

## **CHAPTER 8**

### **STRATEGY FOR TOTAL QUALITY REHABILITATION MANAGEMENT ACCOUNTING**

#### **8.1 INTRODUCTION**

In the previous chapter major sub-strategy groups of factors which have an influence on and provide information for decision-making purposes are discussed. These influencing factors are internal and external background knowledge, a holistic approach in several respects, cost improvement policies, the role of authorities, a total quality environmental management approach, and research and development with the object of continuous improvement. These factors culminate in the final stages of a strategy for total quality rehabilitation management accounting. The position of management in the overall strategy is illustrated in Figure 7.1(Chapter 7).

The next series of sub-strategy factors includes a strategy followed in terms of adequate management policies, evaluation of rehabilitation performances, reporting to interested and affected groups, and the arrival at a balancing position between financial implications and the natural environment. The objectives of this chapter are to analyse these strategies and the factors which they comprise, and to advance reasons for including each one of them in the final model.

#### **8.2 THE ROLE OF MANAGEMENT**

##### **8.2.1 Introduction**

The role and function of the management team in the development of a comprehensive strategy on total quality rehabilitation management is illustrated in Figure 8.1. The input to this model in Figure 8.1 consists of information and the influence of various factors which are considered for management decision making. These factors are a background knowledge of local and overseas practices, the influence of the attitude of authorities, total quality environmental management approaches, research and development, a holistic approach, ethical issues and cost improvement policies.



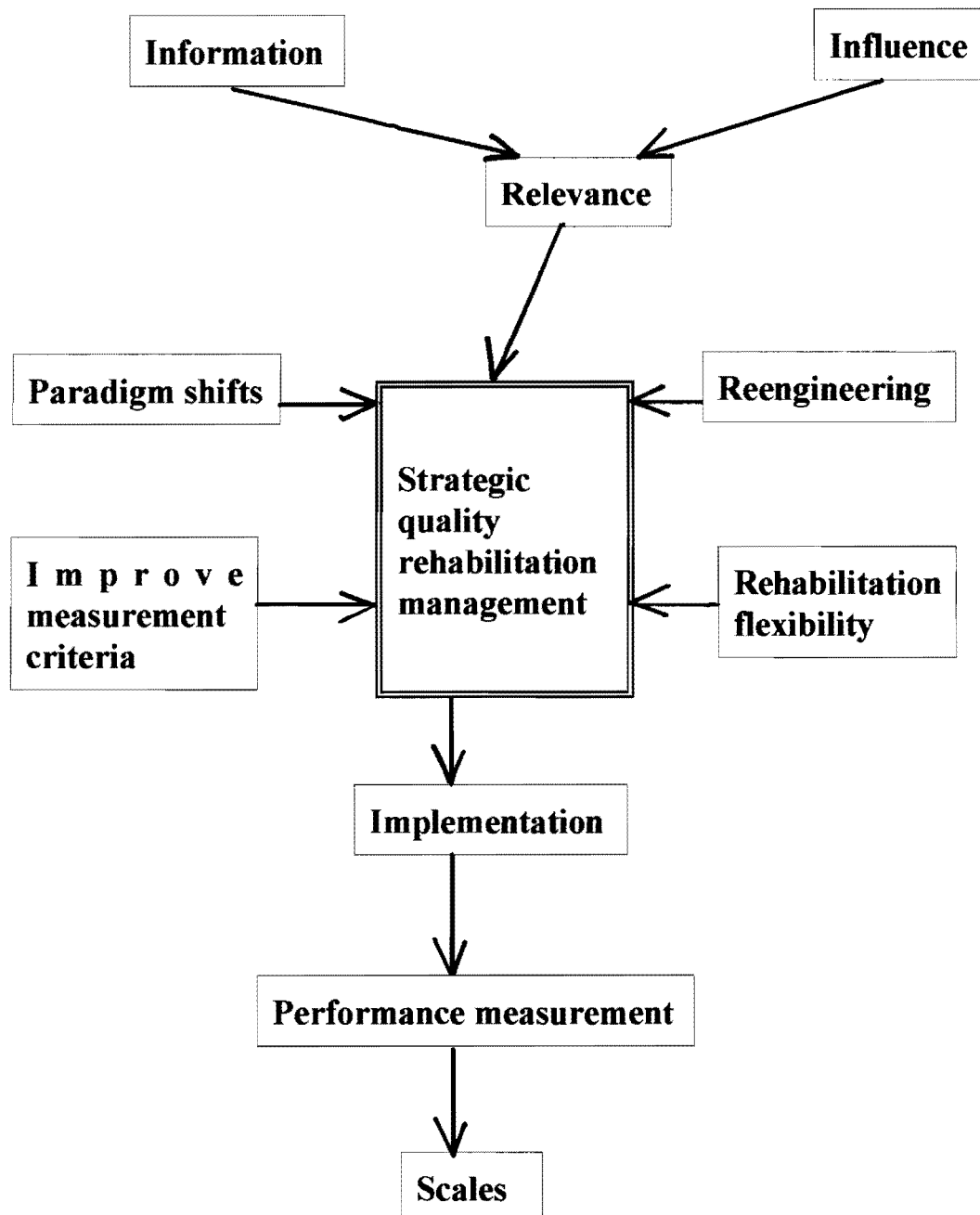
Increased awareness by society of environmental problems is leading to pressure on industries from governments, customers, competitors and employees (Winsemius and Guntram 1992:12). Local pollution problems easily become regional and global problems. Polluted water in rivers eventually becomes polluted oceans. This consciousness of pollution effects has led society to realise that the present generation can destroy its very existence. Traditionally information was used for control purposes only, but lately complex and ambiguous information of no immediate value has also been considered (Wheatley 1994:91). This information originating from uncertain circumstances is likely to drive change and improvement in decision making.

In order to process such information and influences, their relevance in a changed approach by the accountant and management accountant towards environmental and rehabilitation management should be determined. Various strategies are encapsulated in the major strategy of the management team. These strategies are to consider paradigm shifts and reengineering whenever necessary, to build in flexibility to adapt to changing circumstances and developments, and to improve measurement criteria. After the strategy has been formulated and implemented, performances are measured and improved policies are introduced by means of feedback mechanisms in a continuous cycle of improvement. The objective of the strategy is eventually to reach a balancing position where all affected and interested parties would be satisfied.

### **8.2.2 Relevance**

The importance of relevant information on environmental and rehabilitation expenditure is stressed by the fact that these costs are increasing in proportion to profits and are now running into huge sums. The quality and distribution of relevant information would determine the degree of performance improvement of companies (Johnson 1992:202). Information should be judged by accountants and management accountants against new megatrends when they have to decide whether it is relevant for decision making, and existing directions should be restructured and redirected where appropriate.

Figure 8.1 7 Management



(Source: Empirically developed)

Some of these trends which reach into the near and distant future are the following (Enthoven 1985:5):

- The industrial society is changing into an information economy where information is created and distributed instantaneously and where short-term planning is changing into long-term strategies.
- Local management is becoming part of global management, industrial cities are being left behind and there are movements to new sites.
- Results are achieved from the bottom up, from centralisation to decentralisation, from economies of scale to small, efficient plants, and the utilisation of outsourcing and institutional aid is being replaced with self-reliance and entrepreneurial activities, and a movement away from limited choices to a multi-option society can be detected.

Relevant information for future development should therefore consist of multidimensional and multidisciplinary actions concentrating on people, information and systems to bring people and information together in a meaningful way. Management information is needed to enable companies to capitalise their resources of people and time (Johnson 1992:11). Accounting information will have to be more socioeconomically acceptable, useful and relevant, and should include social responsibility aspects such as contributions towards environmental and rehabilitation policies. Efficiency and effectiveness assessments would be required in terms of both financial and non-financial values. Accounting and management accounting approaches should also become more homogeneous in an environment made up of perspectives. The shift from short-term to long-term planning, assessments and reporting requires information to be more future-oriented for the purposes of relevant decision making. Alternative solutions to management problems should be provided in a multiple-option society. To prepare themselves to provide suitable information in an economy subject to these megatrends, accountants and management accountants should utilise systems such as networks (Johnson & Kaplan 1987a:262), the latest information technology, and decentralised structures.

Other new developing practices (Johnson & Kaplan 1987a:210) that should be taken into account when preparing relevant information for decision making are total quality control, just-in-time, computer-integration, life cycles and future deregulation of governmental interference in markets. A tendency is also developing to outsource rehabilitation projects

to companies specialising in the remediation of abandoned mine sites, such as Fraser Alexander.

Relevant accounting and management accounting information would place less emphasis on quantitative financial aspects and would also include qualitative (Roslender 1995:55) and non-financial aspects of organisation and management. In this regard the accountant and management accountant have to provide information on the expenditures involved at various purity levels of water released in nature. This information would allow management to perform the functions of strategic planning, as well as control resources and operations (Johnson & Kaplan 1987a:168).

### **8.2.3 Paradigm shifts**

In order to coincide with the megatrends in the economy and make it possible to direct relevant management decisions, paradigm shifts should be considered. “A paradigm is a set of rules and regulations, written or unwritten, that establishes or defines boundaries and tells you how to behave inside the boundaries in order to be successful” (King 1996:23). Traditional and existing models and patterns should be analysed and adapted, improved or replaced to meet changed needs. They could also be replaced by improved or new ways of thinking.

Traditional management accounting information was based on financial reporting which was too late, too aggregated and too distorted to be relevant to management teams for purposes of planning and decision making (Johnson & Kaplan 1987a:194; Roslender 1996:534). Profits were the ultimate measure of performance. Management often does not have detailed information on environmental costs, since these costs are hidden as overheads (Greyling 1997:11). A paradigm shift towards more fragmented financial and non-financial environmental information in a broader context would enable management to determine the contribution of environmental and rehabilitation costs to profits. Costs relevant to particular decisions would be available to support management in their tasks. Such knowledge would also lead to more efficient applications of materials, less waste, and to the general improvement of environmental and rehabilitation activities.

Paradigm shifts from short-term decision making to long-term strategies should be encouraged. Long-term expenditure on research and development, quality improvement,



engineering, education and training of human resources, and rehabilitation should not be rearranged (Johnson & Kaplan 1987a:201) under short-term expenses for taxation purposes, or reduced only to show higher immediate profits. Paradigm shifts are to a large extent based on continuous performance improvement. Strategic positioning and repositioning (Roslender 1996:536) develop from paradigm shifts due to changed situations and circumstances.

A further paradigm shift should be introduced away from accounting results only, towards processes and people (Johnson 1992:30). Processes should be aimed at the reduction of waste products as well as at more effective rehabilitation techniques. The interests of all people categorised as interested and affected parties should be considered when preparing and interpreting management accounting information for decision-making purposes.

Accounting and management accounting paradigms should be changed to accommodate changed patterns in management (Kaplan 1985:225; Drury & McWatters 1998:38) such as rehabilitation policies. Measurement and control systems should be chosen that simultaneously and explicitly support the corporate and long-term strategy of the company. Paradigm shifts towards the more holistic approach of rehabilitation management and the related accounting function, are discussed in Paragraph 7.4.6.

#### **8.2.4 Reengineering**

Following the fundamental changes in approach of paradigm shifts, reengineering is reconstruction and experimentation in the sense of fundamental new organisation and radical redesign of business processes and procedures to bring about dramatic improvements in performance (Yeo 1996:322). Since adaptability and organisational learning become key issues for survival, reengineering supports total quality management and the implementation of continuous improvement cycles. Reengineering also allows rapid radical experimentation (Yeo 1996:321), other than the more gradual forms of change inherent in total quality management.

Together with the reengineering of rehabilitation management approaches, accounting and finance functions as well as their supporting information systems should also be considered for reengineering. Reengineering is associated with productivity, timeliness and usefulness. The results of these outcomes would reduce the number of transactions,

and would place responsibility for the costing activities of the accounting department on the personnel directly involved (Vollmers 1997:64) with these rehabilitation projects. To be more cost effective and to utilise external expertise, it might be necessary to outsource certain rehabilitation activities or entire projects (CIMA S4 P16 1996:202). Internal reengineering should be compared with the cost savings of outsourcing.

Out of necessity, reengineering might create a new management format that is rigid, unadaptable and chaotic. Timeliness, positive feedback and a basis of continuous improvement would to a certain extent prevent such a complex result of reengineering. With rapid unpredictable patterns of change such as might be required as a result of fluctuations in financial markets and thunderstorms over slimes dams, reengineering can easily approach the verge of chaos. This is a region between chaotic and stable behaviour with a constant battle between stagnation and energy (Leach 1996:87). While management systems that are too stable would cease to exist, those on the edge of chaos could evolve towards survival.

Reengineering concerns changes in phases from investigation to planning to implementation (Vollmers 1997:64). Investigation includes the study of procedures for improvement, existing cost structures, and comparisons by means of benchmarking. Planning involves the development of a scheme for producing results, time schedules and transitional arrangements. Implementation is the delegating of responsibilities, the financial and non-financial assessment of results, feedback, and the maintenance of the new reengineered process. Unsuccessful actions should be investigated and improved, changed or replaced as part of the feedback and continuous improvement process.

In a system of reengineering managerial accountability is transferred to teams that become increasingly self-managed, whereas middle management has to redefine their traditional management activities (King 1996:24). Middle management would be responsible for effective project strategies for success. People who are more directly involved with the pollution effects of mining activities, would have the authority and responsibility to take preventative actions in both financial and non-financial terms. Visibility of rehabilitation efforts would then be provided throughout the company and to all interested and affected parties.

Optimal solutions could be found by means of reengineering within different and conflicting constraints. Financial economic issues, such as the availability of input funds and their projected monetary gains, and the application of economic principles are needed for restructuring, pricing and risk management. Constraints such as present and future budgets, tax policies and accounting rules would influence the design of various alternative options for new strategies.

### **8.2.5 Rehabilitation flexibility structures**

Provision should be made for flexibility in the rehabilitation strategy. Flexibility means being able to act or react to changes when providing information for decision making (Koornhof 1998:272). Flexibility in the redesign of processes and procedures would reduce the effects of constraints such as organisational structures, changeover time and the links between people and work. Improvement in flexibility should be incorporated in all management functions, especially those associated with control and evaluation (Johnson 1992:52). Since flexibility is a complex management instrument, its benefits are not often fully utilised.

The importance of managerial flexibility is supported by the respondents to the questionnaire on environmental and rehabilitation management. Most of the rehabilitation managers reacted favourably by agreeing that maximum results would be obtained when there is flexibility between the strategic dimensions of quality, cost and time, and the technical, behavioural and cultural attributes of a good rehabilitation management accounting system (Statement 4.6; 76,6%).

The improvement of skills by approaching rehabilitation management procedures including management accounting, in exactly the same way as twenty years ago, would not allow for new ideas such as under flexibility conditions. In the past companies concentrated on the speed at which work was done, whereas flexible companies focus on the total time, including lead time, required to get the work done (Johnson 1992:68). Lead times are influenced by non-financial indicators such as delays, excess work and too many variations in processes.

In the rehabilitation management accounting context this would mean that funding and rehabilitation operations should not be delayed until the closing down of mines, or put



off for future generations, but that rehabilitation should be incorporated as part of the excavation process. Better deals could be negotiated with subcontractors at the time than would be possible at a future date, under threat of legal action. Since accounting and management accounting are information-oriented disciplines, responsiveness and flexibility would assist companies to adopt improvement changes in management strategies. Flexibility would enable management accountants to adapt information to changing circumstances, both efficiently and without delay. For these purposes projections and futuristic views should be added to the existing historically based reports in order to support the ability to continue to absorb change and disturbances.

Organisational structures should be developed to make them self-renewing systems which could accommodate external and internal change in a flexible manner. These structures should also be equipped to change in response to changed needs, and to utilise expertise, teams, tasks and projects to fulfil these needs (Wheatley 1994: 91). Constantly changing information and new information, most of which would be supplied by the accountant and management accountant, should be applied when formulating alternative courses of action.

In order to implement the concept of flexibility, with its accompanying demand for new thinking, employee relations should be sound. Employees should be valued as a resource and as a source of ideas, and not regarded as a source of energy and cost (Johnson 1992:94, 103). The power of people to remove constraints on flexibility is the most important asset of a company. A workforce allowed and empowered to innovate and learn would form the basis for the introduction of flexibility that would decrease constraints. Responsibility and control are therefore placed in the hands of the people who do the work so that they can improve processes. This attitude would replace the traditional manipulation in order to achieve accounting results.

#### **8.2.6 Improved measurement criteria**

The improvement of measurement criteria forms an integral part of the comprehensive management strategy towards rehabilitation management. (Performance measurement is discussed in detail in Paragraph 8.3.) The purpose of assessing, measuring and reporting on environmental costs is to provide management with information to enable them to manage these costs (Ansari et al 1997b:MMEC-11). The improvement of measurement

and assessment bases links up with the overall strategy of total quality management and with the cycle of feedback and continuous improvement. Within the management accounting setting and its dynamic work environment, the gathering of relevant data should be achieved. Performance measurement should therefore be regarded as a dynamic process which should be maintained. This management instrument for improving measurement criteria has the potential to enhance company performance in respect of rehabilitation strategies.

Performance measurement programmes should not just determine performance, but should also actively encourage improvements in volume and quality with the aim of reducing costs and increasing profits. In order to improve measurement criteria the following guidelines should be considered (Ricciardi 1996:67; Odiorne 1993:2):

- The measurement programme should give equal weight to quality and productivity.
- With a good programme everyone and every segment are measured in the same manner, obtaining comparable results.
- Incentive and participation in the measurement programme should be provided, in combination with reward and continuous training systems.
- Reviewing and updating of measurement standards should be incorporated in the measurement programme, especially after a technology change, making it adaptive to change.
- Measured data should be reviewed on a regular basis.
- Adequate action should follow soon after reading reports compiled as a result of these measurement programmes.
- Pitfalls in the measurement system should be quickly identified and resolved.

From these guidelines it may be deduced that a performance measurement programme should be able to transform itself into a continuous improvement programme.

But when a perfect measurement programme does not yet exist, it does not mean that the impact and full implications of environmental and rehabilitation projects, as well as delays in these projects, should be ignored. Even if the assessments are somewhat imprecise, the measurement of environmental costs should continue (Ansari et al 1997b:MMEC-14). Long-term financial and non-financial environmental damage could

lead to serious financial consequences for mining companies. This attitude of not avoiding costs would allow the management team to operate within a strategic framework, and to improve measurement criteria on a continuous basis.

Benefits that could be determined with a continuous improvement of measurement criteria would include benefits to the macro economy, cost reductions, and increases in output and utility (Freeman 1982:176). More cost-effective rehabilitation strategies would result in a lower financial burden to authorities and taxpayers, as well as increased profits. Improved measurement criteria for the present and future utilisation of resources would allow the management team to formulate policies to reduce costs and to contribute towards the macro economy.

#### **8.2.7 Towards implementation, performance measurement, feedback and equilibrium**

The collections of strategies discussed in the preceding paragraphs would be included in the overall management strategy for rehabilitation management that the management team would consider. Relevant information should be selected and presented, paradigm shifts which change value systems should be considered, reengineering should be implemented to a lesser or greater extent, flexibility should be incorporated and measurement criteria should be continuously improved.

The management accountant as part of the management team should be involved in the selection of relevant information for decision-making purposes. This information should be socio-economically acceptable, should be useful and should include relevant financial, non-financial and qualitative data. Information should form a sound basis for decisions on total quality management, just-in-time and life-cycle cost calculations. Provision should be made for projections and futuristic views in addition to historically-orientated information. Relevant information should be provided which would enable management to weigh alternative options.

Reengineering involves the reconstruction and redesign of processes and procedures based on increased productivity, timeliness and usefulness. Radical and rapid changes could be affected through reengineering, both on the mining sites and in the offices of the management accounting team. Financial and non-financial benefits of internal

reengineering should be compared with those of outsourcing. Accountants and management accountants accompany the investigation, planning and implementation of reengineering projects, from the rehabilitation sites right up to the financial reports.

Flexibility in decisions and policies is a complex management instrument. Information provided by the accountant and management accountant should provide for alternative options to be considered under varying circumstances. Provision should be made for flexibility between quality, cost and time on the one hand, and the technical, behavioural and cultural attributes on the other hand, of a good management and management accounting system. Projections, trends and futuristic views should be added to the traditional historical information to enable improved flexible decisions to be made. Flexibility is to a large degree people-oriented and emphasis should be placed on the importance of adequate education and training of decision-makers of all ranks.

Measurement criteria should be improved on a continuous basis in order to provide quality information for decision making. These criteria include financial and non-financial measurement instruments as well as criteria to assess volume and quality, such as in surface and underground water quality. The accountant and management accountant should link both financial and non-financial measures in improved and more meaningful ways. Improved measurement criteria would have an escalating effect, from improved profits to more accurate macroeconomic figures. Cost-effectiveness would be improved, output could increase, resources would be better utilised, and the financial burden on authorities and the taxpayer could be lessened.

The management functions of performance measurement, reporting and the comparison with a balanced situation, form part of the overall comprehensive strategy, which is illustrated in Figure 7.1.

## **8.3 PERFORMANCE EVALUATION**

### **8.3.1 Introduction**

Since organisations are interested in finding out how they are doing in terms of environmental and rehabilitation operations, performance measurement and evaluation should become inherent in the culture and should be included in the initial stages of

strategic planning schedules.

Performance measurement is “the process of quantifying the efficiency and effectiveness of action” (Neely, Mills, Platts, Gregory & Richards 1996:424). The measurement process is the “assignment of numbers to objects in such a way that the relation among objects can be determined from the relation among numbers” (Ijiri 1967:22). Performance evaluation programmes should, in addition to calculations and reports, also include dynamic procedures that would actively encourage improvement in quality rehabilitation schemes and decreases in waste volumes and so reduce operating rehabilitation costs and increase profits (Ricciardi 1996:66). Quality measurements serve as an analytical instrument to determine when, where and how quality money has to be spent. The functions of evaluation reports (Tatikonda & Tatikonda 1996:7) are to provide information, and to motivate, communicate, coordinate, prioritise and evaluate performance. The progress of quality projects and their contribution to profits is monitored. In the evaluation process performance indicators are established and interpreted in order to follow progress of activities towards the set objectives. Potential further improvements are identified and the cycle of evaluation continues, beginning with the initial stage of the monitoring of the effectiveness of operations (Smith 1995:146).

Environmental performance measurement and evaluation form an integral part of the comprehensive management accounting strategy for rehabilitation management (Eckel et al 1992:16) for the following reasons:

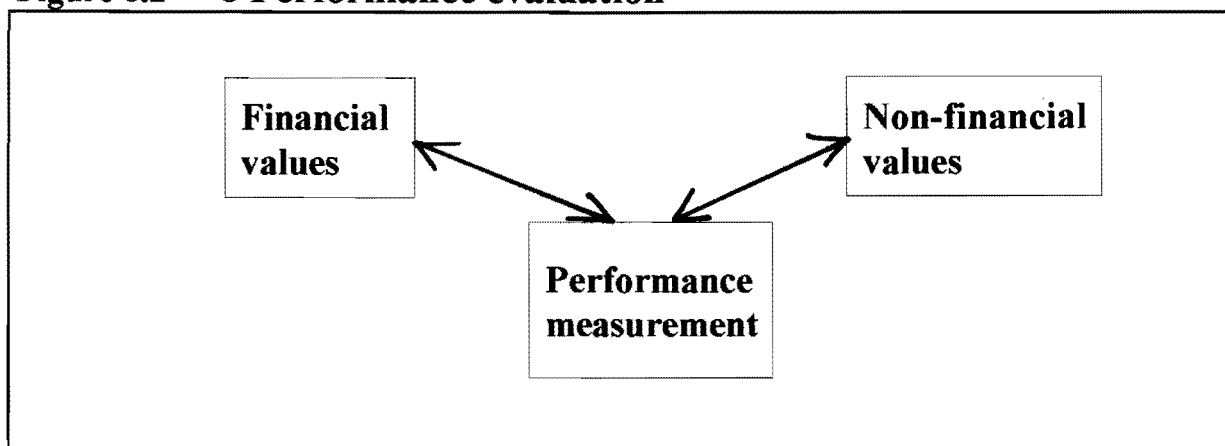
- Mining activities have an impact on the ecology, on society and on the economy.
- Companies are increasingly being held liable for environmental remediation costs, as may be deduced from regulations and penalties.
- Environmental management often results in improvements to the “bottom line” as a result of cost reductions and increases in goodwill. Allocation of scarce corporate resources towards environmental policies requires evidence in the form of adequately measured information.
- Lower levels of management are empowered and need more and better information for decision making and monitoring.

The alignment of performance measurement with total quality management would eventually lead to effectiveness of decision making. The flowchart of performance



evaluation is illustrated in Figure 8.2. Since most of these evaluation criteria have already been discussed throughout the text, a brief discussion will follow. Performance evaluation has traditionally been based to a large extent on financial values only. Other criteria such as non-financial values and time standards are often ignored, or not linked in a meaningful way to financial results.

**Figure 8.2    8 Performance evaluation**



(Source: Empirically developed)

### 8.3.2 Financial values

Financial analysis of rehabilitation activities indicates the current position as well as comparisons with previous years and with benchmarking competitors. Financial planning strategies and budgets are compared with current financial information in order to facilitate decision making by means of feedback mechanisms.

Financial values to be included in performance evaluations consist of the traditional and existing approaches to the measurement and reporting of activities in monetary terms. Trends are developing to identify and classify quality costs, such as prevention costs, appraisal costs and failure costs (Tatikonda & Tatikonda 1996:2). Prevention costs are incurred to minimise, reuse and recycle waste products, while appraisal costs are associated with assessments of the quality attained. Internal failure costs are incurred to correct failed efforts to rehabilitate, and external failure costs are incurred for correction and service of damage to the external environment.

Although most of the environmental and rehabilitation managers who responded to the questionnaire indicated agreement with the actual separation of the various cost categories of prevention costs, assessment costs, control costs and failure costs (Statements 2.2.11 to 2.2.15), it seems that they do not really care whether they are separated or kept together under overheads. A relatively high response was obtained in respect of the uncertainty option. The principle should be further developed that by using more fragmented cost categories in respect of rehabilitation policies, the management accountant could provide quality information for improved decision making.

With the application of financial value analyses, realistic financial estimates of the individual activities of the strategic programme could be obtained. The value created or destroyed could be measured by adjusting this programme (Bannister & Jesuthasan 1997:14). Supporting financial information is needed for decision making and activities, and should indicate how financial returns will change (CIMA Stage 4 Paper 4 1996:82; Parker et al 1989:84). Relevant financial information is therefore required, such as information on avoidable and incremental costs.

### **8.3.3 Non-financial values**

The impact of investments in rehabilitation technology and procedures should also be assessed in non-financial and non-quantitative terms which could not be immediately translated into numbers or which are not easily identifiable. Environmental pollution is not normally a measured variable as it could not readily be translated into profitability and efficiency (Evans 1996:48). Other non-financial evaluations would include toxicology as well as assessment of the health and safety of occupational and local residents (Shimell 1991:16). Environmental damage should be assessed in terms of the levels of water and air pollution, solid and hazardous waste substances, soil degradation and the loss of biodiversity (Todaro 1994:331). Environmental performance in terms of rehabilitation successes, for example, should be measured for water pollution readings relative to the permissible standards set by authorities. Similarly the existence and potential of environmental liabilities (Cormier & Magnan 1997:235) in respect of closed sections of mining sites should be calculated and disclosed.

Non-quantitative factors could be shown on a scale with a total equal to 10 or 100 points indicating flexibility, simplicity of operations, timeliness and company image (Carter

1992:61). Other factors in this category would include safety, ethical attitude of decision-makers, morale, awareness and skills (Smith M 1995:181). A spider diagram (Quest Quality 1997:32) could be applied to illustrate these situations.

Traditional financial evaluations of performance should be complemented with non-financial measurement instruments. Pollution and pollution control, especially regarding contaminated soil, are not easily quantifiable in terms of gains and costs, making assessments and comparability difficult. Owing to uncertainty regarding the application possibilities of non-financial indicators and the limited recognition of their function, they are not used for reporting purposes (Cormier & Magnan 1997:236). But developments in information technology continuously provide improved measurement systems for the generation, analysis and storage of information in order to facilitate decision making on more levels. Although non-financial results are not reported and disclosed regularly in South Africa, they are indeed measured according to the response of environmental managers to the questionnaire (Statement 2.1.12: 74,5%). The compilation of the optimum set of non-financial indicators to evaluate rehabilitation performance is furthermore linked to the goals of the mining company.

Non-financial indicators of performance would be more relevant (CIMA Stage 4 Paper 16 1996:210) to rehabilitation processes under certain circumstances and also more useful in determining the strategic priorities of modern enterprises. Non-financial indicators such as quality, time and flexibility measures could be distinguished. In environmental and rehabilitation strategies especially, longer corporate time horizons are needed since future quality of life should not be sacrificed for present economic gain (Kleiner 1991:38-47).

Responses of environmental and rehabilitation managers indicate that the non-financial indicator of time is actually a factor in management accounting policies in rehabilitation management (Diagram 4.7). They agree that a heritage of badly rehabilitated land is an important factor for strategic management (Statement 2.3.1:83,3%). Time in terms of years is needed to remediate the neglected damage of previous years. It is also the time factor that causes the escalation of repair and recovery costs due to inflation. These respondents also agree that investments of time in education and training of the whole workforce in environmental preservation contribute towards better management results (Statement 2.3.2:70.2%). They realise that non-financial input in terms of time would yield quality non-financial output in terms of environmental and ecological attributes.

Non-financial indicators could be determined according to the nature and size of mining companies, and would vary according to the needs of each individual situation. Non-financial indicators could be defined for each one of the categories of input, performance, products and services, markets, employees and customers (Smith M 1995:180). Examples of time factors would be time on repeat work, on backlog tasks, on repairs and overtime. Other non-financial indicators would be the number of failures, such as instances of clean water mixing with polluted runoff water from waste dumps. Percentages could be calculated such as the percentage of unplanned tasks in relation to planned tasks, preventive maintenance to total maintenance, and research and development on rehabilitation schemes to total budgeted research and development allowances. Indices could be compiled for educational attainment, rehabilitation success, community involvement and satisfaction regarding environmental management, employee contributions, leadership and the utilisation of benchmarking opportunities.

For the successful implementation of non-financial indicators the human factor forms the basis regarding data accuracy, manipulation opportunities (Smith 1990:26) and the ability to be continually innovative (Hiromoto 1988:26). The effectiveness of the utilisation of non-financial indicators would therefore depend largely on the historical background, culture and management style (Eccles 1991:137) of the mining company and its people.

Conventional management accounting has to adapt a selection of non-financial indicators to take into account environmental and rehabilitation performance. The integration of non-monetary outcomes with traditional financial information would enable the compilation of a structured approach towards decision making (Fitzgerald 1997:26). Legislative support and incentives to assist rehabilitation policies set by authorities would further encourage the introduction and development of non-financial indicators. To enable the management team to take a strategic view, both financial and non-financial information should be provided by the management accountant for decision-making purposes. Long-term strategies would more easily include the environmental consequences of present decisions and assessments of waste and the rehabilitation of mining waste sites. The utilisation of non-financial evaluation instruments should be regarded as an ongoing and evolving process for obtaining future rewards.

#### 8.3.4 Performance measurement

A performance measure as “a metric used to quantify the efficiency and/or effectiveness of action” (Neely et al 1996:424). Since performance measurement is an empowerment instrument which forms the basis of good management practice, the utilisation of appropriate measures should generate an improvement orientation. The rehabilitation managers who responded to the questionnaire agree in this regard that measureable is tantamount to manageable in rehabilitation management (Statement 2.1.18: 76,1%). In a tradition of quality management, including continuous improvement, a new era of performance measurement is evolving. Qualitative and non-financial measures are often more difficult to determine, but the management accountant has to find means to assess these figures for a comprehensive strategy towards rehabilitation management. A new attitude has taken shape which states that something is difficult to measure because it has not been clearly enough defined (CIMA Stage 4 Paper 16 1996:214). Galileo said much the same thing (Stainer & Heap 1996:11):

Count what is countable, measure what is measurable and what is not measurable, make measurable.

A performance measurement system has the different levels of individual performance measures, the performance measurement system itself, and the performance measurement system operating within its environment. When, as part of their function as providers of information, management accountants design and assess a performance measurement procedure, measures should be clearly defined, purposeful, practical, self controlling and effective at the individual level. At the performance measurement system level these measures should be integrated to include functions and hierarchy, should provide information on past and budgeted future performances, and should aim to provide and reflect a balanced picture of activities. Within its operating environment the performance measurement system should match the culture of the company, emphasise its strategies, should be in compliance with the reward system, and should provide information for comparison with external data. (Neely et al 1996:425.)

Performance measurement provides information for the management accountant as well as to management to enable them to assess and compare the performance of the company with that of its peers. By investigating and analysing this information, strengths and



weaknesses could be identified, as well as areas for improvement. With the analysis of strengths, weaknesses, opportunities and threats (SWOT-analysis) financial needs are identified that pertain to profitability, gearing, liquidity and working capital (Smith M 1995:21). As a result of SWOT analyses, improvements can be effected in respect of quality, processes, information and technology, communication and management information systems (Smith M 1995:49).

It is fairly easy for companies to achieve 25% improvement (Kleiner 1991:47) in environmental strategies by means of better internal operations as a result of more detailed measurement systems and technologies, but it is much more difficult to continue with this trend. After the initial success environmentalism should be incorporated in a comprehensive strategy which includes flexibility, creativity and the maintenance of a higher standard than is required by relevant existing legislation.

The introduction and evolution of non-financial indicators, as with the utilisation of traditional financial measurement criteria, is dependent on the human factor for accuracy, manipulation and interpretation purposes. Results could be compared and communicated to all interested and affected groups, and could motivate both employers and employees towards the development of an optimum measurement system (Smith 1990:26) in order to achieve the rehabilitation objectives.

Management has to decide what measurement instruments should be utilised and how those chosen criteria should be used in a meaningful way. Environmental performance evaluation measures are developed as part of other activities in the dynamic planning and control structure. Although measurement in itself does not cause improvement, relevant performance yardsticks would encourage analyses and a movement towards progress. In this evaluation process (Russell 1996:40) the objectives of the company regarding rehabilitation strategies should initially be determined and quantified in both financial and non-financial terms. Existing measurement instruments should be reviewed and strong and weak attributes identified. Limitations and gaps should be detected and resolved by means of retraining or the acquisition of better equipment. New measurement instruments should be established to replace inadequate ones, especially after technology changes, and to upgrade the general measurement system. The measurement system should be designed to report and disclose the processing of data and the distribution of relevant information to interested and affected parties, and to provide for flexibility. The

collection of data and the evaluation of performances should be supported by the actions of management and employees. In the end positive communication of information resulting from performance measurements would determine the degree of the successful future direction of the company.

In order to improve the communication of information to staff, provision should be made for an understanding of the effect of their actions, for feedback, for the encouragement of teamwork, for early reaction to evaluation indicators, for flexibility and simplifying evaluation systems (Grady 1991:53). In the process of identifying relevant environmental indicators for evaluation purposes, environmental audits should be conducted and stakeholders consulted (Eckel et al 1992:18). A diversity of assessment criteria should therefore be found that would support the rehabilitation strategies of the company in a balanced way that would include financial, non-financial and human factors.

A comprehensive and balanced performance measurement system which also encourages quality and good communication should include the following attributes (Stainer & Heap 1996:10; Eckel et al 1992:17; Kravchuk & Schack 1996:350; Van Schalkwyk 1998:10; Price Waterhouse 1995:183; Thor 1993:2-6.1):

- The system should be in accordance with the objectives of quality evaluation, for both internal and external comparisons. Changes to the system should be introduced at the beginning of a business cycle. All key elements of performance should be assessed, such as productivity, quality, timeliness, creativity and the use of natural capital resources.
- The measurement criteria should be reliable and easily understandable in order to create confidence in the long term at all levels.
- The measurement criteria should link up with operational activities, frequently utilising existing data where possible to evaluate performance, and should change with changing rehabilitation strategies.
- Only those financial and non-financial factors which could be controlled by individuals or teams should be included in the major measurement system, omitting factors such as water pollution resulting from excessive thunderstorms over discard dumps since such factors require separate appraisals. The control function of the measurement system should not be applied in order to ascribe blame, but to determine what people do well and for the purposes of training and

education in the event of mistakes.

- Lower levels of performance measurement should contribute to the achievement of higher levels in a hierarchical structure. A balanced set of performance measures should be found which would include financial, non-financial, internal, external and qualitative instruments.
- The period of measurement should be consistent with the project and the strategic plan, especially with rehabilitation management where actual positive or negative results of remediation actions could only be observed after decades.

Benchmarking for best practices would provide information to set goals for evaluation purposes. The actual situation should be compared with these goals by applying gap analysis (Grady 1991:52). Both financial and non-financial information is included in this comparative model. Stability of soil, water quality, input costs to achieve certain remediation levels, and maintenance inputs and results after closure could be included in these gap models on an evaluation scale of 1 to 10.

Once these measurement criteria have been established by the management team, which includes the management accountant, a comprehensive strategy for implementation should be determined. The initial stage would be to develop a prototype measurement system in order to refine the evaluation system (Eckel et al 1992:23). A successful implementation strategy for performance measurement should have the following major characteristics (Daly 1996:66):

- Disciplined adherence to the integrated program should be encouraged. Strategic objectives and performance measures, as well as employee behaviour, should be continuously aligned.
- Provision is made for both radical and continuous improvement to the evaluation system. Information on the achievement of environmental objectives is combined with information on changing political, legal, economic and social attitudes in order to reevaluate environmental policies and objectives.

The various attributes and actions mentioned above could be combined in the Perkin-Elmer analytical model of environmental performance appraisal (Daly 1996:66). The following actions are included in this model:

- An environmental team is formed and an environmental measurement strategy is developed.
- Each division has to select a smaller set of baseline measurement indicators, and a baseline year for comparison with present performance. The impact of recent progress together with future initiatives is determined.
- Key quantitative results are formulated, such as energy and water consumption, and the regulation of hazardous and non-hazardous waste. A decision is taken on how or whether to index data according to some single normalising variable measure.
- Unexpected and unusual circumstances are accommodated, providing for comments to reports, such as on the diminution of toxic waste, causing a higher volume of non-hazardous waste.
- A simple system is developed for the collection, documentation, processing and reporting of data.
- Provision is made for qualitative performance measurements, such as for cross-functional teams, air quality, energy and water consumption, waste water, safety and soil stability.

The degree of compliance with this evaluation model could be compared with the stages in the development of environmental responsibility, which vary from ignorance and doing nothing to sustainable development (Eckel et al 1992:19). Responsiveness might range from reactive approaches to regulatory compliance, to proactive responses to going beyond legal requirements.

### **8.3.5 Towards reporting and comparison with an equilibrium situation**

Performance evaluation primarily includes financial and non-financial values aimed at the provision of information for decision-making purposes. Supporting financial information needed for management decisions should indicate financial returns and the results of decisions based on changed situations. The utilisation of non-financial evaluation instruments should be regarded as an evolving process that is ultimately aimed at future successes. Management accountants as circulators of management information have the opportunity to be more involved with the integration and coordination of financial and non-financial data resulting from rehabilitation activities (Fitzgerald, Johnston, Brignall, Silvestro & Voss 1993:124). For the successful implementation of

these evaluation techniques, the human factor should also be considered, since accuracy, manipulation and interpretation would determine the eventual quality of decisions.

The potential functions of management accountants would include the tabulation of environmental costs under separate headings (Fitzgerald 1997:28), such as prevention costs and failure costs. In addition, environmental accounting standards could be introduced and followed by compulsory inclusion in evaluations and disclosures. Multi-disciplinary teams consisting of banks, insurers and the accountancy profession should develop acceptable methods for utilisation measurement instruments for environmental and rehabilitation purposes. Accountants should become more involved in the development and application of non-financial assessment instruments, and should continually monitor new methods and systems in environmental accounting. Performance evaluation and measurement form the basis for reporting and disclosure of information, both for internal decision-making purposes and for external stakeholders.

A complex combination of quantitative and qualitative indices and information is needed for a balanced assessment (Parker 1979:319) of divisional and total performance regarding financial, non-financial, employee, social and ecological operations (Price Waterhouse 1995:173). The future focus might change to the reporting of quantitative and qualitative information including environmental accounting and accounting for time (Barbera 1996:73). These evaluations and reported figures in respect of rehabilitation programmes would provide further information to determine the degree of balance between profit-generating initiatives and the long-term ecological wellbeing of all interested and affected parties. Performance evaluations and assessments would eventually influence the value of assets such as abandoned mine properties and environmental capital.

## **8.4 REPORTING AND DISCLOSURES**

### **8.4.1 Introduction (from performance evaluation)**

Environmental reports are internal as well as public disclosures and they are reports provided and published by companies with the object of communicating with stakeholders on relevant rehabilitation and environmental issues (Bartolomeo & Ranghieri 1996:70). The objectives of environmental performance reporting (CICA 1994:6) is to



share responsibility for the state of the natural environment, to report on performance, to obtain approval for environmental policies, to demonstrate compliance with regulations, and to differentiate the company from its competitors.

The reporting and disclosure of environmental and ecological inputs and gains is a much discussed topic owing to various in-depth national and international research projects, and need not to be analysed in detail in this study. The disclosure of the results of rehabilitation policies, however, forms an integral and very important part of the comprehensive management accounting strategy for rehabilitation management.

Rehabilitation and environmental reporting and disclosures are increasingly needed in the South African society for the following reasons (Erasmus 1998:10; De Villiers 1996a:50):

- Companies have to indicate their social responsibility in view of the demands by employees and stakeholders for the right to a safe and healthy natural environment for themselves and for future generations.
- Reports on the environmental successes of companies would enhance public trust from bankers, creditors, insurers, ethical investors and environmental groups.
- In the capital markets investors realise that the effective management of both economic and environmental scarce resources would give them a competitive advantage as a result of long-term cost savings, advantages and profitability. A reduction in waste and the accompanying total quality management principles would support this movement of continuous improvement.
- Other companies that report rehabilitation and environmental information set the standards in a competitive market. Customers want the reassurance that they are supporting companies that do not intend harming the community and natural resources. Disclosed concern for the natural environment could place the company in a better position.
- Companies have to demonstrate that they have adequate environmental management systems at work in compliance with the latest legislation, or even before legislation is enacted.

Despite the fact that the number of companies reporting environmental information has increased significantly in Europe during the past few years, the quality of reporting in general is very low (De Koning-Martens & Van der Ende 1996:22). Since South Africa

is following in the footsteps of developed countries, these tendencies are also likely to be detected in local environmental disclosure practices.

The disclosure and reporting of information derived from performance evaluations forms an integral part of and basis for management decision making. In this regard rehabilitation and environmental managers who responded to the questionnaire agree that measurable is tantamount to manageable in rehabilitation management (Statement 2.1.18:76,1%).

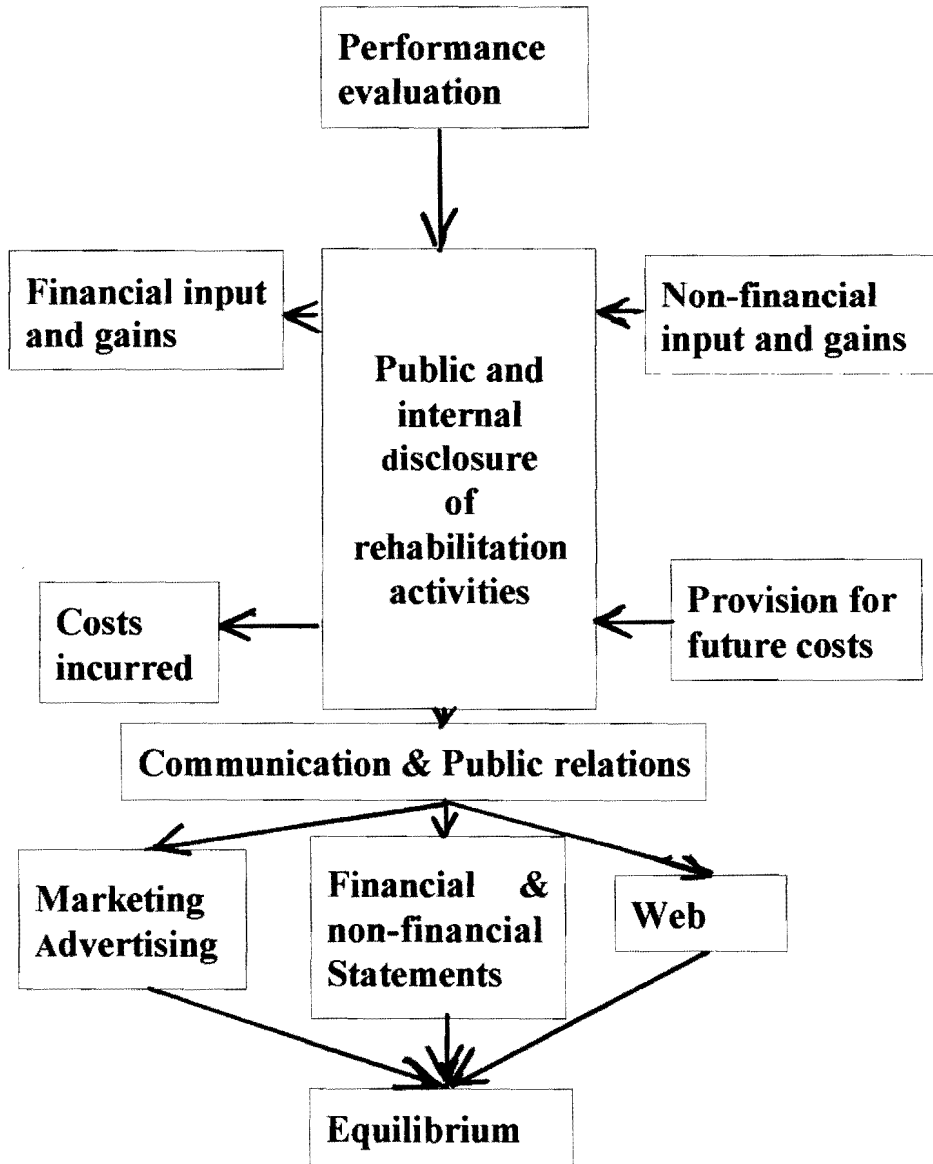
Environmental reporting goes through various evolutionary stages and actual reporting should be judged against the particular stage of evolvment. The following stages were identified (Ulhøi et al 1996:133):

- no reporting
- minimal reporting by exception
- internal reporting only
- mostly internal reporting with some external reporting
- both internal and external reporting
- full public sustainability performance reporting

Performance measurements and evaluations are disclosed and reported by accountants and management accountants to management groups for decision-making purposes, as well as for external stakeholders. Financial as well as non-financial inputs and gains are combined into these reports. Costs incurred during the recent financial period as well as provision for future costs in combination with gains obtained from these inputs, are weighed to determine profits, losses and variations in profits and losses of previous periods. These disclosures of information on financial and non-financial activities that influence profits are made in the annual statements, through advertising campaigns and by means of web pages on the Internet. These activities surrounding the reporting and disclosure of rehabilitation operations should in the long term lead to a balance between the interests of stakeholders in short-term profits only, and the long-term sustainability of the natural environment.

This sequence of events relating to reporting and disclosure of rehabilitation activities is illustrated in Figure 8.3.

**Figure 8.3 9 Internal and external disclosure and reporting**



(Source: Empirically developed)

#### **8.4.2 Reporting financial input and gains**

Traditionally disclosure and reporting of annual activities were reflected without any clear indications of rehabilitation and environmental performance. Developments in environmental accounting paved the way for the inclusion of environmental projects in financial terms.

The financial environmental reporting system would be expected to provide information on a regular basis according to external requirements, which include the following (Eckel et al 1992:16):

- disclosure of rehabilitation and environmental obligations and contingencies
- disclosure of financial and environmental risks internally to the company and externally to the community
- separate disclosure of environmental expenditure in the form of both capital acquired and expenses. Environmental expenditure would include environmental costs and the cost of lawsuits.

Although financial information traditionally forms the basis of the information used for reporting purposes, and is continuously being complemented with non-financial and qualitative information needs, financial issues still form an integral part of the procedure of finding a balancing position in respect of environmental cost management. This view is confirmed by the rehabilitation and environmental managers who responded to the questionnaire (Statement 2.1.14: 89,6%). In addition to this view, the rehabilitation and environmental managers who responded agree that monetary rehabilitation inputs are indeed disclosed to stakeholders (Statement 3.2.4: 64,6%).

Rehabilitation and environmental costs which are built into the price of coal and other commodities delivered to users should be disclosed in annual reports. The removal of impurities in coal for example, would lower the ash content and would increase the heat content (Torrens 1982:23). Environmental costs results in a better quality product for customers, and they should be informed of this fact in statements issued by companies.

### 8.4.3 Reporting non-financial input and gains

Since the reporting of non-financial rehabilitation and environmental input and gains is not regularly included in annual reports, Gray (1992:410) suggests that current accounting practices should be retained, but that attempts should be made to change them, either directly or indirectly by means of education and agendas, or to subvert some current actions. The reporting of non-financial measured rehabilitation and environmental performances must be integrated with and might rely on financial accounting and reporting practices. It would however, function differently and might not conform with the requirements of general accounting practice in terms of objectivity, quantifiability and the assignment of monetary values (Eckel et al 1992:16). It is not an easy task to reconstruct the world in terms of historical information based on financial accounting alone. Non-financial information is therefore needed to supplement existing financial accounting information systems.

Non-financial gains in the form of awards encourage management initiatives towards improved rehabilitation policies. This view is supported by the rehabilitation and environmental managers who responded to the questionnaire, since they agree that awards for green reporting enhance the awareness of cost management for rehabilitation purposes (Statement 4.2:70,8%).

Non-financial information that should be disclosed includes elements found in all activities and performances throughout the company. The following major areas are to be included and disclosed in environmental and information systems (Gray 1992:411; Gray, Bebbington & Walters 1993:233; Bartolomeo & Ranghieri 1996:71):

- audits on compliance and ethics to monitor whether legal requirements and the company's own code of conduct are being met, and audits on waste and energy to determine whether the company is making the best use of its input in terms of environmental policy on the conservation of natural resources
- environmental management systems such as environmental budgets that set targets as part of performance evaluation, as well as risk and emission management
- techniques such as environmental impact assessments (EIA), environmental hurdle rates, best practicable environmental option (BPEO), best available technique not entailing excessive cost (BATNEEC) and environmental risk assessments



- environmental reporting, as part of social reporting, to reinforce the accountability of the company and increase transparency (Elements in these reports would be, for instance, the rehabilitation and environmental policy, environmental contingencies, disclosure of critical, natural and man-made assets, transfers between these assets, environmental consumption, the emission statement and voluntary regulations not yet required by authorities.)
- non-priced environmental performance indicators of critical and natural capital, which should be captured in environmental asset accounting and maintenance, such as biodiversity and the assessment of the extent to which a mining company is destroying natural capital to create man-made capital (These indicators should be compared with information from previous periods.)

Other categories of non-financial reporting would be changes in the nature of natural resources such as in the landscape, water and rivers, soil and air. The flow of natural resources into the excavating processes should be compared with the outflow, including losses, waste, stability of land and pollution. These non-financial items which should be reported and disclosed should be measured against the criteria of eco-efficiency and eco-justice. Eco-efficiency concerns reduced input of resources in a business-centred approach with the objective of increasing or maintaining output, and eco-justice is environment-centred and might even require reduction or termination of production in order to prevent environmental degradation (Owen 1996:24). Decision makers have to decide to what degree either one or both of these criteria should be met.

Although non-financial evaluations and reporting are not widely applied, rehabilitation and environmental managers have already introduced these management instruments. According to their response on the questionnaire, non-financial rehabilitation results are indeed measured (Statement 2.1.2:74,5%), and non-financial rehabilitation inputs and gains are disclosed to stakeholders (Statement 2.1.13:67,4%).

Reporting on qualitative matters should be included in non-financial environmental disclosures. Examples of qualitative environmental reporting (Ing 1992:288) are trends, attitudes, opinions, policy statements and data on pollution levels. Pollution should be indicated in parts per thousand and compared with the legal requirements that embody safe norms. Risks to the environment would be expressed in terms of attendance days at dams and fishing downstream, and compared with information of previous years and

similar river systems. Private and public actions of a mining company aimed at the protection of the environment, the decrease of negative environmental impacts, and the reclamation of the landscape form an integral part of qualitative information that should be disclosed.

Impossible non-financial objectives like 100% pure run-off water should be avoided in reports since they could be regarded as misleading and would result in a considerable negative impact for the company. External experts whose honesty could not be questioned should be brought in to provide confirmation that qualitative information has been identified and correctly disclosed. Exceptional incidents, such as flooding and tremors, should be disclosed as well as the cost and the result of these remediation actions. Accountants and management accountants are therefore challenged to develop, utilise and disclose non-financial indicators (Koornhof 1997:115) pertaining to rehabilitation and environmental management results.

Sustainable management forms an integral part of an environmental management system from the initial planning stages up to the reporting and feedback stages. Sustainable development reporting requires that mining companies assess their performance in terms of both the natural environment and the economy with the objective of creating quality of life today and for future generations (Schmidheiny 1992:94). Elements of sustainable management within the system of rehabilitation and environmental reporting to be disclosed include (Gray et al 1993:235) the identification of natural and man-made capital, transfers between these two categories, estimates of sustainable activities and forfeitures to return the natural environment to the same position as before excavating activities commenced for the benefit of future generations.

#### **8.4.4 Reporting and disclosure of environmental costs incurred**

The major categories of rehabilitation costs incurred during the financial period should be disclosed to interested and affected parties. Information on the results of these incurred costs should be matched with the financial and non-financial inputs in a direct or indirect way in financial, non-financial and narrative terms.

Environmental costs in reports could be grouped in various ways such as direct, indirect, hidden and contingent liability costs (Kite 1995:13). Other categories could be identified,

such as prevention, assessment, control and failure costs (Ansari et al 1997b:MMEC-5). White and Savage (1995:50) distinguish about twenty-eight different environmental cost categories that should be considered in financial analysis, ranging from health issues to staff training to energy consumption and waste treatment and disposal. On the other hand Gray (1992:415) defines the primary environmental information groups as input data, processing data and output data.

Although reported information on rehabilitation expenditure would not be accurate in most instances, this fact does not imply that these costs should not be disclosed. Since environmental costs are often uncertain, less tangible, difficult to quantify and influenced by human judgment, estimates of 3% to 20% of operational costs might be substantially understated (White & Savage 1995:54).

According to the survey among rehabilitation and environmental managers in the mining industry, environmental costs such as prevention costs (Statement 2.2.11:45,8% against 37,5%), assessment costs (Statement 2.2.12:50% against 41,7%), control costs (Statement 2.2.13:58,3% against 35,4%) and failure costs (Statement 2.2.14:56,3% against 27,1%) are separated from other environmental cost categories. These major groups of rehabilitation costs which are incurred are also disclosed to stakeholders (Statement 2.2.15:77,1%).

Various parameters which could influence decisions on the environmental costs incurred should also be disclosed. These factors would include downward or upward fluctuations in interest rates, amortisation time for plant and equipment (Torrens 1982:24), as well as time for the transport and installation of rehabilitation machinery.

#### **8.4.5 Provision for future costs**

Escalation in rehabilitation and environmental costs is a serious concern for mining companies. Penalties and fines for the violation of environmental regulations, as well as compulsory clean-up costs for rehabilitation actions required by authorities, could be substantial (up to R200 000 according to the draft National Water Bill of 1998 (Visser 1998:14)). It is therefore necessary that management and interested and affected parties should be informed by means of disclosures in reports about these future environmental liabilities. Potential and actual rehabilitation and environmental hazards with regard to

health and safety as well as projected expenditure should be publicly disclosed.

Provision is made for future costs and liabilities in respect of rehabilitation projects in both capital and expenses budgets. The stages of environmental capital budgeting (Kite 1995:12) are the development of environmental awareness, the identification of projects that support and encourage company objectives, the selection of the project, and the ongoing assessment of the progress of the project. These facts on environmental budgeting schemes together with a statement of the progress made should be disclosed to stakeholders.

Environmental liabilities are commitments to incur future expenditure to prevent, reduce or repair environmental damage (Visser 1998:14). This expenditure might be in connection with past or existing waste disposal. Rehabilitation and environmental liabilities should be disclosed separately in reports indicating the monetary values of liabilities, contingent liabilities and reserves for future rehabilitation projects. When monetary values cannot be assigned to these future costs, the fact of future environmental liabilities should be stated as well as the time factors associated with expected losses due to environmental damage.

The disclosure of future rehabilitation and environmental expenditures forms an integral part of strategic management planning. In this regard rehabilitation and environmental managers in the mining sector in South Africa agree that strategic planning for long-term rehabilitation management and aftercare is necessary (Statement 2.1.4:97,9%). Since there is a general absence of funds earmarked for environmental projects (White & Savage 1995:49), the reporting and disclosure of future rehabilitation and environmental expenditure should be the result of an integrated environmental accounting system.

#### **8.4.6 Communication by means of statements, advertising and the web**

The quality of rehabilitation and environmental management accounting could eventually be reflected in the disclosed reports communicated through the medium of published statements, advertising, webpages on Internet, press releases, speeches, and news reports and publications in scientific and technical journals.

These disclosures could be measured against the following requirements (Baker 1996:46):

- Relevant information should be provided to assist management in planning, controlling, decision making and performance evaluations as part of the feedback function. The costs of pollution and rehabilitation need to be evaluated and preventive managerial strategies developed.
- The disclosed information should be future-oriented and should also reflect environmental realities. The environmental management accountant should be aware of the consequences of the information provided, keeping in mind the objectives of the company.
- Environmental management accounting statements should be in accordance with acceptable standards, and provision should be made for continuously improving these existing accounting practices.

It may be technically difficult for the accountant to compile a complex environmental reporting structure that provides significant information and to compare such systems over years when provision is made for continuous improvement. In addition, every effort has to be made to ensure that the information is correct.

By means of environmental accounting procedures management accountants give meaning to activities in enterprises and this information is communicated to users through effective disclosures. Environmental issues as seen by those inside as well as those outside the company need to be understood. Within the African context where there are traditional perspectives of an abundance of natural resources with no need to provide for future generations, environmental accounting practices (Gouws 1996:117) as well as methods of communicating environmental policies should be adequate for the needs of the users. In order to fully utilise the potential of these presentations and disclosures, information should be communicated in such a way as to be user friendly, useful and of value (Gouws 1997:78) to interested and affected groups. There is a particular interest in information on earnings, projections and management, which would include rehabilitation and environmental policies (Parker et al 1989:110). Both internal and external users of these environmental reports should be able to respond quickly to changed circumstances.



#### **8.4.7 Towards an equilibrium position**

The reporting of rehabilitation and environmental evaluations and information should be helpful in reaching the objective of finding a balance between financial, economic and environmental cost issues on the one hand, and on the other hand the gains in the form of protected natural environments and benefits derived from these inputs. Rehabilitation and environmental reports contain important figures in financial and non-financial terms, as well as qualitative information regarding the relationship between the mining company and the natural environment. They provide information on a regular basis to interested and affected groups of a mining company. This information includes environmental obligations, contingencies, risks, expenditure and acquired capital.

Non-financial input and gains to be disclosed in reports are found in all performances throughout the company. These would include issues on rehabilitation policy, levels of waste and pollution, budgets for waste and pollution standards, rehabilitation and reclamation techniques, and the rate of transformation of natural assets into man-made assets. Qualitative rehabilitation and environmental reporting would reflect trends, attitudes, culture, opinions and information on pollution levels. Sustainable management reporting would present information on sustainable activities and forfeitures for returning the natural environment to the same position as before mining operations commenced.

Rehabilitation and environmental reporting could be classified into various categories, and should be compared with similar information for previous years. Upward as well as downward fluctuations should be noticeable. Provisions for future rehabilitation and environmental expenditure and liabilities should be disclosed as part of the long-term management strategy of the mining company. These commitments might be in connection with past, present or future rehabilitation schemes. Information contained in the reports should be communicated in such a way as to be accessible to the users and should assist management in the feedback function. The environmental management accountant should be aware of the consequences of the information, in view of the objectives of the mining company.

Information disclosed in these reports forms the basis for the feedback mechanism to enable management to continuously improve on policies. Feedback is provided in various forms by the users of this information.

## 8.5 FEEDBACK AND THE IMPROVEMENT OF STRATEGIES

Accounting and management functions require continuous improvement, based on the feedback mechanism, for the provision of adequate information for decision making. Failure to react timeously to negative trends was traditionally ascribed to obsolete and restrictive management accounting and accounting procedures (Turney & Anderson 1989:37). But the relevance of accounting information was also lost through the improper use of accounting and management accounting information with the emphasis on the control of operations (Johnson 1992:31). The role of the feedback function (Paragraph 7.5.6) as well as the continuous improvement cycle were incorporated throughout the text, since feedback and continuous improvement form an integral part of the comprehensive rehabilitation management accounting strategy.

Feedback is information about actual results and achievements, coming from within the company on matters such as rehabilitation expenditure and rehabilitation standards reached, with the purpose of assisting in control decisions. By continually responding to differences between the management accounting system's actual and desired states, feedback mechanisms adapt the system to long-term fluctuations without forecasting (Simon 1990:172). However, feedback adjustments follow these discrepancies after a certain time lag. The difference between planned and actual performances is measured, and subsequent actions are modified in order to achieve improved performance (CIMA Stage 4 Paper 16 1996:49). The management team has to follow up on feedback, whether or not the rehabilitation project was a success or a failure, especially in cases of experimentation and the initial introduction of new ideas (Pascale 1991:21). Negative feedback is information indicating that activities are deviating from the planned strategy, and that adjustments and even a change of course are necessary to reach objectives. In this regard rehabilitation and environmental managers who responded to the questionnaire agree that feedback on failures in rehabilitation management is necessary for management decision-making purposes (Statement 2.1.10: 93,8%).

Positive feedback informs interested and affected groups that targets have been exceeded, and that the actions causing the deviation could possibly be maintained. Rehabilitation and environmental managers responding to the questionnaire agree that feedback to management on successful rehabilitation operations is important for management decision-making purposes (Statement 2.1.9:100%).

Continuous improvement could be described as the relentless pursuit of improvement in the delivery of value, or the reduction of waste and the production of wasteland, by means of ongoing attention to excellence in production, engineering and marketing (Turney & Anderson 1989:38). Improvement is the organised creation of beneficial change and the attainment of unprecedented performance levels (Juran 1989:78).

To make it possible for top management to improve quality and productivity, Deming (1982:16,18) identified 14 points to be followed in the long term. The first of these points is to constantly create a target for improvement. Improvements should be aimed at present problems as well as problems of the future. Continuous improvements to day-to-day problems would be aimed at immediate reactions such as putting in more plant material than the previous week with the same number of employees and equipment. Long-term problems require constancy of purpose and dedication to improvement. This means

- allocating scarce natural resources in an innovative way for long-term strategies
- allocating financial and non-financial resources to research and education
- constantly improving designs in order to improve efficiency in accordance with established quality goals
- allocating financial and non-financial resources to the maintenance of existing equipment and new technology, including the consideration of possibly contracting out of some rehabilitation activities

Other methods of effecting change towards continuous improvement would be to find a new managerial team; adopt a new accounting philosophy with accounting joining production, engineering and public relations; to build trust for new approaches; and to manage excess capacity and employee turnover (Turney & Anderson 1989:40). Juran (1989:80) adds the reviewing of progress, revised rewards systems, and improved employee relationships. A change in the role of the management accountant from watchdog to change facilitator is needed in order to focus information on continuous improvement in order to develop and design new financial and non-financial criteria for performance evaluations.

Part of the research and development component of continuous improvement would include the removal and replacement of obsolete rehabilitation systems. In the improved working environment better systems could be implemented (Turney & Anderson 1989:42)

for the continuous flow of activities and materials, for people involvement in the form of teamwork, continuous processing improvements, the elimination or reduction of waste, the elimination of excess inventory, the replacement of sudden changes with more even change-overs, and visual control to detect imbalances immediately. This view is supported by the rehabilitation and environmental managers who responded to the questionnaire. They agree that there should be an awareness of the continuous search for best practices in order to improve processes and activities (Statement 2.1.8:100%).

The implementation or expansion of continuous improvement activities and cycles could, however, constitute a barrier to long-term improvement strategy. One example would be the increase in overheads as a result of expanded engineering activities to replace escalating labour costs. These overheads could result in expenditures which far exceed the corresponding labour costs (Turney & Anderson 1989:44). Accounting procedures which are segmented over various sections of the total rehabilitation process would record individually low labour costs in accordance with the policy of reducing labour, without comparing labour decreases with total increases in overheads. Continuous improvement should therefore be assessed and measured by means of both financial and non-financial indicators of efficiency, quality and improvement trends.

Continuous improvement and optimisation in rehabilitation strategies support continuous quality improvement. These would eventually lead to the attainment of the objective of remediating the natural environment into a sustainable position similar to its capabilities before the commencement of mining excavations. Feedback and continuous improvement functions are powerful instruments for management to apply in order to progress in the direction of a balancing position between the needs of human and non-human stakeholders in connection with the rehabilitation of mining land. Improvement teams should consist of cross-functional experts so that they are able to operate this complex system of rehabilitation and environmental functions.

Where South Africa is endeavouring to expand trade relations with developed countries, improvements in pollution management and standards would be part of the conditions of trade. A similar situation was found in Mexico when Canada and the United States threatened restrictions on trade unless antipollution standards were upgraded (Schonberger & Knod 1994:618). The need to include continuous improvement cycles in rehabilitation management accounting strategies is further emphasised by the fact that



South Africa is regarded as the leading nation in Africa south of the Sahara.

## **8.6 OPTIMISING EQUILIBRIUM**

### **8.6.1 Introduction**

In the previous stages of the comprehensive management accounting strategy for rehabilitation and environmental management, performances were evaluated and measured with the aid of financial and non-financial indicators. These sets of data should be communicated by means of reports and disclosures to interested and affected parties in a way that is easily understood by them all. Since no single-dimensional set of data could clearly reflect performances, management require balanced presentations of both financial and operational assessments. There is therefore a need to bring together dissimilar issues, to indicate how results are obtained and what the effect would be on the environment, similar to the “balanced scorecard” of Kaplan & Norton (1992:72) for manufacturing and marketing purposes.

In that regard the South African rehabilitation and environmental managers in the mining industry agree that the strategic management accounting dimensions of quality, cost and time should be combined for general rehabilitation management purposes (Statement 4.4: 72,9%), and are indeed combined in the interests of rehabilitation management in their mines (Statement 4.7:56,3%). The rehabilitation managers also agree that the attributes of a successful management accounting system of technology, behaviour and culture should be combined for the benefit of rehabilitation management (Statement 4.5:79,2%), and that these attributes are indeed combined to a certain extent in their mines (Statement 4.8:47,9%).

The data on rehabilitation and environmental strategies that have been gathered should be compared in checklists in order to determine what degree of equilibrium and balance has been achieved in the management of these issues. Equilibrium is the “unchanging state of a system ... resulting from the balance of the influences to which it is subjected” (McLeod & Makins 1993:377). Balance represents “harmony in the parts of a whole” (McLeod & Makins 1993:79). Equilibrium and balance are not necessarily associated with total stability, but would also include elements of instability to make provision for continuous improvement in an effort to achieve an optimum equilibrium position.



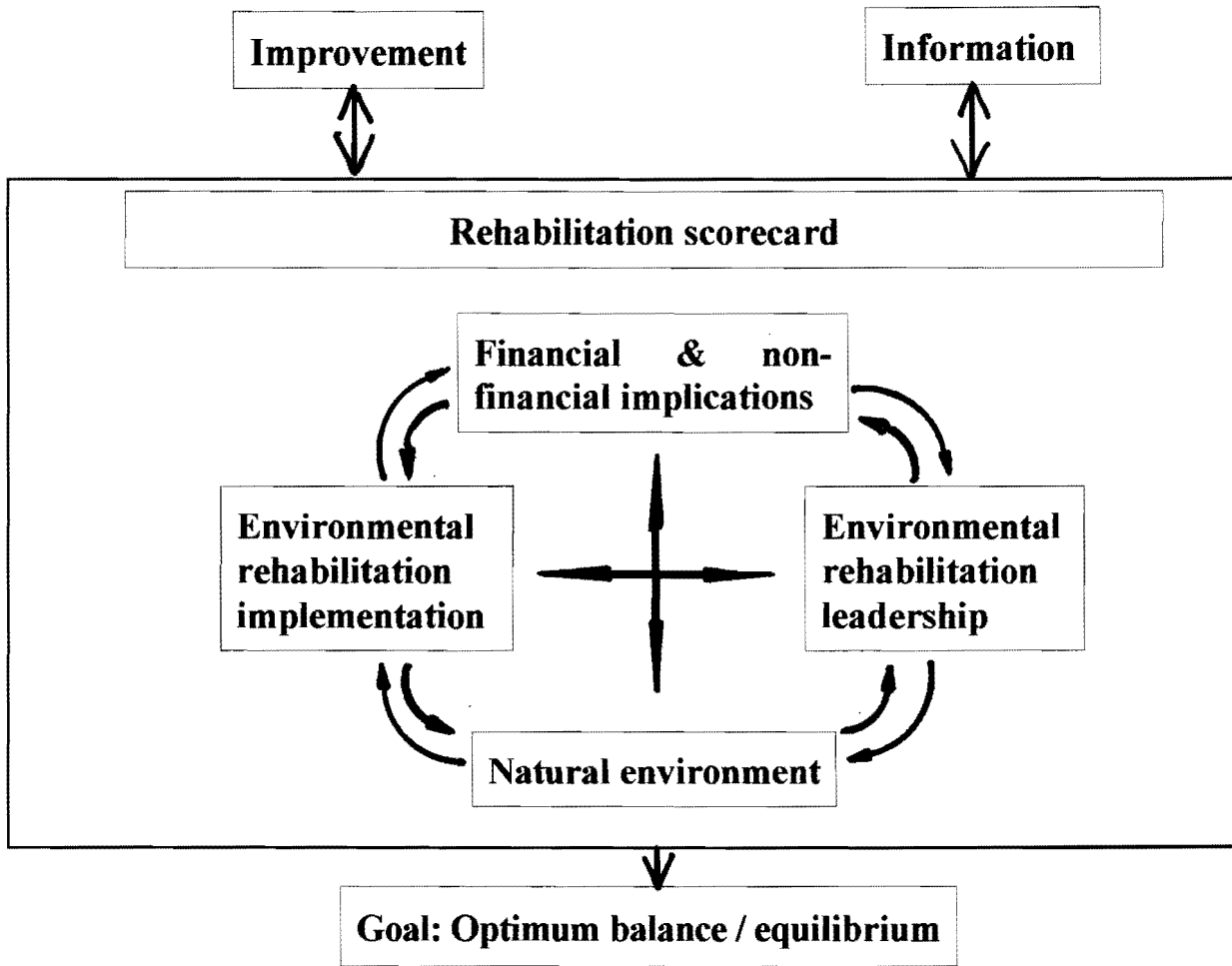
This performance matrix provides numerical information on the mining company's progress towards the achievement of its vision, mission and objectives regarding the long-term strategy for the preservation of the natural environment. The results of these checklists should be compared with the results of previous periods as well as with set goals and standards. An ideal situation would be to reach an optimum equilibrium position in terms of environmental rehabilitation implementation, environmental leadership, financial and non-financial input and gains, and the natural environment. This view is supported by the rehabilitation and environmental managers in South Africa who responded to the questionnaire. They agree that a balancing matrix should be developed to determine the degree of environmental equilibrium (Statement 2.1.3: 86,5% agree; 13,5% uncertain, 0% disagreement).

Most of the elements of these sets of actions would have an influence on decisions in the same set as well as in other sections. The interaction between environmental rehabilitation implementation, environmental leadership, financial and non-financial implications, and the state of the natural environment is illustrated in Figure 8.4.

### **8.6.2 Financial and non-financial implications**

Both financial and non-financial implications of rehabilitation management accounting could be evaluated against a checklist on a scale of zero to five, or zero to ten, depending on the degree of accuracy required. On a scale of zero to five a score of zero would indicate that no satisfaction with the issue is experienced, while a score of five would indicate that full satisfaction with the policy pertaining to that item is experienced. An example of financial and non-financial items to be included in such an assessment scheme is illustrated in Table 8.1. These financial and non-financial indicators have been discussed in the text. Financial and non-financial inputs and gains or results of rehabilitation inputs are disclosed to stakeholders according to the rehabilitation and environmental managers who responded to the questionnaire (Statement 2.1.11:79,2%; Statement 2.1.13:67,4%). They also agree that financial issues form an integral part of the procedure to find a balancing position in respect of environmental cost management (Statement 2.1.14:89,6%).

**Figure 8.4 10 Finding a mining rehabilitation equilibrium**



(Source: Empirically developed)

Items on such a scale should be selected in accordance with the particular rehabilitation and environmental policy of the mining company as well as of the commodity mined. Surface coal mines for example would have different needs from deep gold mines, geological composition might differ substantially, and weather conditions such as rainfall and prevailing winds on discard dumps would be different in various regions.



**Table 8.1 Environmental financial and non-financial checklist**

Item	Ranking				
	1	2	3	4	5
<b>Input</b>					
Total costs of rehabilitation					
Costs of the extended enterprise (aftercare, consultations, environment)					
Designing out of rehabilitation costs during planning					
Costs of pollution prevention, minimising					
Separation of internal, external, capital and operating costs					
Separation of prevention, assessment, control and failure costs					
Separation of rehabilitation costs as part of present process and costs on damage from the past					
Integration of rehabilitation expenditure into decision making					
Life cycle costs					
Time: monetary provision for long-term rehabilitation and aftercare					
Extended capital, expenses budgets to include rehabilitation					
Utilising expertise					
Timing of rehabilitation operations					
Investments of time and funding for education and training					
Financial and non-financial (permits) provision for contingencies					
Future costs: legal, remediation, prevention, failure, control					
Benchmarking, consulting with the surrounding community					



<b>Results:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Financial gains: capital and operating					
Return on investment; costs to benefits					
Performance improvement					
Value of property					
Internal and external value added					
Decrease in pollution, ecological risks					
Increase in water quality					
Aesthetic value, impact					
Health of workers, community					
Productivity, flexibility, efficiency, quality improvement					
Quality of recreation in nature					
Time: short-term, long-term losses/gains					
Employee development towards rehabilitation policies					
Involvement of accounting personnel					
Marketability					
Awards, leadership					
Comparison with international standards					

(Source: Empirically developed)

These financial and non-financial implications of rehabilitation and environmental programmes would determine the degree of implementation of a system of full cost accounting. Both external and internal environmental cost accounting approaches are incorporated in order to provide a more complete assessment of environmental risks and impacts (Heymann 1997:7). Each individual mining company would be in a separate stage of development regarding the differentiation and disclosure of rehabilitation and environmental inputs and gains.

### **8.6.3 Rehabilitation and environmental implementation**

Issues pertaining to the implementation of environmental rehabilitation form an integral part of the procedure to find equilibrium in respect of environmental cost management. This view is supported by the rehabilitation and environmental managers who responded

to the questionnaire (Statement 2.1.17:81,3%). The degree of implementation of rehabilitation and environmental policies could also be evaluated by means of a checklist, such as the one illustrated in Table 8.2. Since the needs and circumstances of each individual mining company and mine might vary, each one has to prepare its own checklist.

**Table 8.2 Rehabilitation and environmental implementation checklist**

Item	Ranking				
	1	2	3	4	5
Evolution stage of comprehensive strategy					
Implementation of this strategy					
From a reactive to a planning approach					
Initial impact assessments					
Separate budgets for rehabilitation programmes					
Integration of rehabilitation policies into major schemes					
Implementation of BATNEEC (best available techniques not exceeding excessive costs)					
Flexibility, redesign in respect of changing circumstances					
Contingency planning for floods, accidents					
Development stage of environmental information gathering and disclosure					
System of waste and rehabilitation accounting					
Internal and external environmental auditing					
Co-operation and relationship with authorities					
Importance of feedback and continuous improvement					
Stage of sustainable development support					
Maintenance after closure					

(Source: Empirically developed)

The rehabilitation and environmental implementation checklist makes provision for the assessment of the degree of full cost accounting being implemented in the rehabilitation management accounting system. Future rehabilitation costs are considered and allocated for present pricing purposes.



#### **8.6.4 Environmental rehabilitation leadership**

Rehabilitation and environmental implementation are closely linked to environmental rehabilitation leadership. Although a mining company would have compiled a comprehensive strategy on rehabilitation management including issues on financial and non-financial policies, would have a programme on the implementation of these policies, and could detect some positive effects on the natural environment, these would not be successful without strong environmental rehabilitation leadership and integrity on the part of top management. This view is supported by the rehabilitation and environmental managers who responded to the questionnaire. They agree that leadership factors form an integral part of the procedure to find a balancing position regarding environmental cost management (Statement 2.1.16: 83%).

An example of a checklist for the evaluation of environmental rehabilitation leadership is illustrated in Table 8.3. These items should be adjusted according to the needs of each individual mining company, since some companies have more difficult environmental problems to solve because of a heritage of badly rehabilitated land or of no rehabilitation at all.

**Table 8.3 Environmental rehabilitation leadership checklist**

Item	Ranking
	1 2 3 4 5
Changing from a compliance to a strategic planning approach, with mission and objectives	
Rehabilitation integration into existing programmes	
Elimination of hidden environmental costs in various overhead accounts	
Integration of awareness of environmental impacts throughout all activities	
Benchmarking in industry, communicating with community	
Involvement of internal and external expertise	
Encouragement of employees to improve rehabilitation performance by means of prevention	
Ethical, cultural attitudes; sensitivity to natural environment; accountability	
Responsibility towards interested and affected parties	
Utilisation of rehabilitation technology in various divisions	
Provision for training and education in rehabilitation issues at various levels	
Encouraging continuous improvement by means of research and development	
Incorporating total quality management, ISO9000, overseas experience	
Utilisation of available financial and non-financial management instruments	
Emphasis on the role of feedback information	
Development of environmental performance evaluation and information systems, including flexibility	
Quality and timely reporting, disclosure of rehabilitation investments, operations, results	
Distinguishing between immediate and gradual reaction to data	
Rehabilitation standards in line with international standards (eg ISO14000)	
Implementation of environmental audits which are continuously being improved	
Accounting approaches from historical to future-oriented emphasis	
Recognition of environmental liabilities for reporting, decision making	

Following a team approach that will include accounting, legal and other managers  
Life-cycle evaluations of present and future rehabilitation policies  
Following total approach from impact assessment to aftercare  
Providing for future, long-term changes in regulations, technology, cost structures  
Encouraging sustainable development

(Source: Empirically developed)

The indicators on the environmental rehabilitation leadership checklist would assess the degree of linkage of environmental information systems with the management accounting systems of control and reporting, as well as with existing cost management and capital investment decision-making systems. Management for quality could therefore be determined in terms of quality environmental planning, quality control and quality rehabilitation and environmental improvement (Juran 1989:26). These indicators would measure the properties of environmental leadership, and would also indicate that these leaders would be successful in other management areas as well, such as planning, anticipation of and provision for change, self-control in establishing clear criteria as well as making use of feedback (Juran 1989:174), and functioning within legal limits.

Progress with these leadership indicators is determined in terms of improvements when comparing these scores with the scores of previous periods and with set standards. Unsatisfactory long-term improvements of the total balance of the four elements of the equilibrium could be ascribed to inadequate management and leadership, rather than to the inadequate performance of employees. Improvements in leadership properties are closely linked to the degree of bottom-up empowerment of employees to recommend opportunities for performance improvement, as opposed to the traditional top-down control approach (Johnson 1992:156). This system for the assessment of an optimum equilibrium position therefore forms an important management instrument for the evaluation of leadership properties.

#### **8.6.5 Effect on the natural environment**

The implications of financial and non-financial actions and results, the implementation

procedure of rehabilitation and environmental programmes and the strength of the environmental rehabilitation leadership form an integral part of the finding and optimising of an equilibrium position. But the positive or negative effects of all these actions are eventually found in the present and future state of the natural environment. This view is confirmed by the rehabilitation and environmental managers who responded to the questionnaire. They agree that issues on the natural environment form an integral part of the procedure for finding a balancing position regarding environmental cost management (Statement 2.1.15: 82,6%). In order to arrive at a more complete reflection of the equilibrium situation, the effect of the comprehensive management accounting strategy should be followed through, and the effects on and reactions of the natural environment should be evaluated.

Since it is difficult to be precise in these evaluations, a degree of subjectivity should be allowed and more than one opinion obtained. A proposed checklist for the evaluation of the natural environment during and after rehabilitation programmes is illustrated in Table 8.4.

**Table 8.4 Checklist for effect on the natural environment**

Item	Ranking				
	1	2	3	4	5
Added value to land, water, air					
Added years for agricultural land, food supplies					
Prolonged useful life of land, property					
Maintenance, supervision after closure					
Reduced waiting period from excavation to remediation					
Reduced pollution of soil, water, air					
Revegetation, reintroduction of former plants, animals					
Water safe for human and animal consumption					
Stability of land for building purposes, sinking of boreholes					
Surrounding communities could survive as previously					
Keeping land, property in ordinarily efficient condition					
Matching quality, cost, time with technology, behaviour, culture					
Public opinion/satisfaction with rehabilitation, preservation of nature					
Sustainability for future generations, life					
Biodiversity remediation, preservation					
Preservation of a number of species					
Reduction of years required for the environment to remediate by itself					
True profits: none of the stakeholders incurs losses					

(Source: Empirically developed)

This checklist provides a means of determining the responsibility of the industrialised sectors towards the natural resources and sustainability. It also gives an indication of the reaction of the mining industry to the environmental challenge to minimise pollutants, rehabilitate and remediate in both monetary and non-monetary terms.

The effect on the natural environment after rehabilitation programmes, is to a large extent linked to time. Historically oriented information could support improvement policies, but the eventual goal would be a sustainable living natural environment for future generations. Projections should be made in order to evaluate the state, sustainability and



financial and non-financial value of rehabilitated and remediated land after ten, twenty and a hundred years. The comprehensive effect of past and present rehabilitation programmes should be projected towards future remediation efforts and quality of life in the area of dependency on soil, water and air.

#### **8.6.6 Goal: Towards optimum equilibrium**

The success of the equilibrium strategy depends on the measurement, accumulation and reporting of rehabilitation and environmental information. Zero risk and total accuracy cannot, however, be achieved in this optimisation model, but the major objective would be to apply quality management policies with the emphasis on continuous environmental improvement towards an optimum equilibrium position. Feedback on the degree of equilibrium consists of various documents to be prepared by the management accountant (Maromonte 1996:147). These include information such as an explanation of the purpose of this set of information, graphs and tables of evaluations, comparing the latest scores with past and estimated future figures, emphasising criteria of quality, time, financial and non-financial input and gains, technical development, and satisfaction of interested and affected groups.

This equilibrium matrix would enable management to realise the impact of the implementation of different policies on several variables simultaneously. Investments, improvements and optimisation in one section which would lead to deteriorations in other sections (Epstein 1995:73; Juran 1989:143) could be detected by means of this model. Information on environmental consequences of rehabilitation programmes is linked to management accounting, control functions, financial and non-financial disclosures and reporting, decision-making systems for cost management and capital investments, the implementation of these policies and the influence of leadership. Information accumulated in this scorecard would enable environmental leaders to build bridges between mining companies, authorities and the environment. In addition to the illustration of past and present rehabilitation performances, this matrix is also an instrument for assessing projections of proposals for future rehabilitation programmes.

This rehabilitation and environmental equilibrium matrix could be adapted for the specific circumstances of each individual mining company. Small and large companies could both benefit from this model, as well as companies with high or relatively low volumes in

potential discard dumps and pollutants. The degree of damage that could be inflicted on the environment as well as the toxic content of effluent could be incorporated in this model.

An optimum equilibrium position in respect of total quality environmental management should eventually be found between economical and environmental objectives by weighing the costs of the protection of the environment against the short-term and long-term benefits to be gained from these investments. This would be in accordance with the vision of the mining company which should be achieved in the shortest practical time span as part of its long-term continuous strategy. An aspiration after an optimum equilibrium position would enhance the competitive position of the company in an increasingly global business environment which accords high priority to rehabilitation and environmental quality management.

## 8.7 SUMMARY

The functions of the management accountant form an integral part of the development and functioning of the various components encompassed in the strategy for total quality rehabilitation management accounting. In addition to the primary contributions discussed in the previous chapter, the following secondary contributions, briefly, are made by management accountants, or should be included in their overall contribution:

- As part of the support service management accountants render to management, they provide information and advice. In addition to financial indicators, relevant information should include qualitative and non-financial evaluations. If necessary, traditional and existing models are analysed and adapted to arrive at improved approaches in the form of paradigm shifts. By means of reengineering, radical and rapid changes and improvements could be obtained in productivity, timeliness and usefulness. This information and advice should make provision for flexibility, especially under changing circumstances. A system of continuous improvement in measurement and evaluation criteria has the potential to more accurately assess inputs and gains in financial, non-financial and qualitative terms. (Paragraph 8.2.)
- Performance evaluation and measurement should be included in the initial stages of strategic planning schedules. Financial analysis indicates the current position in relation to past and future situations in respect of each individual environmental

cost category. Non-financial and quantitative evaluation criteria would include health, safety, time and pollution level assessments. Performance is assessed to combine both financial and non-financial indicators. (Paragraph 8.3.)

- Environmental reports are provided to communicate with stakeholders. Financial disclosures include obligations, contingencies, reserves for closure, risks, capital and current expenditures, environmental liabilities and the value of natural resources. This information is linked to non-financial input and gains in relation to rehabilitation and environmental performances throughout the company which include budgets and standards, waste and pollution levels, reclamation programmes - all of which should be seen against the background of trends, attitudes and culture. The various groups of environmental costs incurred are disclosed according to categories. Projections are made of future rehabilitation costs that must be incurred as well as of expected results. Information in these reports should be communicated in order to be accessible to users and to assist management as part of the feedback function. Procedures for financial and taxation statements would be extended to include the disclosure of rehabilitation and environmental aspects for the broader group of stakeholders. (Paragraph 8.4.)
- The feedback mechanism provides adequate information about actual results and achievements for the required continuous improvement of accounting and management functions. The management team has to follow up on positive as well as negative feedback in order to modify actions for improved present and future performance. A change in the role of the management accountant from controller to facilitator is needed. (Paragraph 8.5.)
- By means of a set of checklists an environmental equilibrium position is determined. The ideal situation would be to find an optimum total quality equilibrium position regarding environmental rehabilitation implementation, environmental leadership, financial and non-financial input and gains, and the natural environment. In this model optimum rehabilitation and environmental programmes in one section would indicate deteriorations in other sections. Short-term as well as long-term financial and non-financial input and gains are combined in this equilibrium matrix for the assessment of environmental excellence. (Paragraph 8.6.)

Apart from the possibilities of continuous improvement in these contributions, management accountants would also take into account the interests of the broader

spectrum of stakeholders. Actual accomplishments as well as future strategies according to this scheme would strengthen the comprehensive strategy for rehabilitation and environmental cost management.

The accountant and management accountant form an integral part of the team that ensures the development of mutually reinforcing practices for the success in quality rehabilitation and environmental management. They have to experiment and seek new and advanced ways of utilising their expertise and enlarge their competence by presenting management accounting as a broader function for use in management decision making.