewed at the end of each phase. These gate-reviews serve as decision points where the project continuation is determined (see Chapter 3.2.2). Environmental sustainability criteria can only be incorporated into the appraisal process if it manifests in the two key aspects of a gate review, namely:

- Information presented to the decision gate meeting, also referred to as decision documentation, which include the status of project deliverables, project plan, technological feasibility, financial feasibility, etc.
- Typical criteria addressed by the meeting (see Figure 3.4)

The Environmental Evaluation Matrix tool provides information about potential areas for environmental concerns. The tool can therefore provide inputs to the information presented to the decision gate meeting. There are, however, different methodologies that can be used to incorporate the output of the tool into the gate review information. The methodologies can be divided into two main categories or schools of thought (Figure 7.1).

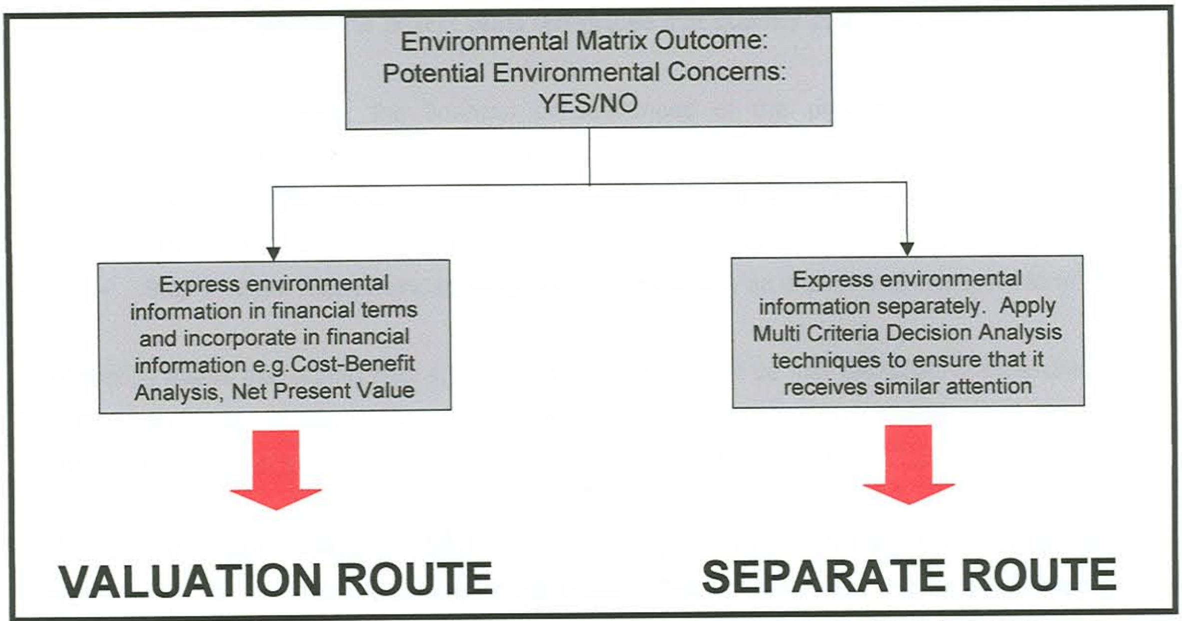

Figure 7.1: Classification of methodologies to incorporate environmental aspects

Criteria for the gate reviews are developed from environmental checklists, scoring guidelines and other environmental management tools' checklists and are addressed in Chapter 8.

7.2 Incorporating environmental sustainability into decision documentation: Valuation Route

The World Bank: Environment Department (1998) regards incorporating environmental aspects into project analysis as a two-step process:

- Understand *what* the impacts are.
- Determine the economic importance of the impacts by estimating the monetary value thereof.

7.2.1 Ecological Economics

Valuation refers to *"the placing of monetary values on environmental goods or services or the impacts of environmental quality changes"* (Dixon, Scura, Carpenter & Sherman, 1994). Environmental valuation, also referred to as environmental economic appraisal, can be incorporated into a decision-making framework by pursuing the following methodology (Winpenny, 1991):

- Step 1: Identify major environmental problems and their causes.
- Step 2: Analyse main potential environmental impacts of the project. Environmental impacts that form an absolute constraint and that will result in project termination can be identified by the analysis.
- Step 3: Review possible alternative solutions or responses to accommodate the identified impacts.
- Step 4: Appraise the project using techniques that quantify costs and benefits as far as possible.
- Step 5: Consider the financial consequences of the project. Also consider externalities resulting from the project.
- Step 6: Draw together implications for policy and institutional building e.g. enforcement, compliance, tax, etc.
- Step 7: Make recommendations to decision-makers in an explicit and intelligent form.

Winpenny states that during step 4, major impacts that cannot be fully identified or measured should be clearly indicated. Furthermore benefits can also be measured qualitatively on a scale from extremely positive (+++) to very negative (---) (see paragraph 7.2.1.c).

The Environmental Evaluation Matrix tool can be used to perform step 1 of the above methodology for the first three gates of the model. The environmental impact assessment (EIA) can be used for the remaining gates. The outcome of the environmental matrix identifies the areas of concern and from the scoring guidelines the problems in each area can be identified. The resource tables (Chapter 4) list possible responses to mitigate the environmental effects. The costs of these responses must be appraised as well.

Dixon and Sherman (1990) developed a flowchart (see Figure 7.2), which guides the appraisal of environmental impacts. The input to this flowchart is the identified and analysed environmental impact of a project. The flowchart provides a simplified guide to *"choosing an appropriate technique for a given situation"* (The World Bank: Environment Department, 1998).

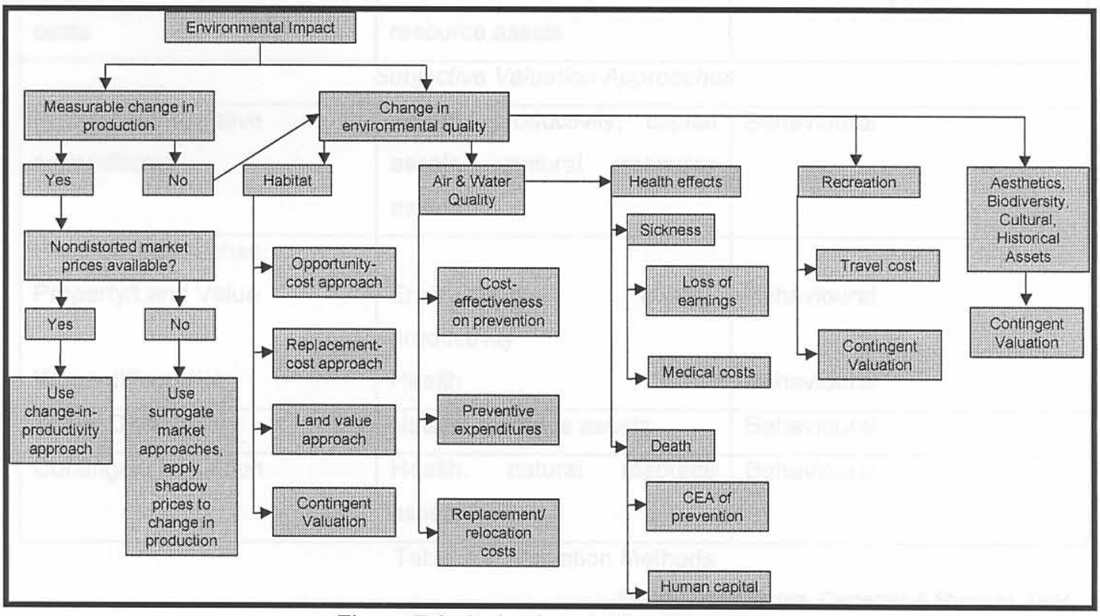

Figure 7.2: A simple valuation flowchart

Source: Dixon, Scura, Carpenter & Sherman, 1994.

The valuation methods, which are mentioned in Figure 7.2, follow either an objective or a subjective valuation approach. Objective valuation approaches aims to describe the cause-effect relationships, which can then be used to provide an objective measure of the damage resulting from certain causes. This approach relies on *"damage functions which relate the level of offending activity (e.g. level and type of air pollutants) to the degree of physical damage to a natural or man made asset (e.g. soiling of buildings) or to the degree of health impact (e.g. incidence of respiratory disease)"* (Dixon, Scura, Carpenter & Sherman, 1994).

Subjective valuation approaches on the other hand is based on *"subjective assessments of possible damage expressed or revealed in real or hypothetical market behaviour"* (Dixon, Scura, Carpenter & Sherman, 1994). Examples of the two approaches, the types of effects that can be valued, and the underlying basis for the valuation is shown in Table 7.1 (Dixon, Scura, Carpenter & Sherman, 1994).

Valuation Method	Effects Valued	Underlying Basis for Valuation
	Objective Valuation Approaches	
Changes in Productivity	Productivity	Technical/Physical
Cost of illness	Health (morbidity)	Technical/Physical
Human Capital	Health (morbidity)	Technical/Physical
Replacement/Restoration costs	Capital assets, natural resource assets	Technical/Physical
	Subjective Valuation Approaches	
Preventive/mitigative expenditures	Health, productivity, capital assets, natural resource assets	Behavioural
Hedonic approaches:		
Property/Land Value	Environmental quality, productivity	Behavioural
Wage differential	Health	Behavioural
Travel Cost	Natural resource assets	Behavioural
Contingent Valuation	Health, natural resource assets	Behavioural

Table 7.1: Valuation Methods

Source: Dixon, Scura, Carpenter & Sherman, 1994.

The valuation methods are discussed in more detail in Appendix I. The specific project and the type of environmental effect will determine the choice of technique. Also, it is often necessary to use more than one technique to address all the aspects of a project. The applicability of all valuation methods on the project evaluation process does, nevertheless, differ. Dixon, Scura, Carpenter & Sherman (1994) classified the methods into three categories, namely:

- Generally Applicable: Standard and Straightforward approaches
- Selectively Applicable: Approaches that require more data or stronger assumptions
- Potentially Applicable: More data intensive and difficult approaches

Examples of each category are given in Table 7.2.

Generally Applicable Methods	Selectively Applicable Methods	Potentially Applicable Methods
• Approaches that use market values of goods and services: o Changes-in-productivity o Cost-of-illness o Opportunity-cost • Cost-side approaches that use the value of actual or potential expenditure: o Cost-effectiveness o Preventive expenditures o Replacement costs o Relocation costs o Shadow-project	• Surrogate Market Techniques: o Travel-cost o Marketed goods as environmental surrogates • Contingent Valuation Methods: o Bidding games o Take-it-or-leave-it experiments o Trade-off games o Costless choice o Delphi technique	• Hedonic Methods: o Property and other land-value approaches o Wage-differential approach • Macroeconomic models: o Linear programming o Natural resource accounting o Economy-wide impacts

Table 7.2: Classification of valuation methods based on applicability

Source: Dixon, Scura, Carpenter & Sherman, 1994.

The information of the environmental valuation is eventually incorporated into the broader economic analysis of the project (The World Bank: Environment Department, 1998). The most common methods used for project appraisal tend to be a Cost-Benefit Analysis (CBA) and a Cost-Effect Analysis (CEA). The three main decision criteria, also referred to as project evaluation indicators, used in the two methods are:

- Net present value (NPV): Determines the present value of net benefits by discounting all benefits and costs back to the beginning of the base year.
- Internal rate of return (IRR): IRR is defined as the discount rate that will result in a zero NPV for a project.
- Benefit-cost ration (BCR): The ratio between discounted benefits and discounted costs. A BCR should be greater than 1 for the project to generate benefits.

Incorporating the environmental valuation into the economic analysis do not change any of the methods of analysis or decision criteria. However, setting the boundaries for the analysis needs special consideration as the environmental impacts could have effects that extend beyond the temporal and spatial boundaries of the project itself.

a) Temporal Boundaries

The temporal boundary of a project refers to the time horizon that is considered for analysis purposes. The choice of a time horizon is further complicated by the choice of an appropriate discount rate. For example a discount rate of 10% would imply that most costs and benefits become inconsequential after 20 years (Dixon, Scura, Carpenter & Sherman, 1994), while certain environmental impacts could have an end-effect for far longer. There are two approaches to handle the time horizon and accommodate long-term environmental impacts in the analysis:

- Choose a time horizon long enough to include all effects of environmental impacts. This implies extending the cash-flow analysis beyond the normal end-of-project period.
- Add a capitalized value of net costs (or benefits) of future environmental impacts (positive or negative) at the normal end-of-project period. The same approach that one will use for a residual value estimate for a long-lasting capital good is thus applied.

b) Spatial Boundaries

The spatial boundary refers to the area that is influenced by the environmental impacts of the project, and it can extend far beyond the geographical boundaries of the project. In choosing a spatial boundary it is important to be transparent in the assumptions that are made.

7.2.2 Total Cost Assessment Methodology

The American Institute of Chemical Engineers' Centre for Waste Reduction Technologies (AIChE CWRT) has developed a standardised, yet flexible, approach to understanding and managing the environmental and health costs associated with products and processes. The approach, "Total Cost Assessment Methodology" (TCA Methodology), can assist in internal managerial decision-making. The TCA Methodology supports a life-cycle thinking approach and is thus regarded by some as a Life Cycle Cost Analysis technique (see Appendix C for more information on the methodology). AIChE CWRT intends for the TCA Methodology to assist in bridging the gap between hard and soft financial values and the current non-monetized concepts of business sustainability goals (AIChE CWRT, 1999).

The Ecological Economics valuation methods conduct a separate economic analysis on environmental impacts and then incorporate these into a broader economic analysis of the project. In contrast, the TCA Methodology incorporates environmental and health costs from the start and have a complete cost inventory that includes all costs necessary to determine whether a project is profitable (Washington State: Department of Ecology, 2000). This is achieved by applying the unique cost classification used in the TCA Methodology. The methodology distinguishes between five types of costs (see Table 7.3).

Cost Type	Definition
Type I: Direct costs for the manufacturing site	Direct costs of capital investment, labor, raw material and waste disposal. Includes both recurring and non-recurring costs as well as both capital and operations and management (O&M) costs.
Type II: Potentially hidden corporate and manufacturing site overhead costs	Indirect costs not allocated to the product process. May include both recurring and non-recurring costs. Includes capital and O&M costs as well as outsourced services.
Type III: Future and contingent liability costs	Liability costs include fines and penalties caused by non-compliance and future liabilities for forced clean-up, personal injury and property damage.
Type IV: Internal intangible costs	Costs paid by the company and includes difficult to measure cost entities such as worker wellness, worker morale, customer loyalty, corporate image, estimates of avoided costs, etc.
Type V: External costs	Costs for which the company does not pay (see definition of externalities in Glossary).

Table 7.3: Costs included in TCA Methodology

Source: AIChE CWRT, 1999.

Information with regards to Type I and Type II costs can be derived from a company's internal cost accounting system. Completing various checklists and obtaining information from cost databases, can determine Type III, IV and V costs. According to AIChE CWRT (1999) the methodology can be applied in various phases of a project life cycle where it can provide a basis for an improved decision (Figure 7.3)

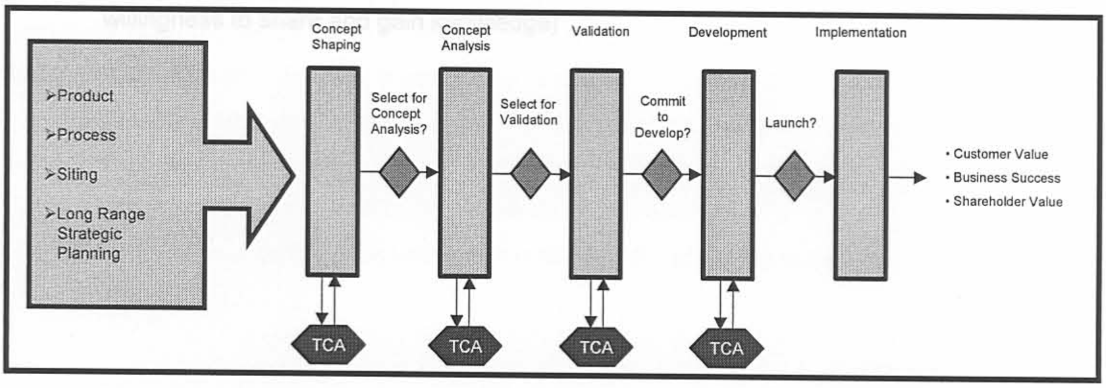

Figure 7.3: Phases where TCA can be applied in an overall Project Management Framework

Source: AIChE CWRT, 1999.

TCA can be performed manually by using spreadsheets and checklists developed by the AIChE CWRT. Two TCA software packages are, however, available for companies to use:

- P2Finance: Spreadsheet Software developed by Tellus Institute (http://www.tellus.org)
- TCAce^{TM}: A software package developed for the AIChE CWRT by Sylvatica (http://www.sylvatica.com/tools.htm)

7.3 Incorporating environmental sustainability into decision documentation: Separate Route

The separate route approach proposes two methods to deal with environmental aspects in a project management appraisal framework.

7.3.1 Balanced Scorecard Approach

a) History of Balanced Scorecards

Robert Kaplan first proposed the Balanced Scorecard (BSC) approach in 1992. The traditional balanced scorecard approach looks at four key business aspects, namely:

- Financial perspective (earnings per share, revenue growth, profit growth etc)
- Customer perspective (market share, customer satisfaction, referral rate, customer retention)
- Internal business process perspective (cycle time, cost of service, speed of services, job safety)
- Learning and growth perspective (effectiveness of change to technology and processes, speed and frequency of changes-adaptability, employee satisfaction, willingness to share and gain knowledge)

The scorecard is centred about the vision and strategy of the company (Figure 7.4) and it suggests the use of non-financial performance measures via the three additional perspectives to supplement the traditional financial measures (Sim & Koh, 2001).

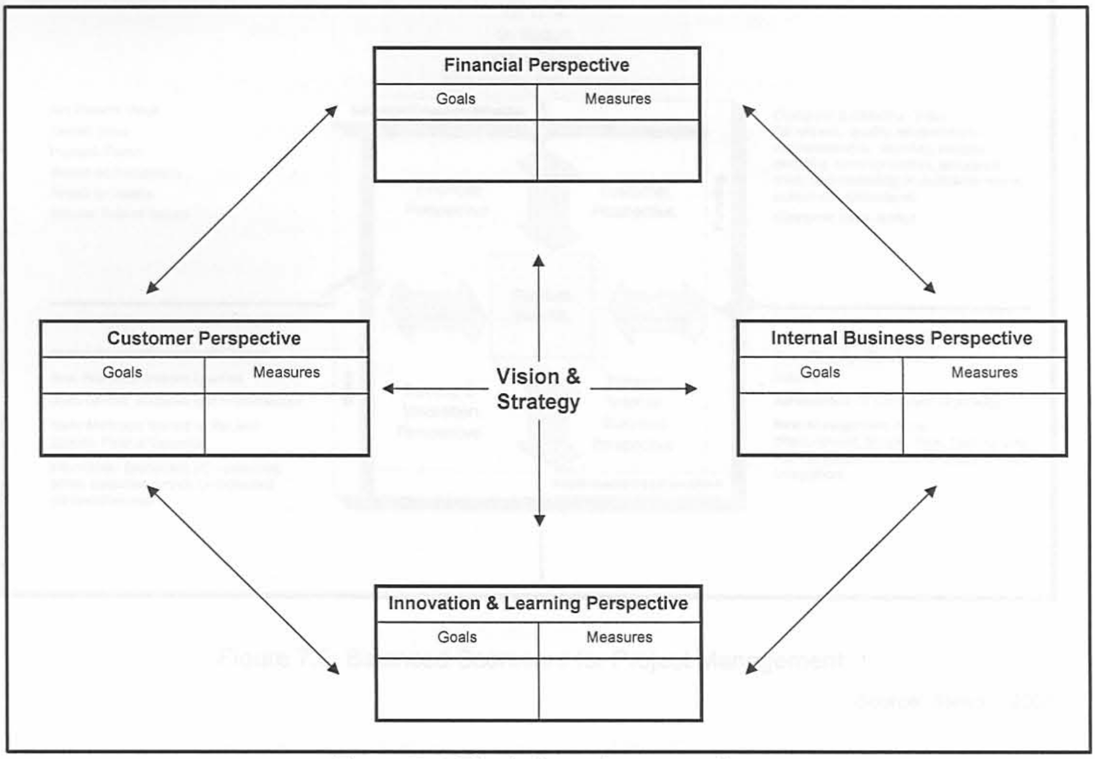

Figure 7.4: The balanced scorecard

Source: Sim & Koh, 2001.

b) Balanced Scorecards for Project Management

Stewart (2001) proposes a BSC approach to *"better manage the project"* and states that the approach can be used to *"perform health checks through the project life cycle"*. The proposed BSC model for projects (Figure 7.5) uses a "stoplight" colour scheme to visually express the status and identified areas of improvement. The colour scheme consist of:

- Green: Project performance agrees with project plans and stakeholder expectations.
- Yellow: Deficiencies in project performance have been noted, are being monitored and corrective action will be implemented in the near future.
- Red: Serious deficiencies have been noted and the project is in a crisis.

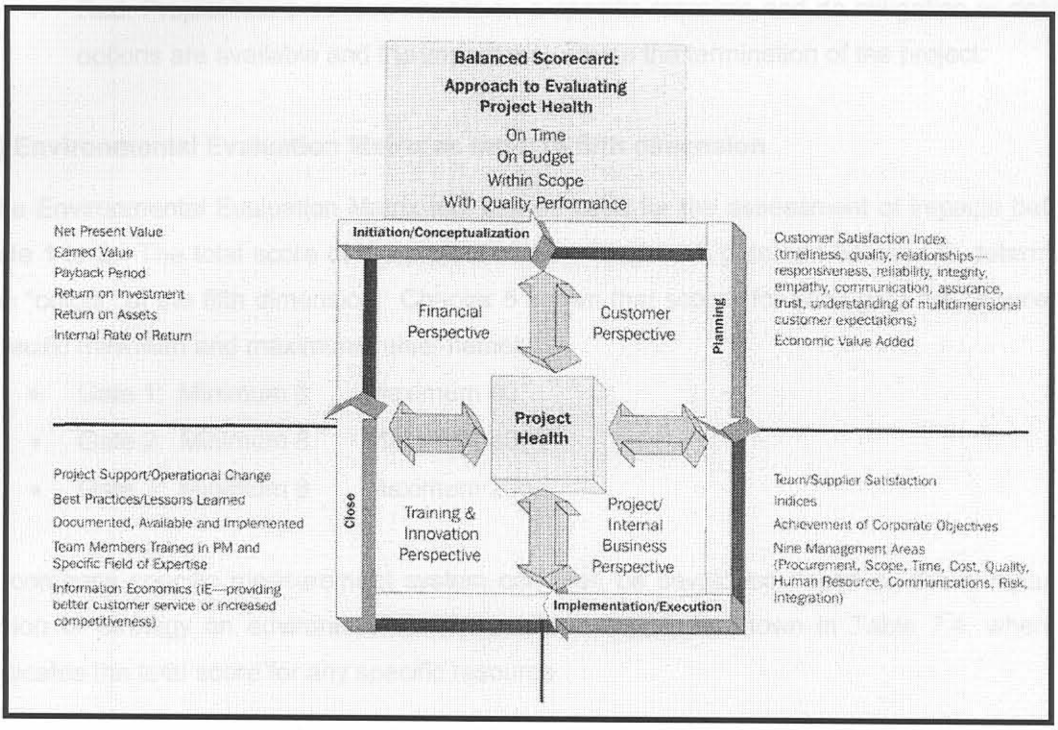

Figure 7.5: Balanced Scorecard for Project Management

Source: Stewart, 2001

c) Approach to include Environmental Sustainability into Balanced Scorecard for Project Management

It is proposed that a fifth perspective be added to the balanced scorecard for a project, i.e. *Environmental Management of Project*. A "*Without harming the environment*" view must then subsequently be added to the Project Health Evaluation Approach (Figure 7.5). In line with the balanced scorecard methodology, goals and measures must be set for this perspective. It is proposed that companies set goals in terms of the four environmental factors identified in the framework in Chapter 4 (Figure 4.5) namely: Air, Water, Land and Mined Resources. The goals should be set in terms of environmental impacts resulting from the project on these resources and will be company specific. Previous projects can be used to set a baseline for the goals.

The colour scheme (rating system) for the proposed fifth perspective, as applied to gates 1 to 3, is as follows:

- Green: Project has minimal impacts on the specific resource.
- Yellow: Project has an impact on a specific resource but mitigation options are available, the impact is still within compliance level, or the subsequent design phase could possibly address the impact.

- Red: Project has a serious impact on a specific resource and no mitigation or design options are available and the impact may cause the termination of the project.

d) Environmental Evaluation Matrix as input to fifth dimension

The Environmental Evaluation Matrix tool can be used for the assessment of impacts before gate 1 to 3. The total score of the project at the end of each gate can be used to determine the "colour" of the fifth dimension. Chapter 5 shown that scores for each gate are between a specific minimum and maximum value, namely:

- Gate 1: Minimum 8 Maximum 40
- Gate 2: Minimum 8 Maximum 40
- Gate 3: Minimum 8 Maximum 200

A company specific measurement system can then be developed based on the company's vision or strategy on environmental affairs. An **example** is shown in Table 7.4, where X indicates the total score for any specific resource.

	Red	Yellow	Green
Gate 1	X > 21	20 < X < 10	X < 10
Gate 2	X > 21	20 < X < 10	X < 10
Gate 3	X > 75	75 < X < 25	X < 25

Table 7.4: **Example** of a measurement system deducted from the Environmental Matrix Evaluation Tool

For purposes of Gate 4 the Environmental Impact Assessment (EIA) can be used to determine the measurement and from Gate 5 onwards the actual impacts should be measured against planned impacts. The goals must also be communicated to the Environmental Management System.

7.3.2 Environmental Indicators for Project Appraisal

a) The World Bank Approach

Segnestam (1999) proposes an approach based on a set of environmental indicators for projects supported by the World Bank. The approach suggests the following classification of indicators:

- Input Indicators that monitor the project-specific resources that are provided.
- Component Outcome/Output Indicators that should relate to stated goals and objectives of the component. The indicators measure the immediate or short-term results of the project as well as goods and services provided by the project.

- Project Impact Indicators that should relate to possible effects of the project on the environment and that should also measure possible externalities related to the environment.

The World Bank (2002) states that the two levels of indicators most useful in tracking project performance are the component outcome/output indicators and the project impact indicators (see Figure 7.6).

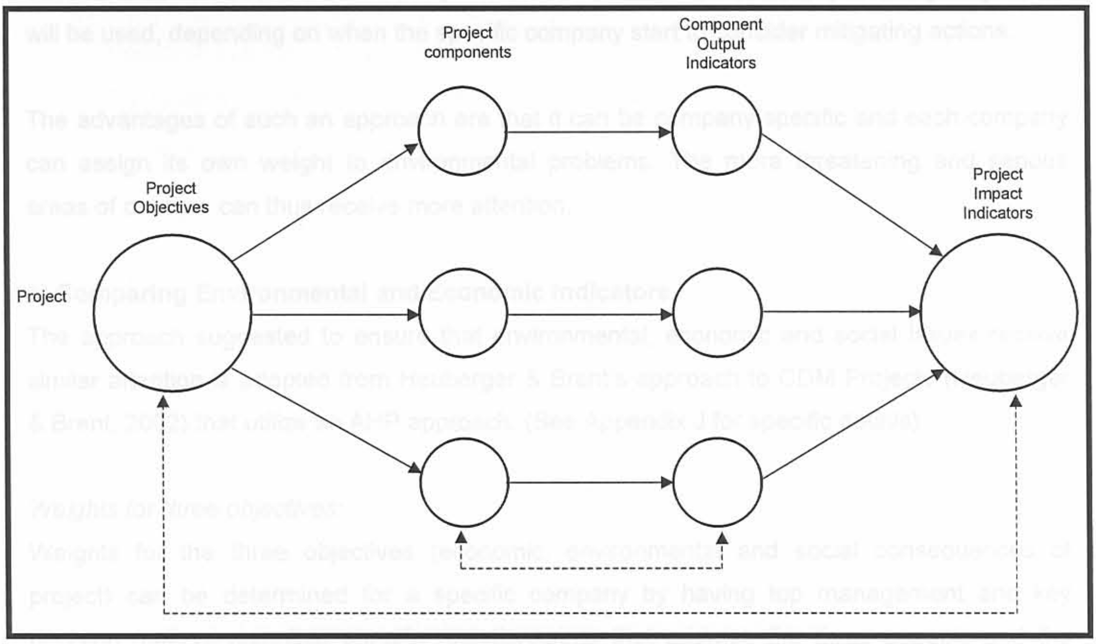

Figure 7.6: Project and component-level indicators

Source: Segnestam (1999) and World Bank (2002)

The World Bank is currently developing various types of impact indicators, which addresses different environmental concerns and aspects. However, it has been noted by the Bank that it is difficult to determine a project's impact on an environmental problem or concern using the indicators.

b) Proposed Use of the methodology

It is proposed that a similar indicator approach is used for project appraisal purposes. Specific indicators with regards to the different aspects of the identified resources can be used to monitor the project impacts (list of indicators in Table 4.6 to 4.9). Financial indicators such as Net Present Value (NPV), Internal Rate of Return (IRR) or Return on Investment (ROI) are used to express the financial feasibility of the project. The environmental feasibility can then be expressed in terms of one indicator value for the different environmental aspects, which can be determined from the Environmental Evaluation Matrix tool.

Multi criteria decision analysis techniques (see Appendix J) such as Analytic Hierarchy Method or Weighted Summation can be used to determine the overall value score from all the project environmental indicators (Heuberger & Brent, 2002). The score can then be presented to the decision-makers at the gate review meetings. Since the accuracy and availability of environmental information also increases through the project life cycle, the indicator can be updated in the different project phases as is the case with NPV, ROI and IRR. It will thus happen that in certain phases an environmental indicator pre mitigating action will be calculated and in other phases an environmental indicator post mitigating action will be used, depending on when the specific company start to consider mitigating actions.

The advantages of such an approach are that it can be company specific and each company can assign its own weight to environmental problems. The more threatening and serious areas of concern can thus receive more attention.

c) Comparing Environmental and Economic Indicators

The approach suggested to ensure that environmental, economic and social issues receive similar attention is adopted from Heuberger & Brent's approach to CDM Projects (Heuberger & Brent, 2002) that utilize an AHP approach. (See Appendix J for specific details).

Weights for three objectives:

Weights for the three objectives (economic, environmental and social consequences of project) can be determined for a specific company by having top management and key decision makers complete specific questionnaires that address the three aspects and the perceived importance thereof (see Appendix J). These weights can then be standarized for the application of AHP to all projects. For purposes of the section social consequences of projects are not considered.

Scores for each objective for a specific project:

A different approach to scoring is suggested by Heuberger and Brent (2002). Heuberger and Brent (2002) define base conditions as the situation that would have occurred in the absence of the project and assign a score of either 1, 0 or –1 to each objective based on the following:

- Project improve base conditions for specific objective: 1
- Project has no effect on base conditions for specific objective: 0
- Project has a negative effect on base conditions for specific objective: -1

An overall score is then calculated for a project and the project can only continue if it has a positive score.

Project Score= $W_{economic}*S_{economic} + W_{environmental}*S_{environmental} + W_{social}*S_{social}$

W = weight of factor *S= score for factor*

It is proposed that the company determine a baseline value for the specific economic indicator it uses for example a baseline value for ROI can be 15%. An environmental baseline can be established for each gate by using the Environmental Evaluation Matrix tool.

d) Example

Scenario:

- Company XYZ is a company in the process industry.
- Project Q is a new project currently at Gate 2.
- The Environmental Matrix Evaluation Tool has been applied to the project (see Figure 7.7) and it is known that the ROI is 22%

	Water	Air	Land	Mined
CONSTRUCTION (10)	*7*	*5*	*5*	*7*
Supply Processes	5	2	3	5
Site Selection & Development	2	3	2	2
OPERATION (20)	*15*	*14*	*12*	*9*
Supply Processes	5	2	3	2
Primary Process	4	5	2	2
Complementary Processes	5	5	2	2
Products	1	2	5	3
DECOMMISSIONING (10)	*5*	*8*	*7*	*3*
Supply Processes	2	3	2	1
Process Implementation	3	5	5	2
(40)	**27**	**27**	**24**	**19**

Figure 7.7: Environmental Matrix for Project Q

Weights for the triple bottom line:

- Company XYZ does not currently include social aspects in its project appraisal.
- Company XYZ regards economic aspects of a project two times more important than environmental aspects.
- Using the Web-HIPRE Multi Criteria Decision Analysis software (http://www.hipre.hut.fi/WebHipre/) the following weights can be assigned to the economic and environmental aspects:
    - Economic: 0.67
    - Environmental: 0.33

Weights for the four environmental factors

Company XYZ has serious problems with the environmental impacts of their process on water resources. They believe that impacts on water resources are four times more important than impacts on other resources. Impacts on the remaining three categories are of equal importance. Using the Web-HIPRE Multi Criteria Decision Analysis software (http://www.hipre.hut.fi/WebHipre/) the following weights can be assigned to the different environmental factors:

Environmental Factor	Weight
Water Resources	0.571
Air Resources	0.143
Land Resources	0.143
Mined Resources	0.143

Table 7.5: Weights for Environmental Factors

These weights can be used together with a completed Environmental Evaluation Matrix to determine the Environmental Indicator:

Environmental Indicator = $W_{water}{*}S_{water} + W_{air}{*}S_{air} + W_{land}{*}S_{land} + W_{mined}{*}S_{mined}$

W = weight of environmental factor *S= environmental matrix score for factor*

Baseline Values at Gate 2:

- Company XYZ has chosen a financial baseline value for Gate 2 as a 15% ROI
- A baseline value for environmental aspects is determined by calculating the Environmental Indicator for a completed Environmental Evaluation Matrix with all entries 3.

	Water	Air	Land	Mined
CONSTRUCTION (10)	***6***	***6***	***6***	***6***
Supply Processes	3	3	3	3
Site Selection & Development	3	3	3	3
OPERATION (20)	***12***	***12***	***12***	***12***
Supply Processes	3	3	3	3
Primary Process	3	3	3	3
Complementary Processes	3	3	3	3
Products	3	3	3	3
DECOMMISSIONING (10)	***6***	***6***	***6***	***6***
Supply Processes	3	3	3	3
Process Implementation	3	3	3	3
(40)	**24**	**24**	**24**	**24**

Figure 7.8; Environmental Baseline for Gate 2 (Example)

Environmental Indicator = $W_{water}{*}S_{water} + W_{air}{*}S_{air} + W_{land}{*}S_{land} + W_{mined}{*}S_{mined}$

W = weight of environmental factor *S= environmental matrix score for factor*

Environmental Baseline (Gate2) = 0.571*24 + 0.143*24 +0.143*24 + 0.143*24

= 24

If a project has an Environmental Indicator (EI) of higher than 24, it has a negative effect on environmental baseline conditions. A project has a positive effect on the financial baseline as long as it has a ROI that is higher than 15%.

Environmental Indicator for Project Q

Environmental Indicator (Project Q) = 0.571*27 + 0.143*27 +0.143*24 + 0.143*19
= 25.427

Project Score for Project Q:

In summary:

	Baseline	Project Q
Financial = ROI	15%	22%
Environmental = Environmental Indicator	24	25.427

Table 7.6: Project Q Information

Project Q thus has a positive effect on the economic baseline and a score of 1 is assigned, the environmental baseline is, however, affected negatively and thus a score of –1 is assigned. The total score for the project is:

$$\text{Project Score} = W_{economic} {}^{*}S_{economic} + W_{environmental} {}^{*}S_{environmental} + W_{social} {}^{*}S_{social}$$

W = weight of factor *S= score for factor*

Project Score = 0.67 (1) + 0.33(-1)
= 0.34

The project score is higher than 0 and thus the project can continue.

7.4 Conclusion

Techniques to include environmental aspects into decision documentation in a way that is logical to decision-makers do exist. First, techniques are available to express environmental impacts in monetary terms and to present it at gate review meetings as part of the broader economic evaluation of a project. Advocates of monetisation of environmental impacts claim that as we are living in a "monetary" society, only aspects that can be expressed in monetary terms receive sufficient attention (Richter, 1991 as cited in Holub et al. 1999).

The critics of monetisation of environmental impacts lay emphasis on the inherent incompatibility between economic and ecological scales and highlight that expressing environmental impacts in monetary terms may give the impression that these impacts are easily comparable with other monetary values such as yields on economic investment. However, the complexity of the monetisation of environmental impacts extends beyond the actual monetary value, which should be communicated to decision makers. It has been proposed that the environmental impacts and effects that can be easily monetised should be express in monetary values, and the remaining effects and impacts should be expressed in non-monetary values (Winpenny, 1991).

Second, tools that can address and incorporate environmental effects into decision documentation without assigning monetary values to it, do exist and can assist the decision process. These tools are, however, not efficiently deployed by business, especially on project level. Advantages of multi criteria decision analysis are that each decision criteria receives due consideration without necessarily converting it to a common scale such as a monetary value. The value these techniques can contribute to strategic decision-making should not be ignored (Petrie, Basson, Stewart, Notten & Alexander, 2001).

The answer to the question of whether it should be by following an economic valuation method or not seems to depend on the type of project, impacts addressed as well as the company preference. The idea to incorporate both approaches into one evaluation has been proposed and supported by various people, i.e. Winpenny (1991) and Ron Janssen (1992), who developed a software package called "DEFINITE" that can assist in improving the quality of environmental decision-making. The software offers multiple approaches to evaluate projects (Table 7.5).

Methods	Transparency	Information type	Output
A) Presentation Methods			
Appraisal Table	Very Good	Quantitative	Overview
Graphic Display	Very Good	Quantitative/ Qualitative	Overview
B) Monetary Methods			
Cost Benefit Analysis	Reasonable	Monetary	Rate of Return
Cost-effectiveness Analysis	Very Good	Monetary	Ranking
C) Multi Criteria Analysis			
Weighted Summation	Good	Quantitative	Ranking
Electre Method	Reasonable	Quantitative	Ranking
Regime Method	Reasonable	Quantitative/Qualitative	Ranking
Expected Value Method	Good	Qualitative	Ranking
Evamix Method	Reasonable	Quantitative/Qualitative	Ranking

Table 7.7: Evaluation Methods in 'DEFINITE'

Source: Jansen, 1992.

The conclusion reached is that companies should apply the techniques they are the most at ease with as the important focus, though, remains the incorporation of environmental information regardless of the approach followed. It is nevertheless recommended that a balanced scorecard or environmental indicator approach are followed for Gate 1 and 2 due to the fact that not a lot of information is available at the early stages. From Gate 3 onwards an economic approach can be followed or the two approaches combined.