





The Federal Ministry
for the Environment,
Nature Conservation
and Nuclear Safety



SUSTAINABILITY MANAGEMENT IN BUSINESS ENTERPRISES

Concepts and Instruments for Sustainable Organisation Development

CONCEPTS



INSTRUMENTS

SUSTAINABILITY MANAGEMENT IN BUSINESS ENTERPRISES

**Concepts and Instruments for
Sustainable Organisation Development**

Commissioned by the
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Authors:
Prof. Dr. Stefan Schaltegger
Christian Herzig
Oliver Kleiber
Jan Müller

Centre for Sustainability Management (CSM) e.V.

University of Lueneburg
www.uni-lueneburg.de/csm



Published by:
The Federal Ministry for the Environment,
Nature conservation and Nuclear Safety (BMU)
Division for Environment and Economy, Eco-Audit
Heinrich-von-Stephan-Strasse 1
D-53175 Bonn
www.bmu.de



The Federal Ministry
for the Environment,
Nature Conservation
and Nuclear Safety

Federation of German Industries (BDI)
Environmental Policy Department
D-10178 Berlin
www.bdi-online.de



© 2002 Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety
1st Edition
ISBN 3-935630-18-2

Authors:
Prof. Dr. Stefan Schaltegger,
Christian Herzig, Oliver Kleiber, Jan Müller

Centre for Sustainability Management (CSM)
University of Lueneburg
D-21335 Lueneburg
www.uni-lueneburg.de/csm



Graphic design:
Michael Rehr-Hoffmann
D-21335 Lueneburg

English translation:
Terence Oliver
D-21423 Winsen

Printed by:
MuK. Medien und Kommunikations GmbH
Wolfener Strasse 36
D-12681 Berlin

The report is available free of charge from the publishers or from CSM.

Foreword



Dear Reader,

In our country the debate about sustainable development has developed from our concern with ecological issues. Thanks to growing consumer awareness of the environment and stringent environmental legislation, ecological aspects have come to play an increasingly important role for business enterprises. This trend has received further momentum from a growing awareness in the business sector that paying heed to environmental protection aspects may also lead to considerable cost savings, especially as a result of targeted reductions in resource and energy inputs.

Today we can see that substantial progress has been made. In many businesses the task of designing production processes, products and workflows to ensure their long-term compatibility with the goal of conserving the natural basis for life has become an important management task, indeed one for top management. This is made clear by the large number of enterprises in Germany that operate an environmental management system in accordance with the European EMAS Regulation or ISO 14000.

Nevertheless, we still have far to go in the entrepreneurial task of gearing business operations and management structures to the goals of sustainable economic activity. The absolute environmental burdens associated with our business activities are still far too great. In the interests of sustainable resource management, therefore, it is absolutely essential to achieve a marked improvement in the ecological effectiveness of environmental protection by business enterprises.

I am firmly convinced that the future belongs to production processes with environmentally friendly technology and closed substance cycles, and to consumption processes that can take account of ecological quality and product functions. It belongs to entrepreneurs who, as producers, accept responsibility for their products – a responsibility that lasts for the entire life cycle of their products from “cradle to grave”. At the same time a development of this kind can help to strengthen our position in international competition and safeguard jobs on a long-term basis.

The future will also belong to those business enterprises that make an active contribution to sustainable development in their country by showing “corporate responsibility”. This means responsibility not merely for effective business management, but also for the social context in which they produce and invest. It applies, for example, to the introduction and enforcement of company-wide social and environmental standards for investment abroad.

The challenges of sustainable business development must also be seen against the background of the far-reaching changes in the business environment that have taken place in recent years. Globalisation has resulted in greater international competition and is increasing the pace of structural change in many markets. Achieving sustainable management therefore confronts business leaders and management with a demanding task: safeguarding the long-term success of their business, making comprehensive environmental protection and resource conservation into an integral component of their business activities, and living up to their social responsibility.

In recent years a large number of new instruments and strategic management approaches have been developed to meet this challenge. But there is still a considerable way to go along the road to a systematic framework for effective “sustainability management”. This report on sustainability management is therefore intended to serve as a guide for all industrialists and business people in positions of responsibility who are faced with the task of sustainable

organisation development. On the one hand it sets out to provide an overview of new instruments and the areas where they can be used. On the other, this guide also supplies users in the business sector with concise, pragmatic instructions for using the instruments and concepts described.

Our aim in providing this report is to make a tangible contribution to the application and dissemination of practical approaches to sustainable business management. In business – as in politics – it is true to say that ten years after the World Summit in Rio, and in the spirit of the World Summit on Sustainable Development in Johannesburg in 2002, all efforts must now focus more than ever on concrete action. With this in mind I hope that the synoptic report “Sustainability Management in Business Enterprises” will become a useful aid to many readers in their day-to-day work – and will thus provide effective support for the implementation of sustainable economic strategies.



Jürgen Trittin
Federal Environment Minister

Foreword



Dear Reader,

Some ten years ago the heads of state of 178 countries met in Rio de Janeiro for the world's first Conference on Environment and Development, to set the course for the 21st century for a number of global problems. In its 40 chapters the now famous Agenda 21, the "timetable" for the 21st century, sets out numerous guiding principles for action.

In accordance with the political intention the process embraced all actors, and especially the business world. Examples of business challenges mentioned by Agenda 21 included greater emphasis on environmental management, increased technology transfer, and greater support for globalisation and sustainable development. A review of progress was made at the second World Summit on Sustainable Development of the community of states, meeting in the South African city of Johannesburg in the late summer of 2002 at the level of heads of state and heads of government. This was designed to give a fresh boost to the Rio process. German industry, through its various branches, its associations and cross-industry networks such as "econsense", the German Industry Forum for Sustainable Development, has also played an active part in the debate. At the same time noticeable advances have been achieved thanks to technological innovations and new management approaches. Sustainable development encompasses not only ecological, but also economic and social issues. For industry this means providing ecologically and socially sound products and services on the basis of economic success.

A good example of the success achieved by measures taken to date is the contribution that German industry has long been making to climate protection under the agreement with the Federal Government. Other positive results can be seen year after year in the "National Environmental Accounts" published by the Federal Statistical Office. The decoupling of economic growth and resource depletion that was postulated in Rio has become a fact of life in Germany thanks to technological innovation by industry.

But German industry can point to numerous achievements in the management sector as well. This can be seen not only from the environmental management systems established in many companies under EMAS and ISO 14001, but also from our position among the leaders in the field of developing instruments for ecological optimisation of products. And it must also be mentioned that many companies have given themselves their own codes of conduct and are engaging in a variety of activities to underline the seriousness of their intentions.

The present report is a further building block in this edifice. With its overview of various instruments and tools that are suitable for the implementation of sustainable development in business enterprises, it creates for the first time a compendium that places all three dimensions of sustainable development in a unified context. The compilation of the report was supported by a joint project team comprising representatives of the BMU and the BDI.

I wish you every success when putting it to practical use in your company.

A handwritten signature in blue ink that reads "Dr. Rogowski". The signature is written in a cursive, flowing style.

Dr. Michael Rogowski
President of the BDI

Summary

As a result of the UNCED conference held ten years ago in Rio de Janeiro, the vision of sustainable development has become a concept of key importance to industry. *Sustainable development* is taken to mean development of a kind that satisfies the needs of people in the present without running the risk that people in other parts of the world or future generations will be unable to satisfy their own needs. Sustainability therefore describes a condition of human welfare in which no excess exploitation takes place and which utilizes nature on a continuous basis and avoids causing irreversible damage to nature. The aim is thus to hand down to future generations an intact ecological, social and economic capital that places equal emphasis on conserving the natural basis for life, maintaining social solidarity and ensuring economic performance. Today this vision is a firmly established component of politics, society and economics. Owing to the social integration of businesses and their central ecological and economic importance, this global vision is of relevance to management as well. Corporate management is faced with the task described by the Brundtland Commission of effectively satisfying ecological and social needs, integrating their management in conventional economic management and thereby establishing *sustainability management*.

In order to implement sustainable business development, companies need *concepts and instruments for sustainability management* of the kind described in this report. Some of the 46 concepts and instruments set out here are already widely known and successfully used in practice (e.g. → Environmental Management System). Other approaches less well known to date possess great potential for dealing with emerging new tasks (e.g. → Sustainability Balanced Scorecard, or → Dialogue Instruments). The report provides a broad overview of such approaches that are available for managing sustainable development. It also assigns them to the principal users and to the challenges confronting businesses in the context of sustainable development (Chapters 2 and 3). The principal users, i.e. the individual operating units, divisions or departments (e.g. Purchasing, Production, Control, Accounting and Finance, Marketing, etc.) are the most important addressees for this guide and the concepts and instruments it describes. The individual concepts and instruments of corporate sustainability management are described in alphabetical order in Chapter 5.

Sustainability management consists in the entrepreneurial task of successfully meeting the following four challenges:

- *Ecological challenge:* The ecological challenge addresses the burdens that economic activities place on ecosystems. Ecosystems can only be subjected to burdens up to a certain limit before lasting long-term damage occurs (e.g. decline in biodiversity, anthropogenic greenhouse effects etc.). The aim is to ensure long-term protection of the natural environment, safeguard its absorption capacity and powers of regeneration, and conserve biodiversity. The ecological challenge consists in reducing the absolute environmental burden caused directly and indirectly by businesses, and hence in *improving the ecological effectiveness* of business activities.
- *Social challenge:* The social challenge faces the business with the task of improving the sum of its social impacts. Businesses are institutions embedded in society that depend on social acceptance. They have to take account of their social impacts on individuals, interest groups and society as a whole. The aim here is to *improve social effectiveness* and hence to reduce socially undesirable effects of the business and promote positive social effects. This increases the social acceptance of the business and thereby safeguards its social legitimation.

- *Economic challenge to environmental and social management:* Since profit-oriented businesses operating in a competitive context are established and run primarily for economic purposes, the environmental and social management of businesses is constantly confronted with the challenge of increasing the value of the business (shareholder value) and making a contribution to profit or at least minimising operating costs. The economic challenge to environmental and social management has two components: increasing *eco-efficiency* and improving *social efficiency*. Unlike the absolute challenges of ecological and social effectiveness, the focus in eco-efficiency and social efficiency is on the ratio of value added to ecological damage (environmental impact added by resource depletion, emissions, etc.) or of value added to social damage (social impact added by socially undesirable effects, lack of social equity, etc.). Thus the ecological or social dimension is linked with the economic dimension that is at the centre of economic activity. In both cases it is a matter of optimising the ratio by reducing impact added and/or increasing value added.
- *Integration challenge:* Finally, the integration challenge is derived from two objectives leading to sustainability management. On the one hand there is the task of simultaneously fulfilling the first three challenges mentioned above. On the other hand there is a need for methodological integration of environmental and social management with their concepts and instruments in conventional, economically oriented management. At present environmental and social aspects are very often dealt with separately from economic management from an organisational and methodological point of view, which may lead to inadequate identification of both common factors and conflicts and to total or partial failure to address such issues. By contrast, the aim of sustainability management is an integrated approach to ecological, social and economic aspects.

Economic effectiveness, i.e. achieving the best possible economic result, also belongs in principle to the overall concept of sustainable development. It is not examined in detail in this context, however, as its characteristics, concepts and instruments are the subject of conventional business management literature and are dealt with adequately elsewhere.

The four sustainability challenges described above which result from the vision of sustainable development face businesses and their divisions, departments or units with a variety of new tasks. Depending on the corporate sector, different concepts and instruments are required to perform these tasks effectively and efficiently. In some cases they are adaptations of tried-and-tested management concepts and instruments (e.g. → (Environmental) Cost Accounting), and many of them are constantly being brought into line with new developments and requirements. Some concepts and instruments have however been developed specifically to meet sustainability challenges (e.g. → Eco-efficiency Analysis). The large number of concepts and instruments existing today and in some cases the lack of clear definitions make it very difficult to obtain a clear overview – both for practitioners and for experts. This may in particular present considerable obstacles to choosing the best possible solution for a specific task.

This is where the present report comes in. It describes the function of 46 concepts and instruments and sets out their most important properties, their strengths for meeting sustainability challenges and their weaknesses (Chapter 5). For practical purposes they can in particular be systematised on the basis of the two categories mentioned: the business units or main users (Chapter 2) and the four sustainability challenges (Chapter 3). The classification by users indicates the sector of a business in which an instrument or concept can be used or is most frequently used at present. The classification on the basis of sustainability challenges, by contrast, gives practitioners an overview of which concepts and/or instruments may help to overcome new problems.

Acknowledgements

The compilation of this report was financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), and its publication made possible by financial support from Degussa, Hydro Aluminium Deutschland GmbH and Siemens AG. We should like to thank the Federal Environmental Ministry (BMU), the Federation of German Industries (BDI), the Federal Environmental Agency (UBA) and the members of the project support group (Michael Aurich, Thomas Becker, Hendrik Biebeler, Stefan Besser, Andreas Burger, Peter Franz, Christian Gessner, Alexander Grablowitz, Petra Jeder, Gerd-Henning Klein, Andreas Lorenz, Wolf Müller, Ute Müller-Eisen, Lutz-Dieter Naake, Gerhard Roge, Hans-Jürgen Schmidt, Ralph Thurm, Gerhard Voss, Irle Wagner and Wolfram Weiss) for their dedicated collaboration in the design of the report. We also wish to thank Eckart Behrens, André Bühne, Eva-Maria Daut, Niels Ferdinand, Frank Figge, Manuel Glauser, Jasmin Godemann, Tobias Hahn, Jutta Hoppe, Nicole Hroch, Nathali Jänicke, Edith Lenfers, Jean Lüchinger, Holger Petersen, Niki Rosinski, Anke Schöndube, Oliver Trisl, David Trudel and Marcus Wagner for their useful comments.

Contents

Foreword BMU	I
Foreword BDI	III
Summary	V
Contents	IX
List of Tables	IX
List of Figures	IX
List of Abbreviations	X
Legend	XII
1 Objectives and structure of report	1
2 Principal users of concepts and instruments	4
3 Central challenges of sustainable development of businesses	6
3.1 The ecological sustainability challenge: Ecological Effectiveness	7
3.2 The social sustainability challenge: Social Effectiveness	8
3.3 The economic sustainability challenge to environmental and social management: Eco-Efficiency and Social Efficiency	9
3.4 The integration challenge of sustainable business development	10
3.5 Concepts and instruments for meeting sustainability challenges	10
4 Outlook	13
5 Compendium of concepts and instruments	15
Concepts and Instruments A-Z (Fact Sheets)	17
Index	119

List of Tables

Table 1: Principal users of concepts and instruments of sustainability management	5
Table 2: Concepts and instruments for meeting the four sustainability challenges	12

List of Figures

Figure 1: The four sustainability challenges for businesses	6
Figure 2: Sustainability Management Signal	15

List of Abbreviations

AA	AccountAbility, Institute of Social and Ethical Accountability
AHK	German Chambers of Industry and Commerce abroad (<i>Auslandshandelskammer</i>)
AktG	German Stock Corporations Act (<i>Aktiengesetz</i>)
ASU	Association of Independent Enterprises (<i>Arbeitsgemeinschaft Selbständiger Unternehmen e.V.</i>)
AUB	Association for Environmentally Sound Construction Products (<i>Arbeitsgemeinschaft umweltverträgliches Bauprodukt</i>)
B.A.U.M.	German Environmental Management Association (<i>Bundesdeutscher Arbeitskreis für Umweltbewusstes Management e.V.</i>)
BDA	Confederation of German Employers' Associations (<i>Bundesvereinigung der Deutschen Arbeitgeberverbände</i>)
BDI	Federation of German Industries (<i>Bundesverband der Deutschen Industrie e.V.</i>)
BDIH	Federal Association of German Industrial and Trading Companies for Pharmaceuticals, Health Products, Food Supplements and Personal Care Products (<i>Bundesverband Deutscher Industrie- und Handelsunternehmen für Arzneimittel, Reformwaren, Nahrungsergänzungsmittel und Körperpflegemittel e.V.</i>)
BMBF	Federal Ministry of Education and Research (<i>Bundesministerium für Bildung und Forschung</i>)
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety / Federal Environmental Ministry (<i>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit / Bundesumweltministerium</i>)
BMWA	Federal Ministry of Economics and Labour (<i>Bundesministerium für Wirtschaft und Arbeit</i>)
BSC	Balanced Scorecard
BVW	Employee Suggestion Scheme (<i>Betriebliches Vorschlagswesen</i>)
CAES	Center for Advanced Educational Services
CAP	Community Advisory Panel
CEFIC	European Chemical Industry Council (<i>Conseil Européen de l' Industrie Chimique</i>)
CEP	Council on Economic Priorities
CFSD	Centre for Sustainable Design
CIA	Cross-Impact Analysis
CIP	Continuous Improvement Process
CML	Centre of Environmental Science
CSM	Center for Sustainability Management e.V., University of Lueneburg
CSR	Corporate Social Responsibility
DfE	Design for Environment
DGFp	German Association for Personnel Management (<i>Deutsche Gesellschaft für Personalführung</i>)
DGQ	German Society for Quality (<i>Deutsche Gesellschaft für Qualität e.V.</i>)
DIHK	Association of German Chambers of Industry and Commerce (<i>Deutscher Industrie- und Handelskammertag</i>)
DIN	German Institute for Standardisation (<i>Deutsches Institut für Normierung e.V.</i>)
DIW	German Institute for Economic Research (<i>Deutsches Institut für Wirtschaftsforschung</i>)
DKNW	German Institute for a Sustainable Economy at Witten/Herdecke Private University (<i>Deutsches Kompetenzzentrum für Nachhaltiges Wirtschaften der privaten Universität Witten/Herdecke</i>)
EAR	Ecological Advantage Ratio
EFQM	European Foundation for Quality Management
EMAN	Environmental Management Accounting Network
EMAS	Eco-Management and Audit Scheme
EMIS	Environmental Management Information System (<i>Betriebliches Umweltinformationssystem</i>)
EMS	Environmental Management System
EPP	Ecological Payback Period
EVZ	European Consumer Centre (<i>Europäisches Verbraucherzentrum</i>)
FLP	Flower Label Programme
FS	Fact Sheet
FSC	Forest Stewardship Council
GEA	Group for Efficient Appliances
GED	German Energy Label Association (<i>Gemeinschaft Energielabel Deutschland</i>)
GEMI	Global Environmental Management Initiative

GRI	Global Reporting Initiative
GUT	Carpets Tested For A Better Living Environment (<i>Gemeinschaft umweltfreundlicher Teppichboden e.V.</i>)
IAI	Institute for Applied Innovation Research (<i>Institut für angewandte Innovationsforschung</i>)
IAO	(Fraunhofer Institute for Industrial Engineering) (<i>Institut für Arbeitswirtschaft und Organisation, Fraunhofer Gesellschaft</i>)
IBFA	International Best Factory Award
IBR	Rosenheim Institute for Building Biology (<i>Institut für Baubiologie Rosenheim GmbH</i>)
IDTA/ITA	Information Service for Innovation and Technology Analysis (<i>Informationsdienst für Innovations- und Technikanalyse</i>)
IDW	Institute of German Auditors (<i>Institut der Wirtschaftsprüfer</i>)
IFF	Fraunhofer Institute for Factory Operation and Automation (<i>Institut für Fabrikbetrieb und - automatisierung, Fraunhofer Gesellschaft</i>)
IFO	Institute for Economic Research (<i>Institut für Wirtschaftsforschung</i>)
IFU	Institute for Environmental Informatics (<i>Institut für Umweltinformatik</i>)
IHK	Chambers of Industry and Commerce (<i>Industrie- und Handelskammer</i>)
IISD	International Institute for Sustainable Development
ILO	International Labor Organization
IMU	Institute for Management and the Environment (<i>Institut für Management und Umwelt</i>)
IMUG	Institute for Market - Environment - Society (<i>Institut für Markt-Umwelt-Gesellschaft e.V.</i>)
INA	Corporate Instruments for a Sustainable Economy, promotion area of BMBF (<i>Betriebliche Instrumente für nachhaltiges Wirtschaften, Förderschwerpunkt des BMBF</i>)
INEM	International Network for Environmental Management
INV	International Natural Textile Association (<i>Internationaler Verband der Naturtextilwirtschaft e.V.</i>)
IÖW	Institute for Ecological Economy Research (<i>Institut für ökologische Wirtschaftsforschung gGmbH</i>)
IPSI	Fraunhofer's Integrated Publication and Information Systems Institute (<i>Institut Integrierte Publikations- und Informationssysteme, Fraunhofer Gesellschaft</i>)
ISO	International Organization for Standardization
IUWA	Institute for Environmental Economic Analyses (<i>Institut für Umweltwirtschaftsanalysen</i>)
IW	Cologne Institute for Business Research (<i>Institut der deutschen Wirtschaft e.V., Köln</i>)
KrW-/AbfG	Act for Promoting Close Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (<i>Kreislaufwirtschafts- und Abfallgesetz</i>)
LCA	Life Cycle Assessment
MIT	Massachusetts Institute of Technology
NEF	New Economics Foundation
NGO	Non Governmental Organization
NPO	Non Profit Organisation
NUA	Academy for the Protection of Nature and Environment (<i>Natur- und Umweltschutzakademie</i>)
PEFC	Pan European Forest Certification
PLA	Product Line Analysis (<i>Produktlinienanalyse</i>)
PR	Public Relations
PUSCH	Swiss Foundation for the Practice of Environmental Protection (<i>Praktischer Umweltschutz Schweiz</i>)
QC	Quality Circles
RAL	German Institute for Quality Assurance and Certification (<i>Deutsches Institut für Gütesicherung und Kennzeichnung e.V.</i>)
RC	Responsible Care
R&D	Research and Development
RMI	Rocky Mountain Institute
ROI	Return on Investment
ROST	Return on Stakeholder
SA	Social Accountability
SAI	Social Accountability International
SBSC	Sustainability Balanced Scorecard
SCM	Supply Chain Management
SCMI	Scenario Management International
SDMF	Sustainable Development Management Framework, Shell

XII Legend

SERC	Social and Ethical Reporting Clearinghouse
SETAC	Society of Environmental Toxicology and Chemistry
SME	Small and medium enterprises
SRA	Society for Risk Analysis
TOC	Total Organic Carbon
TQEM	Total Quality Environmental Management
TQM	Total Quality Management
UBA	German Federal Environmental Agency (<i>Umweltbundesamt</i>)
UN ISAR	United Nations Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
US EPA	United States Environmental Protection Agency
VCI	Association of the German Chemical Industry (<i>Verband der Chemischen Industrie e.V.</i>)
VDI	German Association of Engineers (<i>Verein deutscher Ingenieure e.V.</i>)
WBCSD	World Business Council for Sustainable Development (formerly BCSD)
WWF	World Wide Fund for Nature
ZWW	Centre for Further Training and Knowledge Transfer (<i>Zentrum für Weiterbildung und Wissenstransfer</i>)

Legend



Reference to a concept or instrument that is explained in a Fact Sheet (Chapter 5)



Ecological challenge



Social challenge



Economic challenge to environmental and social management



Integration challenge

1 Objectives and Structure of Report

The UNCED Conference in Rio de Janeiro in 1992 and the book “Changing Course” launched on that occasion by Stephan Schmidheiny and the Business Council for Sustainable Development (now WBCSD) made a major contribution to the fact that environmental protection in business practice crossed the threshold from being a technological problem to becoming an economic challenge and opportunity. Since then environmental protection has become established as an important management task in countless business enterprises around the world. In the past decade numerous enterprises and industrial associations have got to grips with the task of operationalising eco-efficiency, corporate sustainable development and *corporate sustainability management*. Corporate sustainability management can be described in both functional and institutional terms. From a functional point of view it is designed to steer ecological, social and economic impacts of business activities in such a way that an enterprise develops in the direction of sustainability. The aim is not only to ensure systematic management of social and ecological aspects using economic methods, but also to integrate them in the conventional business management process. From an institutional point of view, corporate sustainability management describes the group of actors and organisational structure within the business enterprise that are concerned with social and ecological aspects and their integration in the conventional process of operational management of business activities.

Sustainability management: economic challenge and opportunity

Today, so many instruments and concepts for environmental and sustainability management have been developed by industry and academic research institutions that even experts have difficulty in maintaining a clear picture of these approaches and of their applications, strengths and weaknesses. At the same time, the need for a systematic framework for sustainability management and for targeted use of appropriate instruments and concepts is greater than ever. In many industries the current globalisation trends are causing structural changes and increasing the pressure of costs. There are also growing pressures in the form of urgent ecological and social problems. By means of more efficient and more effective answers to sustainability questions the aim is to achieve competitive advantages in terms of costs, markets and society.

Competitive advantages through efficient and effective sustainability management

This is the starting point for the present synoptic report published in cooperation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the Federation of German Industries (BDI). The report is intended as a source of ideas for the senior management of small and medium enterprises (SMEs) and for people at all management levels in large enterprises who are starting to tackle the challenges of corporate sustainable development. Specifically, the *objectives of this report* are to

Synoptic report as a source of ideas for all management levels

- describe the central challenges of sustainable development that face companies today,
- identify the main concepts and instruments that companies and their staff can use to meet the central sustainability challenges, and
- describe the concepts and instruments of sustainability management and outline their strengths and weaknesses.

General objectives of sustainable development The ideas and definitions surrounding the vision of sustainable development are many and various. Nevertheless, there is a broad measure of agreement among both academics and business practitioners that

- sustainable development is desirable and necessary,
- sustainable development requires effective achievement of targets in each of the dimensions – ecological, social and economic – and
- one cannot speak of sustainable development until the integration of ecological, social and economic objectives is achieved.

Consequences for corporate sustainable development What are the *practical implications* of these abstract and very general objectives for their implementation in business? To provide a pragmatic guide for operational implementation of sustainable development it is necessary to answer five key questions, on which the structure of this report is based:

- In what *corporate sectors* can the concepts and instruments of sustainability management be used with good prospects of success? (Chapter 2)
- What *specific business challenges* result from the objective of sustainable development? (Chapter 3)
- What *central concepts and instruments* currently known from theory and business practice are suitable for meeting the sustainability challenges and thus support corporate sustainability management? (Chapter 3)
- What are the characteristics of the concepts and instruments and what are their *strengths* and *weaknesses*? (Chapter 5)
- What *advantages* and hence opportunities can business enterprises derive from making use of the concepts and instruments for successful corporate sustainable development? (Chapters 3 and 5)

This report now goes on to examine the five questions set out above. It is intended to serve as a guide for business practice, and provides an overview of various management concepts and instruments. It starts from the premise that

Starting point and goal of corporate sustainable development

profit-oriented enterprises, unlike the state and unlike NPOs such as environmental associations or social institutions, are established and run primarily for economic purposes. *Thus the general business task resulting from the goal of sustainable development consists on the one hand in effective satisfaction of ecological and social needs, and on the other in skilful integration of environmental and social management in the conventional economic management of the enterprise.* From this we can deduce the principal sustainability challenges that enterprises are faced with in the context of sustainability management. This guide does not discuss the traditional focal task of corporate management, namely that of working successfully from an economic point of view (i.e. being economically effective), since adequate literature already exists on this subject. Instead it concentrates on the additional challenges with which business enterprises are confronted in the context of sustainable development. The central challenges discussed in the business context can be summarised as follows (Chapter 3):

- *The ecological sustainability challenge:* How can a business enterprise reduce the absolute environmental burden caused by its activities (environmental impact added)?
- *The social sustainability challenge:* How can socially undesirable impacts (social impact added) that originate from a business enterprise be minimised?

- *The economic sustainability challenge to environmental and social management*: How can environmental protection and social commitment be implemented at low cost while increasing profitability and shareholder value?
- *The integration challenge*: How can the first three challenges be mastered simultaneously, and how can ecological and social aspects be integrated in the conventional economically oriented management process?

In general, systematically addressing business challenges calls for the use of management concepts and instruments. In view of their different functions and purposes, the four challenges of corporate sustainable development affect corporate sectors, departments or operating units of an enterprise in different ways. Thus in order to meet these sustainability challenges the various users in an enterprise require different concepts and instruments. These are classified in Chapter 2 on the basis of their principal users and corporate sectors. A structured description of the most important concepts and instruments of sustainability management follows in the Compendium (Chapter 5).

But what do we mean in this synoptic report when we talk about “concepts” and “instruments”?

An *instrument* is an aid or tool that helps to achieve a specific objective or group of objectives.

Normally it serves to perform only one specific function or task (e.g. providing information in the form of a ➔ Life Cycle Assessment). By contrast, a *concept* (e.g. ➔ Balanced Scorecard) makes

use of a set of systematically coordinated instruments (e.g. ➔ Investment Appraisal, ➔ Cost Accounting, ➔ Budgeting etc.) to achieve a particular objective or group of objectives, such as a continuous improvement in eco-efficiency. In other words it integrates and coordinates the use of various instruments. Management may use a concept for more than one step in the management process (e.g. obtaining information, decision making, communication, implementation). This means that it is able to use its instruments to cover several different areas of activity at the same time and thereby serve various corporate sectors.

What is an instrument?

What is a concept?

It goes without saying that this synoptic report cannot provide an exhaustive treatment of the bewildering array of instruments and concepts that are described and suggested in the literature. The selection of the instruments and concepts suitable for sustainability management is made on the basis of *three criteria*: how widely they are used in business practice, how closely the instruments or concepts are geared to meeting the sustainability challenges, and how great their potential is considered to be for performing the tasks that are emerging.

**Selection criteria
for concepts and
instruments**

This report identifies 46 concepts and instruments that meet these criteria. Its methodological scrutiny disregards state environmental policy approaches (public policy functions etc.), conventional management instruments not specifically related to sustainability, general systematic approaches such as “strategic environmental management” or “ecological learning processes”, general personnel management approaches, traditional collective bargaining issues (e.g. pay negotiations, works council), technical tools for occupational safety and metrology (measuring instruments etc.) and IT solutions. Nor does it discuss projects and programmes, whether initiated by political groups, associations or individual companies, that serve to implement and disseminate sustainability management instruments (e.g. Eco Profit, www.cpc.at; Global Reporting Initiative, www.globalreporting.org, Responsible Care, www.cefic.org). It also excludes philosophical and paradigmatic approaches that are not basically of an instrumental nature (e.g. Industrial Ecology, www.yale.edu/is4ie). For instruments and concepts for improving economic effectiveness, which is not discussed here, the reader is referred to the relevant business management literature.

Further information on concepts and instruments

To ensure that the report and the Fact Sheets provide a clear overview, we have deliberately dispensed with detail in describing the concepts and instruments, and have instead included references to further literature and Internet addresses. It is planned to develop and update the report in future in cooperation between the Centre for Sustainability Management (CSM), University of Lueneburg (www.uni-lueneburg.de/csm), and the publishers. Mention must also be made here of the assistance programme “Business Instruments for Sustainable Management (INA)” run by the Federal Ministry of Education and Research (BMBF), in which further development work is currently in progress on projects relating to information, control, planning and communication instruments for sustainable development. The business associations B.A.U.M. e.V. (www.baumev.de) and future e.V. (www.future-ev.de) play an important role in the practical dissemination of environmental management.

Before the four central challenges of corporate sustainable development are discussed in detail in Chapter 3, the following chapter takes a look at the principal users of the concepts and instruments for meeting the sustainability challenges.

2 Principal Users of the Concepts and Instruments

Sustainability management basically concerns the enterprise as a whole. Upwards of a certain size, however, companies are divided into different sectors or departments with specific functions. In view of these different functions there are variations in the nature and intensity of the impact of the individual challenges on the various corporate sectors. As a result, each department needs different concepts and instruments to meet the four sustainability challenges. In this report we examine nine different corporate sectors (in alphabetical order):

- Accounting and Finance
- Control
- Human Resources
- Marketing and Public Relations (PR)
- Production
- Purchasing
- Research and Development (R&D)
- Sales and Logistics
- Strategic Planning

Most of the 46 concepts and instruments discussed here can be used to tackle more than one challenge and in some cases to pursue several objectives. They may therefore have various addressees and users. The following *allocation of the concepts and instruments to the principal users* therefore offers the practical user an overview of all those approaches to meeting the sustainability challenges that are of interest to the user and his or her corporate sector (Table 1). Here the concepts are listed separately from the instruments: the upper (blue) part of Table 1 lists the concepts in alphabetical order, while the lower (yellow) part lists the instruments, also in alphabetical order.

Table 1: Principal Users of the Concepts and Instruments of Sustainability Management

Concept/Instrument		Principal Users								
		Accounting/ Finance	Control	Human Resources	Marketing/ PR	Production	Purchasing	R&D	Sales/ Logistics	Strategic Planning
Concept	Accounting	●	●							●
	Control	●	●	●		●				
	Env. Management Information System	●	●		●	●	●	●	●	●
	Environmental Management System	●	●	●	●	●	●		●	●
	Marketing				●		●	●	●	●
	Social Management System	●	●	●	●	●	●		●	
	Supply Chain Management	●	●		●	●	●		●	●
	Sustainability Balanced Scorecard	●	●	●	●	●	●	●	●	●
	Total Quality Env. Management	●	●	●	●	●	●		●	●
Instrument	ABC Analysis		●			●	●			
	Audit	●	●			●	●		●	
	Benchmarking	●	●			●		●	●	
	Benefit/Risk Dialogue ¹				●	●				
	Budgeting	●	●			●	●			
	Checklist		●		●	●	●		●	
	Community Advisory Panel ¹				●	●				
	Cost Accounting	●	●							
	Cross-Impact Analysis		●					●		●
	Dialogue Instruments		●		●	●				●
	Early Identification		●		●			●		●
	Eco Compass					●		●		
	Eco Design/Design for Environment				●	●		●		
	Eco Efficiency Analysis		●			●	●			
	Eco Rating	●		●						
	Emission Trading	●	●			●				
	Employee Volunteering			●	●					
	Environmental Shareholder Value	●	●							
	Guideline		●	●						●
	Incentive System			●						
	Indicator	●	●		●	●			●	●
	Investment Appraisal	●				●			●	
	Label				●					
	Life Cycle Assessment		●			●	●			
	Material Flow Accounting ³		●			●		●		
	Material Flow Cost Accounting ²	●	●							
	Networks ¹		●		●					●
	Product Line Analysis		●			●	●	●		
	Quality Circles			●		●	●		●	
	Reporting	●	●	●	●					
	Risk Analysis	●	●			●				●
	Scenario Analysis		●					●		●
	Social Accounting	●		●	●					●
Sponsoring		●		●						
Stakeholder Value Analysis	●		●						●	
Substance Flow Analysis		●			●		●			
Suggestion Scheme			●	●	●			●	●	

● Principal user of the relevant concept/instrument

For the definition of concepts and instruments see Chapter 1

¹ The instruments "Community Advisory Panel", "Networks" and "Benefit/Risk Dialogue" are described in the Fact Sheet on "Dialogue Instruments".

² The instrument "Material Flow Cost Accounting" is described in the Fact Sheet on "Cost Accounting".

³ The instrument "Material Flow Accounting" is described in the Fact Sheet on "Substance Flow Analysis".

3 Central Challenges of Corporate Sustainable Development

The four sustainability challenges

The vision of sustainable development embraces three dimensions – economic, ecological and social aspects – and seeks to integrate them. In the past ten years this vision has grown increasingly important, and at the same time its status has evolved from a theoretical, abstract project to an increasingly tangible and concrete task. The objective of sustainable development confronts business enterprises with four sustainability challenges (Figure 1):

- Ecological challenge: increasing ecological effectiveness
- Social challenge: increasing social effectiveness
- Economic challenge to environmental and social management: improving eco-efficiency and/or social efficiency
- Integration challenge: bringing together the first three challenges and integrating environmental and social management in conventional economically oriented management

Economic effectiveness, i.e. achieving the best possible economic result, is the classic entrepreneurial task, which is also of relevance in the context of sustainable development. However, as it is the subject of traditional business management it will not be discussed in detail in the present report.

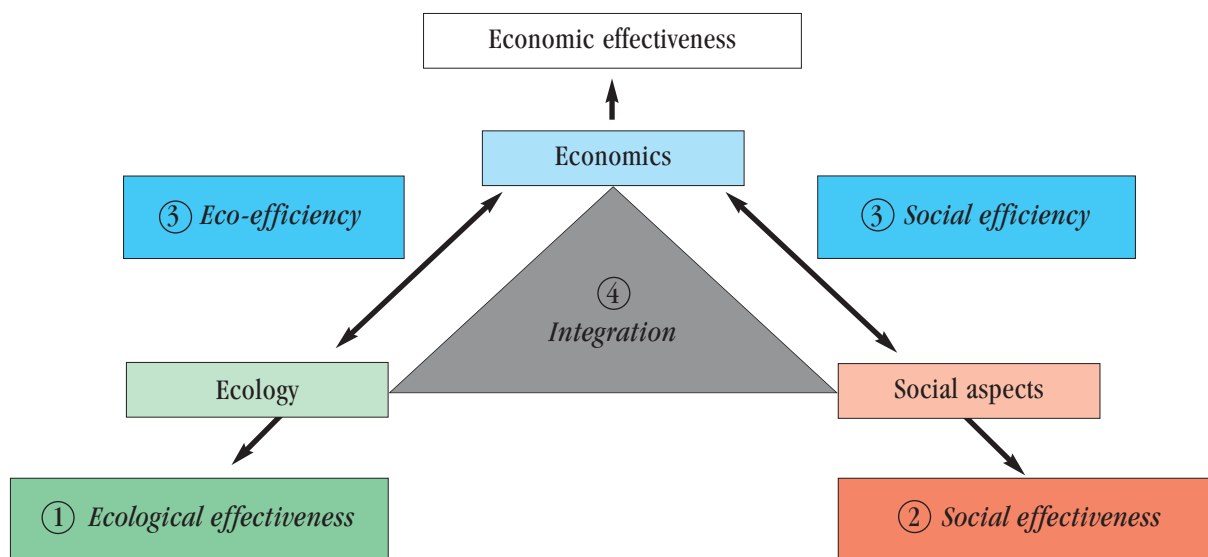


Figure 1: The four sustainability challenges to business enterprises:

① ecological challenge, ② social challenge, ③ economic challenge, ④ integration challenge

Corporate sustainable development and successful mastery of its four challenges not only open up opportunities for business enterprises, e.g. through new markets, improved employee motivation, increased marketing opportunities, image enhancement and cost reductions in production, but also serve as elements in a comprehensive risk prevention system.

Corporate sustainable development as an opportunity

3.1 The ecological sustainability challenge: Ecological Effectiveness

All human activities influence the ecosystem, and this also includes economic activities. The central environmental problems include the greenhouse effect, the destruction of the ozone layer, acidification and over-fertilisation of soil and water, declining biodiversity, photochemical smog, toxicological burdens harmful to humans and the environment, etc. The excessive overall environmental burdens in many fields, e.g. as a result of CO₂ emissions (climate effect) or sealing of land areas (loss of habitat), therefore confronts businesses with the challenge of making substantial reductions in the absolute scale of the environmental impacts of their production processes, products, services, investments etc. In most cases it is not possible to avoid environmental burdens entirely. However, every effort must be made to minimise them as far as possible given the existing framework conditions. The criterion for assessing how successfully a business enterprise meets the ecological challenge is ecological effectiveness (eco-effectiveness or environmental effectiveness).

Effectiveness is a general description of the extent to which an objective or impact is achieved. *Ecological effectiveness measures the degree of absolute environmental soundness, in other words the extent to which the targeted objective of minimising environmental impacts has been achieved.* Whereas in some cases it is easy to measure ecological effectiveness (e.g. the extent of the reduction in CO₂ emissions from a defined production process as determined by means of a ➔ Life Cycle Assessment or a ➔ Substance Flow Analysis), in other cases its measurement is very difficult or even controversial. Thus the ecological effectiveness of an environmental protection measure may be perceived very differently by different stakeholders (interest groups). For example, a furnace for incinerating hazardous waste may be regarded by some as a very (eco-)effective environmental protection measure (e.g. on the basis of the results of material flow accounting (➔ Cost Accounting, ➔ Substance Flow Analysis)), since it transforms toxic substances into inert slag. On the other hand it may also be considered ecologically ineffective, because the operation of the incinerator makes it possible to continue using production processes that give rise to hazardous waste and the creation of such waste is not prevented at source. Such conflicts of objectives have to be made transparent by ensuring clear formulation of the targeted environmental relief objectives and of the concept of effectiveness (e.g. in the ➔ (Environmental) Report). The specification and assessment of ecological effectiveness should be keyed to socially accepted scientific findings. Thus business enterprises and their output cannot really be ecologically effective unless their achievements are in line with what society perceives to be environmentally sound.

Ecological effectiveness: degree of absolute environmental soundness

Orientation to social perception

A concept or instrument helps a business enterprise to improve corporate ecological effectiveness if its use reduces the resulting environmental burden.

3.2 The social sustainability challenge: Social Effectiveness

Business enterprises are set in a social context. They are supported and influenced by a large number of stakeholders. Management has long been faced with the social task of managing people and organising activities. But this does not mean that every business can automatically be regarded as socially sound or equitable. The social challenge to management consists in ensuring the existence and success of the enterprise while at the same time taking account of the diversity of social, cultural and individual social demands. This makes it possible to safeguard the

Social acceptance and legitimization of business activities

social acceptance of the enterprise and the *legitimation* of its business activities. Safeguarding its legitimization involves taking account of a great variety of factors such as inter-regional and inter-temporal equality of rights, fairness, equity of needs and performance. It has to be borne in mind, however, firstly that social, ecological and economic concerns may conflict with each other, and secondly that they can never be completely satisfied as a whole in view of scarce human, temporal and financial resources. Thus with regard to social issues as well, management is faced with the challenge of setting priorities in a dialogue with the principal stakeholders (➔ Dialogue Instruments, ➔ Reporting) and of maximising the positive social impacts of the business and minimising the negative impacts (➔ Social Management System).

The main societal, cultural and social criteria that are assessed by rating agencies (➔ Eco Rating) and investment companies today include equal human rights (with regard to status of women, ethnic minorities, foreign employees, handicapped persons, older employees etc.), child labour (➔ Label), job security, assembly rights, working conditions (➔ Checklist, ➔ ABC Analysis), conformity with the law, working atmosphere, leadership style, pay structure, voluntary contributions to retirement schemes and fringe benefits for salaried staff (➔ Social Management System), occupational health and safety risks (➔ Audit, ➔ Risk Analysis), training and education, social standards for suppliers and contractors (➔ Supply Chain Management), social guidelines and policy (➔ Guideline/Model), cultural commitment, combating corruption, patronage etc. Today these social criteria are surveyed by means of questionnaires that list large numbers of frequently unweighted individual social issues. The degree of satisfaction of these social concerns is usually tested on the basis of a simple exclusion principle (e.g. yes/no; observed/not observed) with the aid of ➔ Checklists.

Social effectiveness: Degree of absolute social soundness

An enterprise can be described as socially effective if it has effectively reduced the absolute level of negative social impacts and succeeds in keeping it low, and if it also gives rise to important positive social impacts and benefits. The concept of social effectiveness, as the degree of effective satisfaction of social concerns, has yet to be clearly defined even today. Good operationalisation has yet to be achieved.

Concepts and instruments that contribute to reducing socially undesirable impacts and promoting socially desirable impacts improve the social effectiveness of a business enterprise.

3.3 The economic sustainability challenge to environmental and social management: Eco-Efficiency and Social Efficiency

Whereas the traditional economic challenge consists in raising shareholder value and increasing the profitability of products and services, the economic *sustainability* challenge is concerned with *making environmental management and social management as economic as possible*. Because profit-oriented enterprises operating in a competitive setting are established and run primarily for economic purposes, environmental protection and social commitment in business enterprises are always confronted with the challenge of increasing *shareholder value*, making a contribution to *profitability* or at least *minimising costs* (➔ Environmental Shareholder Value, ➔ Stakeholder Value Analysis, ➔ Cost Accounting).

The traditional economic core task is to overcome shortages, weigh up objectives and improve the ratio of desirable to undesirable impacts. This ratio can be defined in general terms as efficiency. The economic interpretation of efficiency is based on monetary performance data and is expressed in profitability indicators. In the context of the goal of sustainable development, however, there is a need to supplement this interpretation with ecological and social aspects. In addition to the economic efficiency already mentioned (e.g. EUR earned per EUR invested), two types of efficiency are of special importance in the context of sustainable development:

- Eco-efficiency (economic ecological efficiency)
- Social efficiency (economic social efficiency)

Eco-efficiency is defined as the *ratio of an economic (monetary) to a physical (ecological) measure*. In the English-speaking world “Eco-efficiency” or “E2-efficiency” is commonly used as an abbreviated version of “economic-ecological efficiency”. The economic quantity appears in the ratio as value added (in business management terms it corresponds to sales less cost of purchased inputs), while the ecological quantity appears as impact added (➔ Eco-Efficiency Analysis). Impact added is equivalent to the sum of all environmental burdens generated directly or indirectly by a product or activity. It may be due to the production, consumption or disposal of a product or to activities such as transporting, impregnating, painting, etc. *Thus eco-efficiency is defined as the ratio of value added to ecological impact added*. Examples of measures of eco-efficiency are value added[EUR]/emitted CO₂[t], value added[EUR]/solid waste[t] or value added[EUR]/energy consumed[kWh].

On the same lines as eco-efficiency, *social efficiency* can be defined as the *ratio of value added to social impact added*, where social impact added represents the sum of all negative social impacts originating from a product, process or activity. Examples of social efficiency yardsticks are value added[EUR]/personnel accidents[number] or value added[EUR]/absence due to illness[days].

Other efficiency types of a more technical nature are characterised by the fact that only non-monetary quantities are used in the ratio (e.g. hours worked[h]/personnel accident, or product units/emissions[t]). These are thus ratios without any monetary relationship. They are not discussed further in this report.

Concepts and instruments that improve the ratio of value added to environmental impact added or social impact added help to increase the eco-efficiency or social efficiency of a business enterprise.

Efficiency: ratio of desirable to undesirable impacts

Eco-Efficiency and Social Efficiency: ratio of added value to added impact

3.4 The integration challenge of corporate sustainable development

The three challenges of sustainable management as described above can be met by means of systematic efforts to act in an eco-effective and socially effective and eco-efficient and socially efficient manner. But the real challenge of corporate sustainability management is the integration challenge. This derives from two concerns:

The two aspects of the integration challenge

1. combining and simultaneously satisfying the three objectives described above (Sections 3.1 to 3.3)
2. integrating environmental and social management in conventional economic management

The objective of the first concern is simultaneous attention to and improvement of ecological effectiveness, social effectiveness, eco-efficiency and social efficiency. In other words, an integrated approach should be taken to the four aspects. The idea behind the second concern is overall integration, in other words the methodological and instrumental integration of “effectiveness management” (environmental and social management) and “efficiency management” (economic environmental and economic social management) in conventional economic management. Thus the aim is to achieve comprehensive sustainability management by bringing together not only ecological, social and economic, but also ecological-economic and socio-economic perspectives.

The starting point for a successful approach to the integration challenge is concepts and instruments that help not only to improve ecological effectiveness and social effectiveness, but also to increase eco-efficiency and social efficiency. However, there is also a need for approaches to overall integration, in other words to coordinated incorporation of these concepts and instruments in a comprehensive sustainability management based on traditional, economically oriented management (e.g. as in → (Eco-)Control, → Total Quality Environmental Management, → Reporting, or → Sustainability Balanced Scorecard).

3.5 Concepts and instruments for meeting the sustainability challenges

46 important concepts and instruments

This report identifies 46 concepts and instruments for meeting the sustainability challenges. They are selected on the basis of three criteria: their widespread use in practice, the orientation of the instrument or concept to the challenge, and the assessment of its potential for satisfying emerging needs. For each sustainability challenge, Table 2 lists all the concepts and instruments in alphabetical order, showing the concepts first (blue background) and then the instruments (yellow background).

In Table 2 the approaches to sustainability management are assessed on the basis of two criteria: *orientation* and *use*. The orientation criterion considers whether a concept or instrument can explicitly support management in its efforts to meet the respective sustainability challenge. It is assessed in two stages: a solid bullet (●) stands for substantial or total orientation of the concept or instrument to meeting the challenge, while an open bullet (○) stands for partial orientation/suitability. The application criterion (symbolised by an “A” in Table 2) indicates its widespread and frequent use in practice in German-speaking countries. In overall terms, this classification represents the *current* capacity of the concepts and instruments to meet the sustainability challenge. It is clear from Table 2 that the majority of the instruments and concepts are geared to meeting the ecological challenge, and this is where they are most widely used in practice. This is due to the fact that environmental management has been in existence

longer than social management, and in particular longer than integrated sustainability management, which is still developing fast. There are also a large number of instruments and concepts for the management of eco-efficiency and social efficiency, with a clear emphasis on eco-efficiency.

The second part of the report contains “Fact Sheets” for the individual concept and instruments (see Chapter 5). Each Fact Sheet specifically discusses the sustainability challenges that it can help to meet.

Table 2: Concepts and instruments for meeting the four sustainability challenges

Concept/Instrument	Sustainability Challenges				
	 Ecological Challenge <i>Ecological Effectiveness</i>	 Social Challenge <i>Social Effectiveness</i>	 Economic Challenge <i>Eco-Efficiency</i> <i>Social Efficiency</i>	 Integration Challenge <i>Integration</i>	
Concept	Accounting	○		● A	
	Control	● A		● A	
	Env. Management Information System	●		○	○
	Environmental Management System	● A		○	
	Marketing	●	●	●	○
	Social Management System		●	○	
	Supply Chain Management	○	○	●	○
	Sustainability Balanced Scorecard	○	○	●	●
	Total Quality Env. Management	●	○	●	●
Instrument	ABC Analysis	● A	●	●	
	Audit	● A	● A	○	
	Benchmarking	●	○	●	
	Benefit/Risk Dialogue ¹	○	●		
	Budgeting	○		●	
	Checklist	● A	○		
	Community Advisory Panel ¹		●		
	Cost Accounting	○		● A	
	Cross-Impact Analysis	●	○	○	
	Dialogue Instruments	○	● A	○	○
	Early Identification	○	○	●	○
	Eco Compass	●		●	
	Eco Design/Design for Environment	● A		● A	
	Eco Efficiency Analysis	○		● A	
	Eco Rating	●	○	●	
	Emission Trading	●		●	
	Employee Volunteering	○	●		
	Environmental Shareholder Value			●	
	Guideline	● A	● A	○ A	●
	Incentive System	● A	○	●	
	Indicator	● A	○ A	● A	○
	Investment Appraisal	○		●	
	Label	○	○	● A	
	Life Cycle Assessment	●			
	Material Flow Accounting ³	●			
	Material Flow Cost Accounting ²	●		●	
	Networks ¹	○	● A	○	○
	Product Line Analysis	●	●	○	○
	Quality Circles	●	○		
	Reporting	○ A	●	○	○
	Risk Analysis	● A	○	●	
	Scenario Analysis	○	○	●	○
	Social Accounting		●	○	
Sponsoring	○	○ A	●	○	
Stakeholder Value Analysis		●	●		
Substance Flow Analysis	● A				
Suggestion Scheme	●	●	○		

● ○ Concept/instrument is ● largely/○ partly oriented to challenge
 A Concept/instrument is widely used in practice

For the definition of concepts and instruments see Chapter 1

¹ The instruments “Community Advisory Panel”, “Networks” and “Benefit/Risk Dialogue” are described in the Fact Sheet on “Dialogue Instruments”.

² The instrument “Material Flow Cost Accounting” is described in the Fact Sheet on “Cost Accounting”.

³ The instrument “Material Flow Accounting” is described in the Fact Sheet on “Substance Flow Analysis”.

4 Outlook

In the last few decades German industry has made considerable efforts to reduce environmental pollution. There is nevertheless still a good deal to be done in the future, and this opens up great opportunities for business enterprises. It is therefore interesting to take a look not only at the “state of the art” of sustainability management, but also at the future of corporate sustainable development. In view of the unpredictable nature of the constant flow of fashions in management approaches it is not possible to make any reliable statement as to which instruments and concepts will become important in the future. This report will therefore be updated regularly to take account of the latest developments (www.uni-lueneburg.de/csm).

Chapter 3 contains a list of concepts and instruments that are either widely used at present in business practice or appear particularly suitable for meeting the sustainability challenges. There are various steps that can usefully be taken to describe the developments that can facilitate the management of corporate sustainable development:

- Identify the concepts and instruments that are widely used today and are likely to prevail in the future as well
- Analyse the potential of the concepts and instruments less widely used today for meeting the sustainability challenges
- Discover possible fields of action for which few approaches exist or none at all
- Develop new approaches and improve existing approaches for dealing with problems in new fields of action

In recent years sustainable development has come to play an increasingly important role for business enterprises. In view of the practical problems on the ecological and social front, there is at present no reason to assume that the four challenges of sustainable development described here are likely to become less important. This view is also supported by the results of recent surveys¹.

Corporate sustainability management will become increasingly important

For over 70% of large companies and more than a third of all companies in Germany, for example, the vision of sustainable development is already an important issue that is being actively addressed. What is more, the businesses characterised as “sustainability oriented” can boast more favourable results than those classified as “passive” or even “environmental management oriented”. The surveys indicate that one reason for this could lie in the growing integration of environmental and social aspects with corporate strategy and with management considerations oriented to business success. Not only for this reason, but also because of emerging innovation potentials and associated competitive advantages, the motivation and initiative of employees and expected image advantages, we can expect to see further developments in corporate sustainability management and its importance. The remainder of this chapter takes a brief look at a number of emerging developments within the challenges.

On a global scale the rise in raw materials and energy consumption figures in the developing and threshold countries is of crucial importance for the objectives resulting from the *ecological sustainability challenge*. In view of the population and economic growth trends in these countries combined with relatively low environmental protection standards, we can expect to see a sharp rise in raw materials and energy consumption and an associated increase in environmental stresses. In the industrialised countries the limits of many ecosystems have already been reached. In the years ahead efforts relating to the ecological challenge are likely to be focused on a marked reduction in raw materials and energy consumption.

Ecological challenge: reducing consumption of raw materials and energy

¹ Ifo study of the “Eco Radar Project” (cf. DKNW: www.oekoradar.de), and the German survey for the European Environmental Barometer (EBEB/European Business Environmental Barometer) 2001/2002, performed by the Centre for Sustainability Management (CSM) and Chair of Environmental Management, University of Lueneburg (www.uni-lueneburg.de/csm).

For this reason there is likely to be an increase in the importance of instruments that primarily serve to manage substance and material flows (→ Substance Flow Analyses, Material Flow Accounting). Effective data handling also calls for powerful information tools, such as a → Corporate Information System or physical environmental accounting and reporting (→ Accounting, → Reporting). An urgent issue that has hardly been addressed at all to date on the business level is emerging in the field of biodiversity and species protection.

**Social challenge:
transparency and
accountability to
stakeholders**

The *social sustainability challenge* is still receiving relatively little attention within sustainability management. Although there are a few approaches explicitly for improving the social impacts of businesses (e.g. → Employee Volunteering, → Incentive Systems), there appears to be scope for further improvements in effectiveness and efficiency in this sector. Table 2 shows that there are far fewer instruments available for meeting the social challenge than for the environmental challenge. What is more, relatively little use is made of the existing concepts and instruments in practice. In future the social aspect will become more important as a result of the growing expectations and demands addressed to business enterprises with regard to transparency and the accountability of stakeholders of various origins. In particular, → Dialogue Instruments would seem to have great potential for satisfying a wide variety of social demands. In this field we can also expect to see the development of new instruments that will emerge with advances in communication technologies. As with the ecological challenge, it is obvious that social challenge too has to take account of the competitive strength of the business.

**Economic challenge:
value orientation of
environmental and
social management**

Many of the instruments and concepts for the *economic sustainability challenge to environmental and social management* are still based on conventional accounting tools. The economic challenge is of great fundamental importance, as it links sustainability aspects with fundamental economic objectives such as improving economic efficiency, profitability or shareholder value. With growing worldwide competition the future will bring an increase in the importance of the economic challenge and its concepts and instruments. These approaches already show a trend towards innovative accounting methods based on processes and material flows (e.g. material flow accounting, → Cost Accounting). On this basis, for example, → Environmental Cost Budgeting may be an approach with a future. Instruments that document the contribution of sustainability management to shareholder value (→ Environmental Shareholder Value, → Stakeholder Value Analysis, → Eco-Rating) are also likely to have great potential for satisfying future interests and performing such tasks.

**Integration challenge:
call for cross-disciplinary
awareness**

The real objective of sustainable development, however, must be *integration*, i.e. a coordinated approach to meeting all the challenges and the combination of conventional management with the management of sustainability aspects to form an integrated sustainability management system. Bringing together the various aspects presupposes an interdisciplinary awareness of sustainable development. The extent to which this goal has been implemented to date appears to be very limited. Concepts and instruments that enable management to realise the two integration objectives are therefore very important to help us along the road to sustainable development. Table 2 and the Compendium (Chapter 5) show the limited number of concepts and instruments available today that are used or capable of being used to meet this challenge. These integration concepts and instruments are not yet very widely used in practice, but their potential must be rated very high. In the course of increasing globalisation, for example, → Supply Chain Management is likely to become very important for integrating the sustainability challenges. → Control, as a central control approach for businesses, → Sustainability Balanced Scorecard or → Total Quality Environmental Management also provide opportunities for integrating both quantitative and qualitative sustainability aspects in business control and hence for continuing to pursue a course aimed at corporate sustainability.

5 Compendium of concepts and instruments

This section provides a structured overview of the most important concepts and instruments of corporate sustainability management in alphabetical order. For each concept or instrument, an individual “Fact Sheet” gives a brief explanation of how it works. It also describes the various strengths and weaknesses of the concepts and instruments and their potential for meeting the sustainability challenges. Readers interested in more information on an individual concept or instrument can find literature on the subject and Internet addresses in the additional information at the end of each Fact Sheet. The assignment of the instruments and concepts to the four sustainability challenges (Table 2) is illustrated in the Fact Sheets by the *Sustainability Management Signal* (Figure 2). This takes the symbols familiar from Table 2 for the ecological, social and economic challenges and the integration challenge, and brings them together in a synoptic diagram. On the lines of the degrees of support in Table 2, the individual symbols are shown in three degrees of intensity:

- coloured (= extensive or full support)
- dimmed (= partial support) or
- hidden (= no support for meeting the challenge)

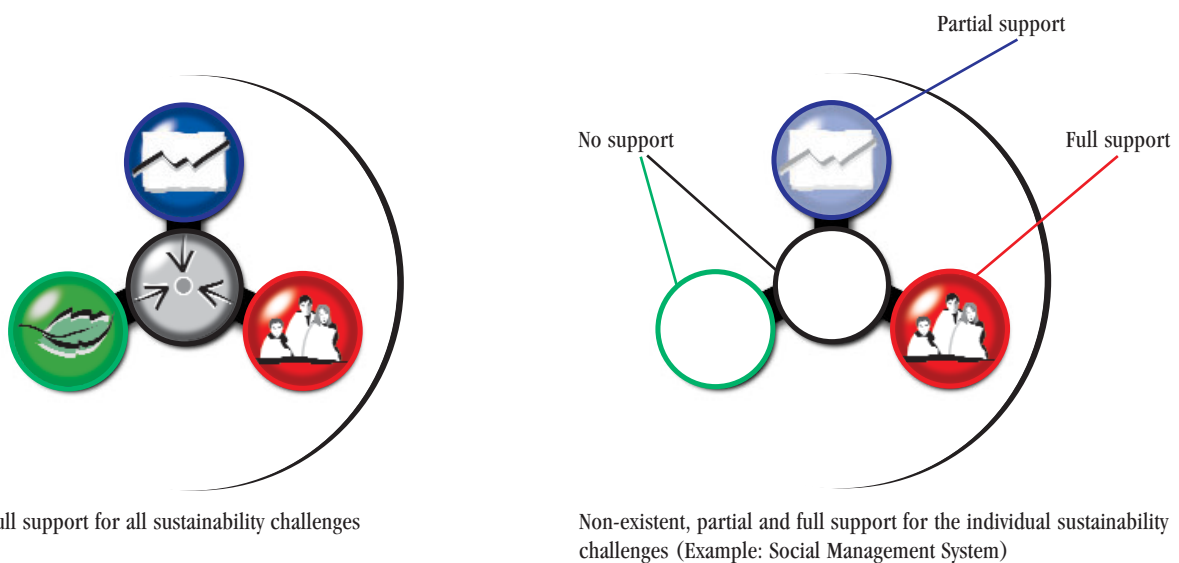


Figure 2: Sustainability Management Signal

Concepts and Instruments for Corporate Sustainability Management

Fact Sheets for the individual approaches
in alphabetical order



Pareto Analysis, Lorenz Distribution

ABC analysis is a simple, qualitative and comparative (planning) instrument for distinguishing important tasks, activities, processes, products, substances or problems from unimportant ones. This distinction or classification on the basis of importance (prioritisation) is based on relative assignment of the items investigated to three classes (A, B and C). In each case it is performed by reference to a specific criterion that reflects the issue in question (e.g. social acceptance, legal/political requirements, customer and supplier demands, share of sales, recyclability, toxicity). The following classification is frequently used for ABC analyses (cf. Figure 1):

- A: very important/very problematic ▶ urgent need for action
- B: important/problematic ▶ medium-term need for action
- C: unimportant/not problematic ▶ no need for action

The results of an ABC analysis provide directly readable “recommendations for action” and serve to focus the existing resources on those situations or weaknesses whose solution holds the greatest promise of success. They may also be used in more advanced assessment instruments (e.g. ➔ Benchmarking).

The assessment grids with the individual classification criteria and requirements are usually drawn up by the individual company – depending on the local situation. In order to ensure meaningful prioritisation (it frequently happens that too many priorities are set without specifying what is less important), it may be useful to define the maximum percentage of the items in view that can be classified as A and/or B. Bringing together individual assessments or ABC analyses of similar items (e.g. substances, products, tasks, processes) based on different criteria (e.g. recyclability, disposal, product use) creates a clear assessment grid that permits cross-comparisons between the items investigated (cf. Figure 2).

Instrument



A (high priority)	Polyurethane PVC
B (medium priority)	Polyamide Polypropylene Polyester Chipboard
C (low priority)	Aluminium sections Ferrous metals Latex foam

(1) Assessment by ecological criterion “Disposal”

	Recyclability	Disposal	Product use	Processing	Pre-production	Accident risks	Social acceptance	Legal framework
Ferrous metals	C	C	C	C	B	C	C	C
Alu sections	C	C	C	C	B	C	B	C
Polyamide	B	B	C	C	A	C	B	C
Polypropylene	C	B	C	C	B	C	C	C
Polyurethane	B	A	C	C	A	A	B	C
PVC	C	A	C	C	A	A	A	C
Polyester	B	B	C	C	A	C	B	C
Latex foam	C	C	C	C	B	C	C	C
Chipboard	B	B	C	B	B	C	B	0

(2) Assessment according to several ecological criteria (priority: A: high, B: medium, C: low; 0: not relevant)

Figures 1 and 2: Materials assessment by the Wilkhahn company (after BMU & UBA 2001)

20 ABC Analysis

ABC analysis can be extended by an additional dimension (XYZ) (ABC/XYZ analysis, cf. Table 1). The XYZ rating is often concerned with the duration of an environmental impact (X: permanent, Y: temporary, Z: sporadic) or the quantity effect (X: large quantity used, Y: medium quantity used, Z: small quantity used). Other parameters are also conceivable (e.g. ABC: rating of intensity of environmental impacts of products, XYZ: rating of social acceptance of products; ABC: rating of error probability, XYZ: rating of consequences of possible errors). The result of an ABC/XYZ analysis is a matrix with 9 fields. Events classified as A/X have the highest priority.

Table 1: Example of product assessment using ABC/XYZ analysis

	X	Y	Z
A	Product 3 Product 8		Product 2 Product 5
B		Product 1	
C	Product 4 Product 7	Product 9	Product 6

Strengths and potential for meeting sustainability challenges

Ecological challenge

The simple structure of the ABC analysis permits rapid classification of ecologically problematic substances, processes or products, and the establishment of action priorities. This is the basis for successfully improving the ecological effectiveness of an enterprise.

Table 2: Possible ecological assessment grids and criteria (after BMU & UBA 2001, 230ff.; Winter 1998, 560f.)

	A	B	C
Environmental law/ political requirements	Environmental laws disregarded or not complied with	Affected by foreseeable tightening of environmental legislation	Substances, plants, machines are used and operated in compliance with regulations
Social acceptance	A product or process is the subject of constant criticism from ecological pressure groups in society	Ecological pressure groups warn against playing down negative aspects and call for more stringent regulations	No (appreciable) public criticism
Hazard/ accident potential	High ecological hazard potential, high accident risk or serious negative ecological consequences of an accident	Medium ecological risk potential, medium accident risk or medium ecological problem to be expected in the event of an accident	No/virtually no ecological hazard potential or accident risks
Internalised environmental costs	High environmental costs/valued productivity losses	Medium environmental costs/valued productivity losses	Environmental costs/valued productivity losses are low/non-existent
Environmental impacts on upstream/downstream stages (negative external effects)	Material/product/process with high environmental burdens in upstream and downstream stages	Material/product/process with medium environmental burdens in upstream and downstream stages	Material/product/process with low environmental burdens in upstream/downstream stages
Exhaustion of non-renewable/ renewable resources	Risk of short-term exhaustion/over-utilisation/exploitation of potentially renewable raw materials and of plant and animal species threatened with extinction; failure to observe principle of sustainability	Raw materials exhausted in medium term; non-natural husbandry, monocultures, industrial agriculturals, impairment of threatened animal and plant species	Raw materials available on long term basis and/or use of secondary raw materials

Social challenge

ABC analysis permits rapid identification of the main weaknesses of a company in relation to social aspects as well. Eliminating these weaknesses (and promoting the positive social impacts generated by the company) may produce a successful increase in social effectiveness. Assessment grids and criteria can be formulated in the same way as for the ecological challenge.

Economic challenge to environmental and social management

ABC/XYZ analysis can be used for efficiency assessment in a manner comparable with → Eco-Efficiency Analysis. The aim is to identify the (ecologically/socially) most efficient processes or practices in an enterprise so as to promote them on a targeted basis and thereby achieve improvements in eco-efficiency and/or social efficiency.

Limitations and weaknesses

An ABC analysis is normally internally oriented and highly subjective. As a rule, therefore, it is not possible to make comparisons of ABC analyses between different companies. Moreover, the use of only three categories for prioritisation means that ABC analysis is a coarse instrument.

Further information*Literature*

- German Federal Environmental Ministry & Federal Environmental Agency (Ed.) (2001): Handbuch Umweltcontrolling. Munich: Vahlen.
- Hallay, H. & Pfrieder, R. (1992): Öko-Controlling: Umweltschutz in mittelständischen Unternehmen. Frankfurt/Main: Campus-Verlag.
- Stahlmann, V. (1994): Umweltverantwortliche Unternehmensführung: Aufbau und Nutzen eines Öko-Controlling. Munich: Beck.
- Schaltegger, S. & Sturm, A. (2000): Ökologieorientierte Entscheidungen in Unternehmen (1st ed. 1992, 2nd ed. 1994, Download: www.uni-lueneburg.de/csm under publications).
- Winter, G. (Ed.) (1998): Das umweltbewusste Unternehmen. Munich: Vahlen.

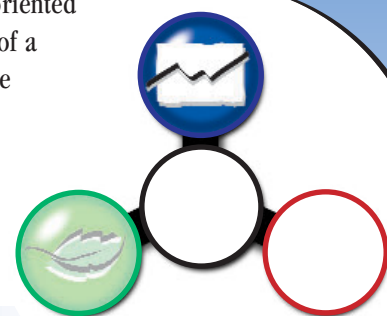


Environmental Accounting, Social Accounting, Sustainability Accounting

Conventional accounting is a concept that supplies a company with important information (both historical and, to a certain extent, also future-oriented) about the course of the business, and which makes use of instruments such as ➔ Cost Accounting, ➔ Investment Appraisal, ➔ Budgeting etc. In the context of sustainable development, there has been both a differentiation and an extension of conventional accounting. The *differentiation* has given rise to approaches such as environmental cost accounting, investment appraisal for environmental protection projects etc. (cf. economic challenge below). Thus different cost accounting approaches can be used to identify, for example, what costs are caused by environmental protection measures, what costs are caused by lack of environmental protection measures and what costs could be avoided by taking such measures.

The purpose of *extension approaches* in which conventional accounting is supplemented by physical/ecological accounting is to use methods related to conventional accounting to register, document and analyse ecological and social impacts of the company's activities. For example, ecologically oriented ➔ Investment Appraisal uses a variety of methods to investigate the ecological advantages of a planned investment, while ➔ (Eco-)Budgeting looks at the contribution (to reducing) the company's environmental impacts in the next period. By means of environmental and *social assessment* (e.g. ➔ Social Accounting) the company documents its performance in the field of sustainable development in relation to external and internal interest groups (➔ Reporting).

Concept



Strengths and potential for meeting sustainability challenges

Ecological challenge

Accounting instruments can be successfully used to register, analyse and communicate environmental impacts. In ecological or physical accounting, which embraces instruments such as material flow accounting (➔ Substance Flow Analysis), substance flow accounting (➔ Substance Flow Analysis) and ➔ Life Cycle Assessment, there is an institutionalisation of information management designed to calculate environmental impact added and environmental indicators (➔ Indicator) in physical units of measurement. External environmental accounting in physical units (e.g. kg) serves to provide information for environmental reports (➔ Reporting).

Social challenge

In the 1970s, the application of accounting instruments to social aspects led to the development of ➔ Social Accounting. This is not very widespread today, and primarily suffers from problems arising from the difficulty of measuring the social impacts of a company. More recently a method of calculating an individual aspect of social impacts (evaluation of stakeholder relations) has acquired importance in the form of ➔ Stakeholder Value Analysis. Furthermore, social indicators are gaining attention in the context of ➔ Reporting.

Economic challenge to environmental and social management

In the economic challenge to corporate environmental protection, the focus has been on using cost accounting methods to determine the cost of environmental measures implemented. Methods based on material and energy flows (material flow cost accounting, ➔ Cost Accounting), which permit precise analysis of consumption-intensive and cost-intensive process steps, are of special importance here. They set out to reduce costs by reducing environmental impact added (by means of raw material savings, waste reduction etc.). This is a special quantitative form of ➔ Eco-Efficiency Analysis.

24 Accounting

The data resulting from these methods also offer a basis for planning future activities, e.g. in the ➔ Budgeting field. Accounting-based approaches for explicit assessment of social efficiency are not known to date. The efficiency of stakeholder relations can however be calculated by means of the ➔ Stakeholder Value Analysis approach already mentioned.

Integration challenge

Accounting traditionally occupies an important position in the management of a company, as it creates an essential basis of information for management. For this reason the integration of sustainability aspects in accounting is of central importance for corporate sustainable development. However, there is as yet no comprehensive approach to sustainability accounting, including greater attention to social aspects and overall integration. A certain lack of integration has been a main motivation for the development of the (Sustainability) ➔ Balanced Scorecard.

Limitations and weaknesses

As a rule accounting only takes account of internal costs, i.e. those costs that are incurred within the company. Allocation of external costs (e.g. damage to buildings in the immediate vicinity of an SO₂ emitter) has been very rare to date, partly due to lack of experience and partly to inadequate measurement and allocation methods.

Accounting provides a quantitative representation of environmental and/or economic impacts. It is normally unable to offer complete documentation of qualitative, long-term and future impacts on ecosystems and people.

Further information

Literature

- Bennett, M. & James, P. (Eds.) (1998): *The Green Bottom Line*. Sheffield: Greenleaf.
German Federal Environmental Ministry & Federal Environmental Agency (Eds.) (1996): *Handbuch Umweltkostenrechnung*. Munich: Vahlen.
Schaltegger, S. & Burritt, R. (2000): *Contemporary Environmental Accounting*. Sheffield: Greenleaf.

Organisations and Internet addresses

- Centre for Sustainability Management (CSM) e.V.: www.uni-lueneburg.de/cea
Environmental Management Accounting Network (EMAN): www.eman-eu.net, www.eman-ap.net
Environmental Management Accounting Research and Information Centre (EMARIC): www.emaric.org
German Federal Environmental Agency (UBA): www.umweltbundesamt.de
Global Reporting Initiative (GRI): www.globalreporting.org

Eco-Audit, Environmental Audit, Social Audit, Sustainability Audit, Legal Compliance Audit, Performance Audit, System Audit

In the strict sense, an audit is a control instrument in the form of a comparison of target and actual figures. Today the concept of the audit is interpreted very broadly. A first distinction can be made in principle between internal and external audits (cf. Figure). Internal audits are mostly performed by internal personnel, who are however always external to the area under investigation, and serve to inform management. In external audits, independent experts or auditors external to the company check for compliance with legislation, the requirements of standards and/or internal targets and verify the data obtained.

Depending on the function, the following types of audit are distinguished:

- Legal compliance audit: ensures compliance with legislation
- Performance audit: checks for compliance with company performance standards and targets
- System audit: checks for proper functioning of the management system, i.e. compliance with the demands of procedural and behavioural instructions, guidelines etc.

Audits may be used in a variety of fields, e.g. for financial audits and audits of ecological or social aspects (environmental or social audit). As a rule these are systematic and regular inspection procedures that are documented. Audits serve to adjust imbalances of information between the interest groups within the company (cf. Figure). Audits inform the management about the performance, qualifications and knowledge of their employees, and inform external stakeholders about the performance of the business in the sector audited. Another important aspect is self-control, i.e. ensuring that the system is maintained even after the audit reference date (cf. Figure).

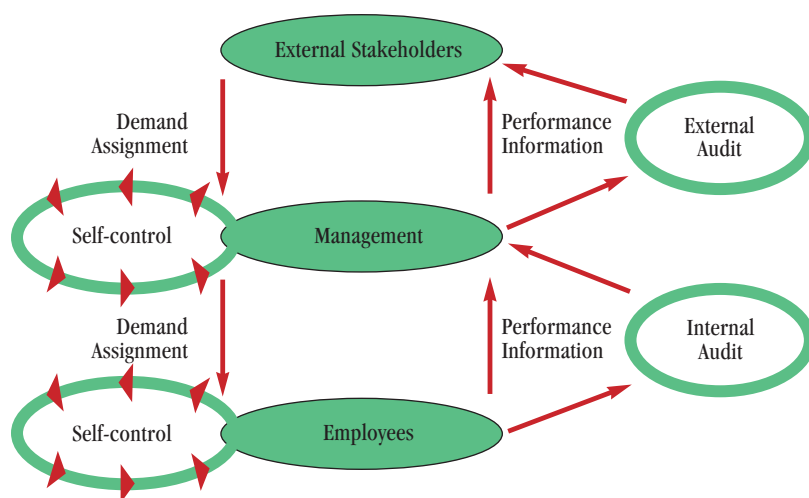
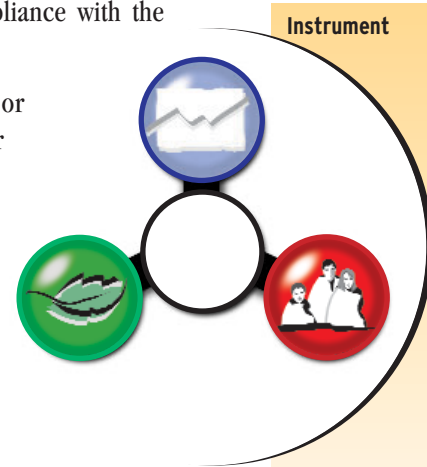


Figure: Audit methods

Strengths and potential for meeting sustainability challenges

Ecological challenge

Environmental audits are used to check the environmentally relevant aspects of an enterprise. Environmental audits are important for the certification of Environmental Management Systems, as these are preceded by an external environmental audit. To this end the design of the environmental management system is compared with what is laid down in the relevant standard and described in the environmental management documentation. In this case the strengths of the instrument also depend on the requirements prescribed, e.g. the rules and regulations of ISO 14001ff. or EMAS II (Environmental Management System).

An audit not only provides direct support for improvements in ecological effectiveness, but is useful for verifying and documenting effective environmental protection efforts. An increase in ecological effectiveness is only achieved if there is also a genuine increase in the company's environmental performance.

Social challenge

Social audits are not so well established as environmental audits, since the social challenges to management are more difficult to measure. Social audits are used to check the social impacts of business activities. There are however different methods, which may for example include working conditions within the company and/or the social context. Attempts to standardise the social investigation of business enterprises were made as long ago as the 1970s with the aid of ➔ Social Accounting. A first catalogue of standards – similar to ISO 14001ff. in the environmental management field – is provided by the Social Standard SA 8000 (➔ Social Management System). With the aid of this and the social indicators called for in the standard (➔ Indicator), social audits can measure and improve the social performance of enterprises and their suppliers. The results of the audit and any measures decided on can be published in a social report (➔ Reporting) and made available to interested stakeholders.

Economic challenge to environmental and social management

Joint recording, analysis and evaluation of economic and ecological or economic and social data makes it possible to determine and check the eco-efficiency or social efficiency of business activities. This applies to performance audits in particular. In this case the instrument serves the purpose of monitoring the efficient improvement of company performance and making information available, e.g. to the management level.

Integration challenge

As yet, sustainability audits are not very widespread. Only isolated approaches exist to date. The purpose of integrated audit methods in the context of sustainable development is to investigate interdependencies between environmental aspects, profitability and social aspects, with the aim of revealing common or conflicting objectives.

Limitations and weaknesses

Audits have specific weaknesses, depending on the form in question. One example: although a legal compliance audit investigates conformity with legislation, it does not investigate, for example, the functioning of the ➔ Social or ➔ Environmental Management System. Basically, auditors form an impression through individual observations, interviews and data analyses. From these findings they draw general conclusions about the subject under scrutiny. Unconscious falsification of the results or generous interpretation of the audit criteria cannot be entirely ruled out. In addition the problems familiar from the use of ➔ Indicators also occur. The question of the “snapshot effect” may also cause difficulties. Employees prepare themselves for the audit and have a tendency to neglect the issue until the next audit unless they are prevented from doing so by other management instruments.

Further information

Literature

- Ewer, W., Lechelt, R. & Theuer, A. (Eds.) (1998): Handbuch Umweltaudit. Munich: Beck.
- Fichter, K. (1995): EG-Öko-Audit-Verordnung. Mit Öko-Controlling zum zertifizierten Umweltmanagement. Munich: Hanser.
- Löbel, J. & Schörghuber, W. (Eds.) (1997): EU-Umweltaudits: zukunftsfähige Geschäftsprozesse gestalten. Berlin: Springer.
- Wruk, H.-P. & Ellringmann, H. (1998): Praxishandbuch Umweltschutz-Management. Methoden, Werkzeuge, Lösungsbeispiele, Umsetzungshilfen. Cologne: Deutscher Wirtschaftsdienst.

Organisations and Internet addresses

Social audit: www.socialaudit.org

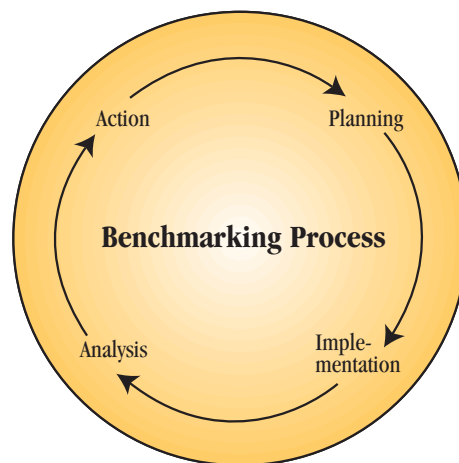
Environmental Benchmarking, Sustainability Benchmarking

Benchmarking means analytical comparison of workflows, products, services or corporate structures with the strongest competitor or the industry leader (“best in class”). This performance comparison helps management to identify and understand outstanding achievements, technological breakthroughs etc. (“best practice”) by other enterprises or corporate sectors, with a view to integrating them in their own workflows and structures. Thus the aims are to improve corporate performance and increase competitive strength by using efficient practices. The company’s own strengths and weaknesses are made visible, and its processes ideally adapted to market conditions and customer demands on the basis of best achievements. The performance standards derived from “best practice” (benchmarks) serve as yardsticks. Business performance is tested with the aid of ➔ Indicators. Benchmarking may be regarded as a motive force for improvements and innovation thrusts. Thus it is also an aid to credible and reasoned establishment of new targets (target setting process). Various kinds of benchmarking can be distinguished depending on the orientation and use of the instruments: internal benchmarking (comparison within a company), competition-oriented benchmarking (comparison between competitors on the sales market), functional benchmarking (comparison of corporate functions in different enterprises) etc.

The benchmarking process represents a continuous search for possible improvements and can be divided into four phases:

Communication of results and next steps; setting targets; planning and implementing measures (adaptation); monitoring improvements

Performance difference; critical performance factors (causes); potential opportunities for improvement



Benchmarking subject (business process, product/service etc.); criteria (quality, costs, time etc.); benchmarking partners

Data compilation method (information sources); data acquisition

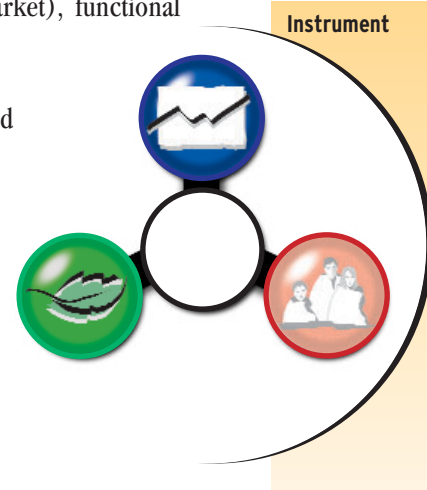


Figure: Benchmarking process (after Watson 1993)

Strengths and potential for meeting sustainability challenges

Ecological challenge

Continuous comparison of environmental performance with other enterprises or corporate sectors in an eco-benchmarking process makes it possible to arrive at an ecological assessment of the company’s own performance and implement a continuous improvement process. The design of the business processes, products and services should be as ecologically sound as possible. In an interchange of information with the benchmarking partner it is possible to compare items such as environmental indicators (➔ Indicator), environmental management structure, business processes and functions, and products and services. The task of obtaining the information is made easier by environmental reports (➔ Reporting) and the environmental statement (➔ Reporting) that has to be prepared in accordance with EMAS (➔ Environmental Management System). Quantitative data can also be obtained from ➔ Life Cycle Assessments.

28 Benchmarking

Social challenge

Benchmarking of corporate social performance can basically be carried out in the same way as eco-benchmarking. Relevant social indicators (➔ Indicator), which are for example also communicated in ➔ Reports, may be used as a basis for comparison. However, social benchmarking is not so widespread as environmental benchmarking. This is due among other things to the difficulty of measuring the social performance of business enterprises.

Economic challenge to environmental and social management

Eco-efficient benchmarking is based not only on the environmental compatibility of the benchmark aspect that is to be optimised, but also on the economic criteria of quality, costs and time. The aim is to implement the most eco-efficient practices in the business. Here too, a variety of information instruments may be useful, e.g. ➔ Reporting, ➔ Indicators and ➔ Life Cycle Assessments. No appreciable use is yet made of benchmarking in the context of social efficiency.

Limitations and weaknesses

The individual types of benchmarking have specific weaknesses. While it is fairly easy to acquire the information in an internal benchmarking operation, the observer's view is confined to the internal situation. In external benchmarking the potential of the instrument is limited by the difficulty sometimes encountered in obtaining information. There may also be uncooperative behaviour between individual benchmarking participants, explained by concerns about undesirable disclosure of information to competitors, easily copied success practices and loss of competitive advantages. In functional benchmarking difficulties are often experienced when applying the data to the specific business situation. Other basic obstacles arise from the fact that it is not always possible to quantify the desired information. A further aspect is that benchmarking has a tendency to encourage imitation rather than innovation.

Further information

Literature

Camp, R. (1994): Benchmarking. Munich: Hanser.

Goldmann, B. & Schellens, J. (1995): Betriebliche Umweltkennzahlen und ökologisches Benchmarking. Cologne: Gutke.

Hitchens, D., Clausen, J. & Fichter, K. (1999): International environmental management benchmarking: best practice experiences from America, Japan & Europe. Berlin: Springer.

Huber, J., Mazzariello, A., Schwob, R. & Naish, C.-P. (2002): Environmental Benchmarking. In: EFQM-Magazine, Vol. 1, No. 2, 30-35.

Schneidewind, U. & Dyllick, T. (1997): Ökologisches Benchmarking. In: Die Betriebswirtschaft, Vol. 57, No. 4, 569-572.

Watson, G. (1993): Benchmarking: vom Besten lernen. Landsberg/Lech: Verl. Moderne Industrie.

Organisations and Internet addresses

Benchmarking in Europe: www.benchmarking-in-europe.com

European Foundation for Quality Management (EFQM): www.efqm.org

Global Environmental Management Initiative (GEMI): www.gemi.org

Globale Reporting Initiative (GRI): www.globalreporting.org

International Best-Factory-Award (IBFA): www.benchmarking.de

Novartis International AG: www.novartis.com/hse

Budgeting, Eco-Budgeting

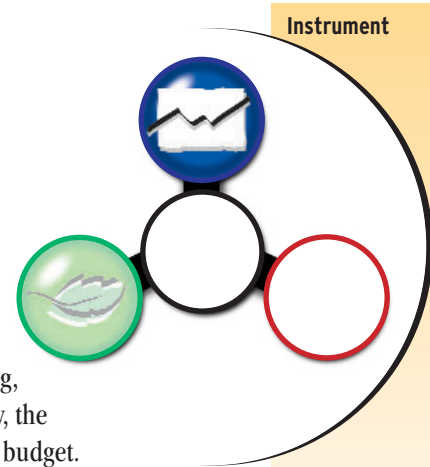
Budgeting means developing a plan for central economic parameters, e.g. sales, expenditure, income etc., for a future period. A budget contains a value-based quantity with a defined degree of rigidity (fixed limit or guide value) that is laid down for a decision-making unit in the company for a specific future period. This means, for example, that a specific sales figure is laid down for a department within a company for the next quarter. Other examples of value-based quantities are costs and profit.

Unlike ➔ Investment Appraisal, budgeting does not describe the benefits of an individual acquisition over a lengthy period, but determines the funds available to a business unit for the coming period. It differs from ➔ Cost Accounting in particular in that budgeting is a future-oriented planning instrument, whereas cost accounting relates to past periods. The difference from Standard Cost Accounting lies in the fact that the latter is an information instrument, whereas budgeting is a control instrument.

The principal objectives of budgeting are to:

- help achieve the corporate objectives and
- create defined limits within which employees can use resources.

Conventional budgeting may adopt one of two strategies: in the retrograde approach the plans are derived from a predetermined performance datum. In the progressive method, by contrast, the budget is developed on a bottom-up basis from the individual plans of the various corporate sectors. The retrograde method corresponds to the approach in target costing, where the maximum costs that can be borne are derived from the market price. Another fundamental distinction relates to the priority of *formal objective oriented budgeting* compared with *technical objective oriented action plans*. As primary planning, budgeting may determine the scope and design of the lower-ranking action plans. Conversely, the action plans may show the primary planning, which in turn determines the contents of the budget.



Strengths and potential for meeting sustainability challenges

Ecological challenge

Budgeting lays down the limits that corporate sectors are not to exceed in their activities during the next period. Budgeting for (future) environmental impacts could take the form of limits on the cost of environmental impacts during the next period and thus, as a rule, the scale of the environmental impact itself. In this way (eco-)budgeting facilitates control of the environmental impacts of the business and hence also its ecological effectiveness.

Economic challenge to environmental and social management

Budgeting is an instrument that may play a central role within ➔ Control. For large companies it is a useful instrument for direct control of central economic parameters. The preparation of an environmental protection budget provides management with an instrument for planning the relevant total expenditure. Only in combination with ecological objectives (e.g. 10% reduction in environmental burdens) does it facilitate control of eco-efficiency.

Limitations and weaknesses

A budget can only be as good as the foundation of data on which it is based. Detailed ➔ Cost Accounting therefore supports successful budgeting, whereas less well developed cost accounting makes budgeting difficult.

One problem in budgeting is defining the flexibility of the figures. If the budget is applied too rigidly, it may restrict the corporate sector too much and deprive it of the necessary flexibility. On the other hand budgeting no longer offers any advantages if it does not possess the necessary rigidity. Budgeting of income and expenditure originating

30 Budgeting

from sustainability management is not very widespread to date. There are however various theoretical approaches. These are based on marginal (direct) costing, absorption (full) costing, or process costing. Burritt & Schaltegger (2001) identify two main problems that arise when applying the budgeting approach to environmental costs:

- The ex-post perspective of cost accounting and the inadequate consideration of income from environmental and sustainability management, and
- the failure to take account of costs that would arise even without the environmental and sustainability management measures.

Budgeting is only of limited suitability for increasing social effectiveness, because this is a field where it is far more difficult to acquire the basic data (measuring and evaluating social impacts).

Further information

Literature

Burritt, R. & Schaltegger, S. (2001): Eco-efficiency in corporate budgeting. *Environmental Management and Health*, Vol. 12, No. 2, 158-174.

Camillus, J. (1984): *Budgeting for Profit: How to exploit the potential of your business*. Pennsylvania: Radnor.

Hornigren, C., Foster, G. & Datar, S. (2000): *Cost accounting*. Upper Saddle River, NJ: Prentice Hall International.

Horváth, P. (1986): *Controlling*. Munich: Vahlen.

Schaltegger, S. & Burritt, R. (2000): *Contemporary Environmental Accounting*. Sheffield: Greenleaf.

Organisations and Internet addresses

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/cea

Environmental Management Accounting Network (EMAN): www.eman-eu.net, www.eman-ap.net

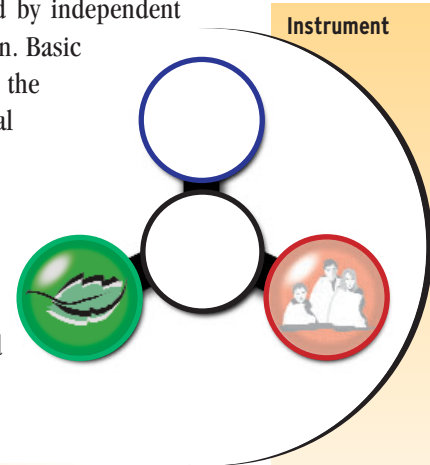
Environmental Management Accounting Research and Information Centre (EMARIC): www.emaric.org

Eco-Checklist

Checklists are primarily used to make a (first) inventory or review of environmental features of companies or corporate sectors. They are thus a first step in the process of establishing an → Environmental or → Social Management System. The aim is simple identification of weaknesses and opportunities. Checklists are lists of aspects for investigation. They may be function related (focusing on environmental impacts of specific functional areas of the business, e.g. procurement) or product related, and may be applied to specific special aspects (e.g. hazardous substances). Checklists are also combined with other instruments. For example, they are the basis for the → Audit process.

Originally checklists were suggested as standardised lists for all companies. However, these proved to be too unspecific and a good deal of work was needed to adapt them to the individual situation. Today checklists are usually drawn up for individual industries or companies (cf. Table). Often they are designed by external service providers (e.g. business consultants, chambers, associations) and are therefore not freely available. In many cases, however, such lists are preferable to company-produced lists, as they are drawn up and checked by independent bodies and are thus likely to come closer to the goal of objective and thorough investigation. Basic information for preparing checklists can be found, for example, in the publications of the German Federal Environmental Ministry (BMU) and the German Federal Environmental Agency (UBA). Depending on the size of a company, a single checklist may be used for the entire company or individual lists for the various corporate sectors.

Checklists adapted to the specific conditions are used to record the necessary data and information (cf. Table). Analysis and comparison with comparable data make it possible to identify weaknesses and decide where action is necessary. Checklists are frequently used for a first investigation of the environmental impacts of small and medium enterprises.



Strengths and potential for meeting sustainability challenges

Ecological challenge

Checklists are relatively easy to prepare and use. They permit a first inventory of the situation or conditions in the field of corporate environmental protection at comparatively low cost. The main purpose of ecological checks is to improve ecological effectiveness. Checklists make it possible to identify potential for saving resources, for example. Simply because it is so easy to use, this instrument can in particular make it easier for smaller companies to embark on environmental management and to introduce an → Environmental Management System, which means it has a very important role to play.

Social challenge

Checklists are also used to check compliance with minimum social standards. For example, → Audits and more advanced → Social Management Systems may employ special checklists to investigate social criteria.

Integration challenge

In all corporate sectors and industries, checklists are a widespread and proven means of investigating and safeguarding a wide variety of business workflows. They are therefore very suitable for bringing together aspects of environmental, social and conventional management. Such integration is rare, however.

32 Checklist

Table: Example of a checklist for energy management, energy savings and (selection of) energy sources (after a VCI checklist for the EC Eco Audit Regulation; www.ipsi.gmd.de/oeko-audit/check-1c02.html, 11.03.2002)

System issues	Answers	Compliance issues
a) What ongoing measures are taken to ensure that as little energy as possible is needed, and how is this monitored?	<ul style="list-style-type: none"> - Checking compliance with all legal and internal requirements by means of monitoring measures by operator (job descriptions, procedural instructions), e.g. by measuring quantities - Consideration of energy aspects for new and existing processes (in line with investment guidelines, research guidelines) - Checking general requirements (cf. environmental guidelines, manual) - Control by means of internal audits (audit guidelines, possibly checklist for energy sources) 	<p>Description by department/unit</p> <ul style="list-style-type: none"> - Documentation - Procedural/implementation rules - Definition of competence/responsibilities, description of interface - Was check actually performed? <p>Are there opportunities for energy management, energy saving or selection of energy sources?</p> <p><i>If appropriate, the following questions apply:</i></p>
b) What measures are taken to ensure that energy sources are selected and used on the basis of environment-related criteria, and how is this monitored? What criteria are used to judge the aspect "environmentally friendly"?	<ul style="list-style-type: none"> - Compliance with general requirements found in guidelines, given concrete form through procedural instructions (responsibility with chief engineer, for example (cf. job description); research guidelines, investment guidelines) - Monitoring by central function - Control by means of internal audits (audit guidelines, possibly checklist for energy sources) 	<ul style="list-style-type: none"> - Are investigations into efficient use of energy performed? - Are energy supply alternatives investigated (e.g. renewable energy sources)? - Are the results accounted for? - Are investigations conducted with a view to saving energy? - Are practical tests performed where energy saving opportunities appear to be suitable? -

Limitations and weaknesses

Generally speaking, checklists cannot reveal complex relationships. The effectiveness of the checklist is therefore limited. Only a combination of different checklists (e.g. eco-checklist and social checklist) can help in more extensive investigations.

An important consideration is logical and objective compilation of the criteria used in a checklist. Here there is a risk that the impact of the checklist may be watered down by subjective choice of criteria or overloading with a large number of less relevant criteria.

Further information

Literature

German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (2001): Handbuch Umweltcontrolling. Munich: Vahlen.
 Michaelis, P. (1999): Betriebliches Umweltmanagement: Grundlagen des Umweltmanagements. Herne: Verlag Neue Wirtschaftsbriefe.

Organisations and Internet addresses

Bauchhage Consulting GmbH: www.checkliste.de
 Bay Area Council: www.bayareacouncil.org
 Fraunhofer's Integrated Publication and Information Systems Institute (IPSI): www.ipsi.gmd.de
 German Federal Environmental Agency (UBA): www.umweltbundesamt.de
 Rossmann: www.qualitaetssicherung.de
 USEPA: www.epa.gov/compliance/monitoring/selfevaluation/index.html

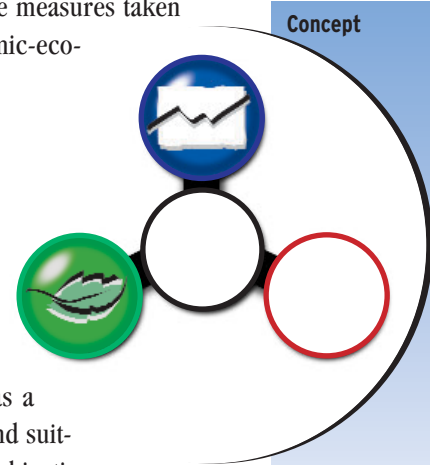
Eco-Control, Environmental Control, Integrated Control, Sustainability Control

Control is a steering concept which makes use of a wide variety of instruments (e.g. ➔ Life Cycle Assessment, ➔ Indicator, ➔ Eco-Compass, ➔ Accounting, ➔ Reports) and which ideally coordinates and integrates all steps in the management process. The function of control is to support and accompany management decisions and their implementation (support for top management). To this end it acquires information (or takes it from the ➔ Corporate Environmental Information System, ➔ Accounting, etc.), performs data management tasks such as creating business ➔ Indicators, determines and interprets indicators of social, economic and ecological changes in the company's setting, and prepares analyses and forecasts on the development of the business (information supply function). Control thus provides company management with decision-support material in the form of all information needed for planning, deciding and coordinating business activities (navigation function and indicator-based steering). Moreover, it assists decision makers with the task of putting decisions into practice, steers and controls the development of the business, and thereby makes a decisive contribution to efficient and effective action (management advisory function). If discrepancies occur, the causes are analysed and corrective measures taken if necessary. Depending on the field of application, one can distinguish ecological, economic-ecological, financial or socially oriented control strategies.

To ensure a structured approach to its numerous tasks and service functions, control is usually subdivided into four or five different functions, or modules. Essentially these are:

- Setting objectives / planning,
- Information / data management,
- Steering / implementation and
- Control.

Communication is sometimes included under information, while others list it explicitly as a fifth function. In practice the various functions frequently take place in parallel. The use and suitability of the instruments must be reviewed regularly and coordinated with the company's objectives.



Strengths and potential for meeting sustainability challenges

Ecological challenge

Ecologically oriented control strategies are keyed exclusively to recording and controlling environmental impacts of business activities. With their focus on the yardstick of environmental burdens, their view of things is unidimensional. An ecologically oriented control strategy can be very effective in steering (reducing and avoiding) environmental burdens. Widely used, it provides a good basis for improving ecological effectiveness.

As a rule, ecologically oriented control strategies are organised so that they run in parallel with the existing financial control strategy.

Social challenge

To date no control strategy exists that is explicitly concerned with managing or steering social concerns and serves to improve social effectiveness.

Personnel control strategies do however exist in the personnel management sector. Usually their purpose is to find the optimum ratio of personnel expenditure (in terms of price, quantity, time and quality) to personnel performance, having regard to current and future developments in the country. They also tend to have an economic bias and are thus geared to improving efficiency (cf. economic challenge).

Economic challenge to environmental and social management

Control strategies with an economic-ecological orientation (eco-control) support the planning of corporate environmental management activities and subsequently ensure the relevant steering and control. Their function is to support efficient and effective implementation of ecologically and economically useful (eco-efficient) activities, with the aim of ensuring successful long-term development of the enterprise. The aim is to increase eco-efficiency.

To date there is no control strategy that is explicitly keyed to improving social efficiency. Under the heading of personnel control, however, there are certain approaches that take a detailed look at corporate human resources management and which seek to take account of personnel as a critical factor for the company's success (cf. Social challenge).

Integration challenge

To avoid situations where a company's control strategies are operated in parallel, it is both desirable and worthwhile to integrate all sustainability aspects in a single control strategy. All information in a given enterprise should come together in a control department and be linked such that the orientation of the corporate objectives, analysis of data, implementation of plans, control of processes and internal and external communication take account of and reflect economic, ecological and social aspects ("integrated control", sustainability control).

By linking ecological with economic information, economic-ecological control strategies at least partially meet the demands of the integration challenge (cf. Economic challenge). However, integration in conventional business control is still unusual.

Limitations and weaknesses

As a rule, various control strategies (e.g. strategies with a business, economic and economic-ecological orientation) are used in parallel. Such parallel operation is suboptimal. Introducing and running an integrated control system frequently calls for substantial restructuring of the control function.

Further information

Literature

German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (Eds.) (2001): Handbuch Umweltcontrolling. Munich: Vahlen.

Günther, E. & Wagner, B. (1993): Ökologieorientierung des Controlling (Öko-Controlling). Theoretische Ansätze und praktisches Vorgehen. In: Die Betriebswirtschaft, Vol. 53, No. 2, 143-166.

Hallay, H. & Pfriem, R. (1992): Öko-Controlling: Umweltschutz in mittelständischen Unternehmen. Frankfurt/Main: Campus-Verlag.

Schaltegger, S. (2002): Umwelt-Balanced Scorecard und Öko-Controlling. Lueneburg/Hagen: CSM/FernUniversität Hagen.

Schaltegger, S. & Sturm, A. (1998): Eco-Efficiency by Eco-Controlling. Theory and cases. Zurich: vdf.

Schaltegger, S. & Burritt, R. (2000): Contemporary Environmental Accounting. Sheffield: Greenleaf.

Organisations and Internet addresses

Center for Sustainability Management (CSM) e.V.: www.uni-lueneburg.de/csm

Deutsche Gesellschaft für Personalführung (DGFP) e.V.: www2.dgfp.com

Ellipson: www.ellipson.com/download/ebooks.html

Fraunhofer Institute for Industrial Engineering: www.bum.iao.fhg.de/intus

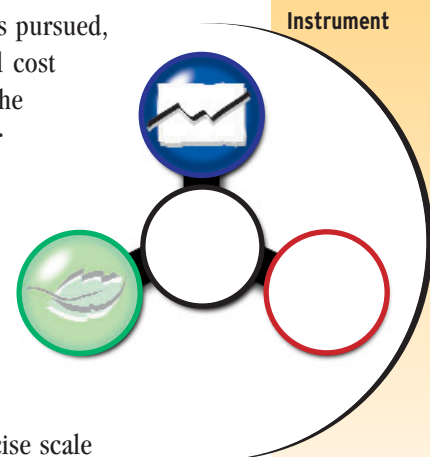
German Federal Environmental Agency (UBA): www.umweltbundesamt.de/uba-info-daten/daten/uin/inhalt.html

Humboldt University Berlin, Institut für Wirtschaftsinformatik: www.wiwi.hu-berlin.de/~arndt/UIS/ucs.html

Environmental Cost Accounting, Ecologically Oriented Cost Accounting, Material Flow Cost Accounting, Environmental Management Accounting (EMA)

Environmental Cost Accounting is intended to record, at reasonable expenditure, the direct and indirect costs of corporate environmental impacts broken down by polluter, and take account of their effects on the achievement of company objectives. Environmental costs are costs that result from the company's environmental impacts. They may arise both inside the company (internal environmental costs) and outside (external environmental costs), and need not be closely connected in time with the activity that causes them. In most cases, however, the instrument only considers costs that arise within the company due to real, generally known and measurable burdens on the environment (e.g. wastewater charges) or reductions in environmental impacts (e.g. expenditure on filter systems). Today's interpretation of environmental costs includes all material flow costs induced by emissions and residual substances, including purchasing, personnel, and waste management costs and depreciation. Recent discussions have focused in particular on material flow and energy flow oriented approaches to determining environmental costs.

Regardless of which of the many different approaches to environmental cost accounting is pursued, there is first of all a need to collect information going beyond the scope of conventional cost accounting. In particular, it is necessary to make as complete and detailed an inventory of the company's environmental impacts as possible (e.g. by means of → Life Cycle Assessment or material flow accounting, → Substance Flow Analysis, processing in the → Corporate Environmental Information System, → Accounting).



Strengths and potential for meeting sustainability challenges

Ecological challenge

Environmental cost accounting enables the company to obtain information about the precise scale of environmentally induced costs and to compare them internally with the relevant income or achievements. This information can then be used as a basis for sound decisions on future company activities in the field of environmental protection, and may in many cases permit improvements in ecological effectiveness. One example of a guide to environmental cost accounting in Germany is the VDI 3800 guideline on determining expenditure on corporate environmental protection.

In particular the *material flow cost accounting* approach enables the company to identify cost-intensive process steps. By discovering hitherto unrecognised potential for saving costs by reducing materials, this approach also opens up opportunities for increasing ecological effectiveness.

Economic challenge to environmental and social management

Cost accounting is a central source of information in every business enterprise. The cost accounting information is used to analyse and assess past business activities, and this serves as a basis for preparing plans for future periods. If this process takes account of environmental costs, it provides a direct view of environmental impacts for major decisions within the company. The comparison of environmental impacts with environmentally induced costs and income permits a direct → Eco-Efficiency Analysis of measures. The eco-efficiency can be determined by looking at these economic impacts in relation to the environmental impact added. Environmental cost accounting also provides a basis of data for several other instruments, e.g. → Budgeting, → Indicators or → Benchmarking.

Limitations and weaknesses

Environmental cost accounting displays several typical weaknesses. Environmental cost accounting on the basis of conventional cost accounting relates to the past and says nothing about future developments. Like conventional cost accounting it also suffers from the problem of plausible allocation of overheads to cost locations and cost units.

Further information

Literature

- German Federal Environmental Ministry & German Federal Environmental Agency (Eds.) (2001): *Handbuch Umweltcontrolling*. Munich: Vahlen.
- German Federal Environmental Ministry & German Federal Environmental Agency (Eds.) (2003, forthcoming): *Leitfaden Betriebliches Umweltkostenmanagement*. Berlin: UBA.
- Fichter, K., Loew, T. & Seidel, E. (1997): *Betriebliche Umweltkostenrechnung*. Berlin: Springer.
- Letmathe, P. (1998): *Umweltbezogene Kostenrechnung*. Munich: Vahlen.
- Schaltegger, S. & Burritt, R. (2000): *Contemporary Environmental Accounting*. Sheffield: Greenleaf.
- Schaltegger, S. & Sturm, A. (2000): *Ökologieorientierte Entscheidungen in Unternehmen. Ökologisches Rechnungswesen statt Ökobilanzierung: Notwendigkeit, Kriterien, Konzepte*. Download: www.uni-lueneburg.de/csm

Organisations and Internet addresses

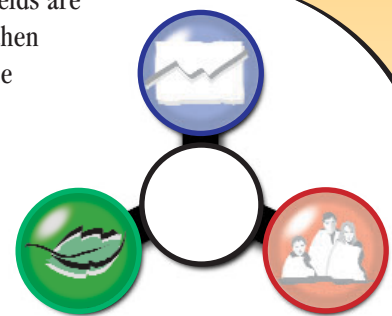
- Centre for Sustainability Management (CSM): www.uni-lueneburg.de/cea
- Environmental Management Accounting Network (EMAN): www.eman-eu.net, www.eman-ap.net
- Environmental Management Accounting Research and Information Centre (EMARIC): www.emaric.org
- Institute for Ecological Economy Research (IÖW): www.ioew.de
- Institute for Environmental Economic Analyses (IUWA), Heidelberg: www.iuwa.de

Cross-Impact Matrix

Cross-impact analysis (CIA) is a forecasting instrument that serves to identify and assess fundamental links between present and possible future situations (➔ Scenario Analysis, ➔ Early Identification). CIA gives a clear indication of the business fields, corporate sectors or product ranges in which there is a need to adapt to the expected (context) developments. This makes it possible to detect opportunities or risks that have hitherto gone unrecognised, and to assess the probability of their occurrence.

A CIA takes place in several steps and is usually undertaken in a workshop with experts (from various fields). The first steps is to make a list of the business fields, corporate sectors or product ranges that are relevant in the light of the terms of reference. In the second step the relevant observation fields (legislation, research and technology, customers, media etc.) for the assignment are defined, and existing or expected developments (events and trends) in these observation fields are described. The third step is to develop the actual cross-linking matrix by looking at the business fields in relation to the observation fields (cf. Figure). The impacts (strength and direction of influence) that are exerted on the business fields by the developments in the observation fields are recorded in the matrix in the form of positive and negative scores. These scores are then totalled horizontally and vertically. It is then possible to conclude from the totals which of the business field in question have good prospects for the future in view of the expected developments in the business context, and which are threatened (cf. total row in Figure). It is also possible to read off the relevance of the observation fields to all business fields (cf. total column in Figure).

Instrument



Basically, however, one can compare not only observation fields and business fields, but also any desired variables.

Observation fields	Business fields / Corporate sectors / Product ranges / ...						Total
	...	Purchasing	Production	Sales	Personnel	...	
Research and technology			3				
Customers			-1				
Legislation	2	1	-2	-1	3	-1	2
Media			-3				
...			-1				
Total			-4				

Figure: Network matrix with a fictitious example of scoring (scores from -3 to +3). This example shows that in relation to the fields of observation examined, production will probably be faced with problems, and that legislation will on the whole (i.e. across all corporate sectors) have positive impacts on the company.

Strength and potential for meeting sustainability challenges

Ecological challenge

The possibility of registering and assessing impacts of the latest developments on corporate sectors, product ranges etc. is interesting with regard to ecological aspects in particular. Examples of ecological observation fields are

38 Cross-Impact Analysis

science and technology, environmental policy and legislation, eco-pioneers as competitors, environmentally aware consumer groups, role of the ecological system as a supplier of resources, or the media. If the environmentally relevant developments indicated by the observations are taken into account in business processes (e.g. in production), thereby generating ecological opportunities, this usually makes a direct contribution to improving ecological effectiveness.

Social challenge

In much the same way as it provides opportunities to identify and assess ecological developments at an early stage, CIA also has great potential for increasing social effectiveness. It permits a targeted response to the social changes which are beginning to emerge and which are of varying relevance to the different corporate sectors. Examples of possible fields of observation are social policy, legislation, personnel (motivation, flexibility, health etc.), critical customers and the media.

Economic challenge to environmental and social management

CIA makes it possible to gear activities at an early stage to the most promising items that can be efficiently implemented – frequently at lower cost than if opportunities or risks are identified later. CIA permits a long-term increase in the ecological and/or social efficiency of a company.

Integration challenge

Thanks to its broad range of applications, CIA has the potential to look at the three challenges above simultaneously and to integrate them in conventional management. It is however important to note its limitations and weaknesses, which may have a restrictive effect in this context.

Limitations and weaknesses

One problem with CIA lies in the correct choice of the observation fields. These should not be narrowed down too much, the broadest possible view can ensure that an emerging development is not overlooked.

To avoid scores that are the product of chance or imagination and thus obtain more objective and more reliable results, it should be borne in mind that the scores may influence or cause each other to varying extents. Basically CIA is only as good or meaningful as the individual scores in the various cells of the matrix. Another weakness is the possibility that compensating effects may occur. For example, a strongly negative score in one place may be offset by several small positive scores in other. This could result in an emerging development being rated unimportant although it has a massive influence on the one point.

Further information


Literature

- German Federal Environmental Ministry & German Federal Environmental Agency (Eds.) (2001): *Handbuch Umweltcontrolling*. Munich: Vahlen.
- Gausemeier, J. & Fink, A. (1999): *Führung im Wandel. Ein ganzheitliches Modell zur zukunftsorientierten Unternehmensgestaltung*. Vienna: Hanser.
- Gordon, T. & Hayward, H. (1968): Initial Experiments with the Cross-Impact Matrix Method of Forecasting. In: *Futures*, Vol. 1, No. 1, 100-116.
- Wiedmann, K.-P. (1984): *Frühwarnung, Früherkennung, Frühaufklärung. Zum Stand der Verwirklichung eines alten Wunsches im Sektor der Unternehmensführung*. Arbeitspapier 25. Mannheim: Institut für Marketing.

Organisations and Internet addresses

- Sociedad Mundial del Futuro Venezuela: www.futurovenezuela.org/_curso/10-cross.pdf
- Southeast Asian Ministers of Education Organisation (SEAMEO): www.voctech.org.bn/virtual_lib
- Univeristy of Colorado at Boulder: www.colorado.edu

Community Advisory Panel, Benefit-Risk Dialogue, Networks, Stakeholder Dialogue

Dialogue between business enterprises and a variety of external groups, so-called *stakeholders*, has come to play an increasingly important role in recent years. Exchanging information on opinions, standpoints and needs in various bodies with citizens, representatives of other companies or experts from independent organisations can serve to improve the knowledge of all concerned. The term *stakeholder dialogue* describes the process of organised and structured exchange of opinions and plays an increasing role in  Reporting. Dialogue instruments offer the platform on which the parties can communicate with one another. Three dialogue instruments are described below.

Community Advisory Panel (CAP)

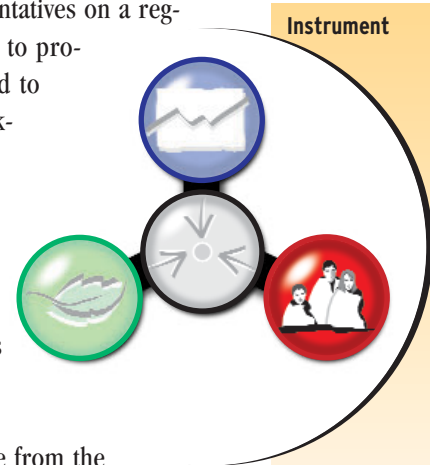
CAPs are usually company-initiated neighbourhood forums or citizens' advisory councils designed to maintain an intensive dialogue between company locations (factories) and neighbours. In the USA and Canada they are widespread (especially in the chemical industry). CAPs give committed citizens an opportunity for open communication and discussion of their needs and views on a broad range of issues with company representatives on a regular basis (usually four to twelve times a year). They also give companies the opportunity to provide their neighbours with detailed information about projects, programmes or plans and to encourage discussion of these issues. The spectrum of topics is broad and may include working conditions in factories, environmental issues, safety, health problems, traffic, expansion projects etc. The aim is a successful joint search for solutions to problems, which requires open communication and cooperation between the enterprise and interested parties. In the ideal case a CAP can for example help avoid lengthy authorisation procedures or even year-long legal wrangles in the administrative courts. Participation in such forums is voluntary and is based on the individual responsibility of their members. A CAP forms a basis for mutual trust and acceptance.

When establishing a CAP it can be an advantage to initially invite only three or four people from the most important interest groups interested in cooperation. They should get together with the company representatives to work out the specific tasks and objectives, and decide on the other members of the CAP. Possible members might be residents, representatives of public authorities, environmental organisations, people from the education and health sectors, media, trade etc. Limiting the number of members (15 to a maximum of 25) tends to increase efficiency and hence improves the prospects of such discussions being successful. An essential precondition for cooperation in a CAP is above all mutual openness and a readiness on the part of the members to address important issues and respond to the concerns and reservations of the other parties. Recommendations by a CAP are not binding on a company or factory, but suggestions should be taken seriously and taken into account if possible. Only if members keep an open mind about the results and take account of the suggestions developed can a CAP be successful and fulfil its function.

Benefit-Risk Dialogue

The benefit-risk dialogue is an instrument on the same lines as the CAP, but it is used to discuss the benefits and risks of company activities and projects, especially those of a technical nature, in an intensive dialogue with the social groups potentially affected (neighbours, experts, environmental associations etc.). As well as sharing factual information, its aim is in particular to discuss the various groups' value judgements about the benefits, risks and acceptance of projects. For the company the important thing is to present its point of view objectively and credibly and to take appropriate account of the standpoints of the other groups in its decisions.

There are three conceivable scenarios for organising such a dialogue: standard situation (normal operation), conflict situation (particularly negative reaction by various groups to company activities) and accident situation (exceptional technical disturbance of operation). The benefit-risk dialogue with social groups should be initiated during the standard situation and maintained continuously (e.g. on a round table basis).



40 Dialogue Instruments

This ensures that in the event of a conflict or accident situation there is already a discussion forum which makes such special situations easier to handle. Important preconditions for a meaningful dialogue are careful selection of the relevant interest groups and the creation of a common basis of knowledge about the problems at issue.

Networks

Networks are usually set up within a company or between companies or other organisations. Various defined in different contexts, network is taken here to mean an instrument for communication and cooperation between company employees or between the company and stakeholders in the field of sustainable development. Basically a network serves the interests of sharing ideas and information, and of achieving competitive advantages by utilising the jointly created information pool. Within a network there are typically few formal rules. It is based on voluntary interaction between autonomous actors, and relies on relationship elements such as trust and openness.

Networks are established without any formally defined procedure. Frequently the creation of a network is due to the initiative of one or more founder members. Today's much improved communication facilities (e.g. Internet, E-Mail) have made the establishment and maintenance of networks considerably quicker and easier.

Strengths and potential for meeting sustainability challenges

Ecological challenge

Environmental protection is a frequent topic in dialogue forums. In recent years there has been detailed public discussion of new and ecologically relevant technologies (e.g. biotechnology, mobile radio technology) and associated anxieties and problems (e.g. disturbance of the balance of nature, electrosmog). Dialogue forums provide a framework within which companies receive feedback from various parties on how the environmental burdens created by the company's activities are perceived. In this dialogue each group seeks to explain to the company what burdens it finds particularly undesirable. Especially in dialogues with experts, e.g. from environmental associations, this may give rise to a wide variety of suggestions for measures that improve ecological effectiveness.

Social challenge

Open exchange of information and dialogue with groups external to the company can promote mutual trust and social acceptance of the company. Activities regarded by stakeholders as problematical (negative social impacts) can be brought to light, discussed and possibly improved with the aid of CAP and a benefit-risk dialogue, and also by networks. The dialogue with the social groups affected, employees and other companies makes it possible to address and analyse anxieties and opposition as early as the planning process, and possibly to take targeted measures to overcome them. Positive aspects (positive social impacts) can also be discussed and general suggestions collected. Dialogue instruments can be used to increase social effectiveness, the degree of effective satisfaction of social concerns. The company promotes its credibility with regard to accepting social responsibility, and hence its legitimation, takes an active interest in the interest groups, creates a dialogue platform and takes part in it.

Economic challenge to environmental and social management

The advantage of dialogue instruments, and especially networks, lies in the direct exchange of information and in cooperation between companies, and in the ability to access what is usually a large information pool. In a dialogue with the members of the network it is possible to share experiences, discuss current problems and, if appropriate, jointly develop solutions to problems or suggestions for improvements, especially with regard to environmental issues and social aspects. This reduces the cost of obtaining information and developing solutions, which may be reflected in an increase in eco-efficiency and/or social efficiency.

Integration challenge

Dialogue instruments, especially CAP and networks, are not tied down to a particular topic. Business activities or measures often affect interest groups from different (ecological, social and economic) fields at the same time. A dialogue platform gives these groups the chance to discuss their wishes and reservations with each other and embark on a joint search for solutions.

Limitations and weaknesses

Where issues are complex and many stakeholders are affected, it is very difficult to cater for socially important groups. This may be perceived as negative and publicly criticised (e.g. in newspaper reports), thereby possibly endangering the success of dialogue instruments such as CAP or benefit-risk dialogue.

Radical members who are unwilling to cooperate or enter into a dialogue may seriously reduce the trust of all concerned in a CAP. Incomplete information or disinformation may lead to failure of the discussions and have negative repercussions on the company's image.

Setting up a dialogue platform involves a good deal of effort, especially in the case of specialised technical problems. In the first instance this applies to the task of putting the company representatives and the other groups on the same footing as far as knowledge and information is concerned. Specialists from companies and associations are usually better informed than the other members of the dialogue forum. Conversely, the company representatives must also be furnished with information about the ideas, assessments and emotions of the various interest groups. First of all, therefore, there is a need for intensive exchange and communication of information. It is also necessary for the company to draw up plans regarding the form the dialogue is to take (venue, participants etc.).

Further information*Literature*

- BASF AG (1998): Verantwortliches Handeln. Bericht zu Umwelt, Sicherheit und Gesundheit.
 BASF AG (1996): Umweltbericht 1996. BASF Group.
 Heath, R. (1994): Management of Corporate Communication: from interpersonal contacts to external affairs. Hillsdale, NJ: Erlbaum
 Hess, T. (1999): Unternehmensnetzwerke. In: Zeitschrift für Planung, Vol. 10, No. 2, 225-230.
 Hungerbühler, K., Ranke, J. & Mettier, T. (1998): Chemische Produkte und Prozesse. Berlin: Springer.
 Lundgren, R. & McMakin, A. (1998): Risk Communication. Columbus, Ohio: Battelle Press.
 Wiedemann, P. & Schütz, H. (2000): Developing Dialogue-Based Communication Programmes. Arbeiten zur Risiko-Kommunikation 79. Jülich: Forschungszentrum Jülich.

Organisations and Internet addresses

- Ann Green Communications: www.anngreencomm.com
 Ascension Parish Community Advisory Panel: www.ascensioncap.com
 Association of German Chambers of Industry and Commerce (DIHK): www.dihk.de
 Association of Independent Enterprises (ASU): www.asu.de
 BT Group: www.btplc.com
 Confederation of German Employers' Associations (BDA): www.bda-online.de
 Confederation of German Industries (BDI): www.bdi-online.de
 Dow Chemical: www.dow.com
 Econsense – Forum Nachhaltige Entwicklung: www.econsense.de
 Forschungszentrum Jülich, Programmgruppe Mensch Umwelt Technik: www.emf-risiko.de
 Future e.V.: www.future-ev.de
 German Environmental Management Association (B.A.U.M.): www.baumev.de
 Global Reporting Initiative (GRI): www.globalreporting.org
 Novartis: www.novartis.com
 Stiftung Risiko-Dialog: www.risiko-dialog.ch
 Unternehmensnetzwerke: www.unternehmensnetzwerke.de



Early Warning, Strategic Early Information, Strategic Radar

Early warning, early identification and early information systems are information systems that serve the interests of business management. They are intended to identify both external and internal trends of great importance for the future progress of the business at an early stage in the development of such trends. This permits timely tuning of (strategic) corporate planning to changes in the business context. Their function is thus timely detection and registration (signal exploration), processing (signal diagnosis) and forwarding of (strategically) relevant information, and production of a final forecast of the impact of the events. They can thus give an indication not only of dangers and risks that present a threat to implementation of the strategic corporate objectives, but also of opportunities that may help to achieve corporate objectives.

Early identification is important for companies at a legal level too. According to the German Stock Corporations Act (Section 91 paragraph 2) the executive board must "... take suitable steps to establish in particular a monitoring system to permit early identification of any developments that threaten the company's continued existence."

Early identification must be geared to both longer-term trends and short-term phenomena. Its "sensors" must therefore have good links with the relevant areas inside and outside the company. For this reason early identification is closely connected with planning (corporate, strategic and operational levels) and business activities and their steering and control (➔ Control and crisis management). Thus it always forms one of the building blocks in an integrated management system.

Instrument

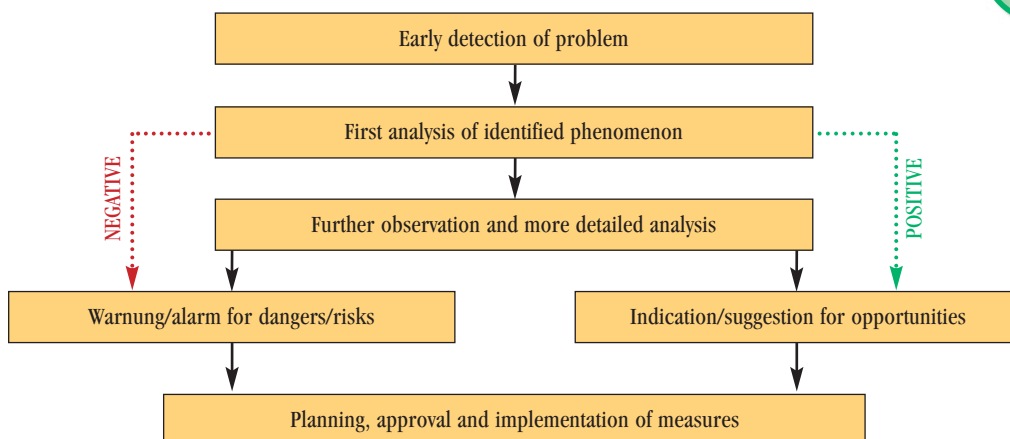
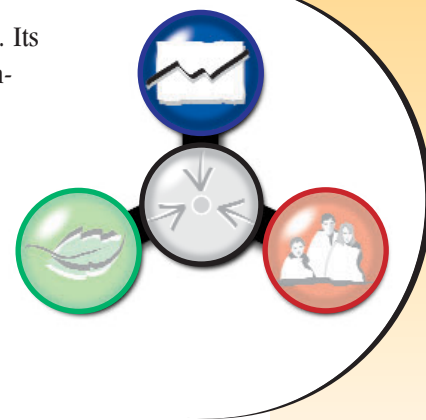


Figure: Basic procedure for early identification (after Welge & Al-Laham 1992, 148)

Depending on the development date and observation horizon of early identification systems, three generations can be distinguished: short-term early warning, early identification and early information (strategic radar).

- *Short-term early warning* is based on internal analyses of variations and causes and is based on ➔ Indicators ("feed back" oriented) and forecasts ("feed forward" oriented). For example, forecasts are regularly made on the basis of interim results and used to compare the current *actual figures* with the *planned figures* (monthly, annual objectives etc.). It is thus confined to early warning of emerging threats and risks internal to the company.
- The observation horizon of *early identification* looks further into the future. Early identification is based on ➔ Indicators, and can be compared to a weather station. By means of suitable indicators – an example of an indicator in a weather station is air pressure – it is possible to detect even slight changes in the business context at an early stage. After detection, such changes are analysed, interpreted and processed

44 Early Identification

to yield forecasts. This makes it possible to take action long before the company suffers a loss or misses an opportunity. The indicators used must be company-specific and must therefore be carefully selected and checked regularly to see that they are suitable for performing the required function. To ensure the broadest possible acquisition of information, use should be made of company, competitor and environmental indicators; for each of these areas there should in turn be indicators available that cover ecological, economic, social and technical fields.

- Strategic *early information*, also known as “strategic radar”, offers the most comprehensive strategic approach and is based on the concept of detecting “weak signals”. Weak signals are relatively unstructured signs (e.g. in the form of suspicions, opinions, expectations, needs, innovations etc.) that provide very early pointers to discontinuities in trends in the development of the business context. The core of the idea is to identify new situations of strategic interest, i.e. opportunities and threats, at an early stage with the aid of the early signals they emit, and to gear ongoing strategic planning to these situations. The emergence of relevant developments is combated by special task forces that undertake more detailed observation and analysis and initiate action if necessary.

Sources of weak signals may include:

- Sudden frequent occurrence of similar events that are associated with the company.
- Dissemination of new opinions and statements by key persons and organisations.
- Trends in court practice and noticeable initiatives aimed at amending or revising legislation at home and abroad.

Early identification makes use of a wide range of instruments to detect such signals. Examples include: ➡ Scenario Analysis, ➡ Risk Analysis, ➡ Cross-Impact Analysis, SWOT analysis, investigation at trade fairs and conferences, media monitoring etc.

Strengths and potential for meeting sustainability challenges

Especially during times of rapid change in business and society the early identification approach, and early information in particular, offers companies a promising means of mentally anticipating the impacts of this change on the company, identifying potential changes and improvements, and exploiting these in the interests of the corporate strategy. These approaches enable the company to act rather than react.

Owing to the rather conceptual character of early identification and information (people commonly speak of early identification/information systems), they can be – and depending on their function they should or even must be – used to meet all four challenges. However, they support the economic challenge in particular.

Economic challenge to environmental and social management

In recent years there have been rapid changes in the opportunities open to companies and demands on companies with regard to environmental issues and social aspects, both in the social and in the market context. One of the main distinguishing features of successful companies is their ability to identify trends in the business context at an early stage and act in a way that is close to the market and the customer. Early identification has the function of filtering out the relevant information from the flood of trend reports and thereby contributing to the successful alignment of a company in the competitive context. This means the instrument can be used to safeguard competitive advantages in existing business fields and possibly to open up new business fields. It also makes it possible to avoid damage to the corporate image and expenditure on measures to deal with unexpected crises.

Limitations and weaknesses

The information value of the early warning, early identification and early information approaches is limited by the difficulty or impossibility of predicting the future. The expenditure and work involved in operating such a system successfully (e.g. simulation of possible impacts, alternative scenarios and reaction strategies, ongoing appraisal of the instruments used and their adaptation to the constantly changing contextual conditions etc.) can be substantial and cost-intensive.

In some cases, and this applies especially to ecological effectiveness (ecological challenge), the system does not directly measure the (ecological) effects (e.g. temperature increase), but simply registers, for example, the number of media reports on this specific topic (greenhouse effect) without looking into their contents. One specific problem of strategic early information is the unsatisfactory definition of the term “weak signal”. As a result it is difficult to operationalise and its use to date is very restricted.

Further information

Literature

- Ansoff, I. (1976): Managing Surprise and Discontinuity – Strategic Response to Weak Signals. In: Zeitschrift für betriebswirtschaftliche Forschung, Vol. 28., No. 1, 129-152.
- Hammer, R. (1998): Strategische Planung und Frühaufklärung. Munich: Oldenburg.
- Henkel von Donnersmarck, M. & Schatz, R. (1999): Frühwarnsysteme. Bonn: InnoVatio.
- Gomez, P. (1983): Frühwarnung in der Unternehmung. Bern: Haupt.
- Koslowski, F. (1994): Personalbezogene Frühaufklärung in Management und Controlling. Bergisch Gladbach: Eul.
- Liebl, F. (1996): Strategische Frühaufklärung: Trends – Issues – Stakeholders. Munich: Oldenburg.
- Welge, M. & Al-Laham, A. (1992): Planung: Prozesse – Strategien – Maßnahmen. Wiesbaden: Gabler.
- Zeisler, S. & Harris, D. (2000): Order from Chaos (Parts 1 to 3). In: Scenario & Strategy Planning, Vol. 2, No. 1, 2 and 3.

Organisations and Internet addresses

Bartl M.: www.krisennavigator.de/akfo30-d.htm

Federal Ministry of Industry and Labour (BMWA): www.bmwi-softwarepaket.de/gruender/Chancen/HTML/start.html



Eco-Compass

The eco-compass enables the ecological and other impacts of existing products or processes to be compared with those of environmentally relevant innovations and environmental measures. The instrument supports the identification and assessment of potential improvements. Based on life-cycle analysis (↻ Life Cycle Assessment) and supplemented by additional factors such as health risks or expansion of services, it offers a practice-oriented evaluation of the benefits of products and processes. In this context the eco-compass can be seen as a tool for weighting inputs and outputs with the aim of presenting important points clearly and facilitating comparisons between different options. This comparative instrument has the character of a strategic tool that makes it easier for management to select viable products and processes for the future.

In the eco-compass, all significant ecological impacts of a product are represented on six levels (cf. Figure): potential risks to health and environment (H & E), resource conservation (mass), expansion of services, recycling, energy intensity (energy) and material intensity (natural materials). Once the data have been classified, the product or process alternatives are ranked by assigning a score for each dimension on a scale from 0 to 5. The scores coded in this way always relate to a base object which has to be selected at the start and is awarded a score of two in each dimension ("status quo"). The instrument always assesses the ecological impacts of a product or process on a comparative basis and distributes the points depending on the percentage improvement or deterioration in the company's performance (logarithmic rather than linear scale). The rankings are then shown in a diagram that takes the form of a concentric hexagon (cf. Figure). The closer a new product or process variant is to the outside of the hexagon in a given dimension, the greater is its efficiency in that dimension. In order to draw attention to those phases of a life cycle that are most important with regard to their positive or negative environmental impacts, the diagram can be supplemented by figures for individual phases.

Instrument

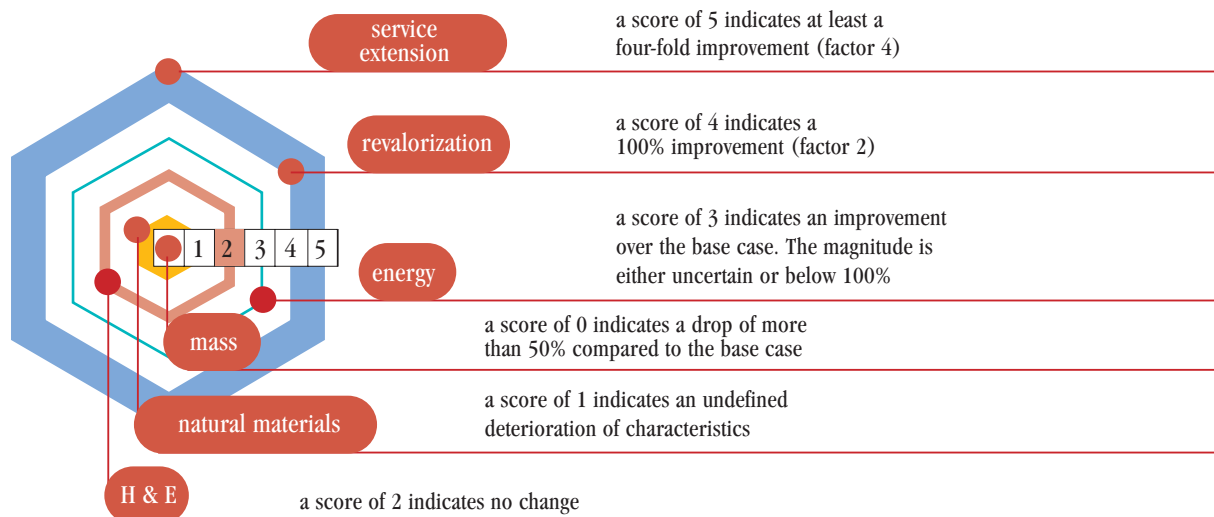
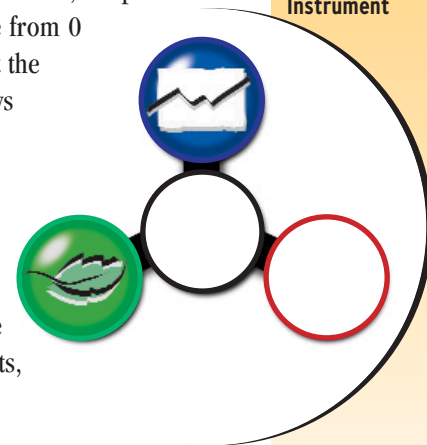


Figure: Example of an eco-compass diagram (Fussler 1999, 144)

Strengths and potential for meeting sustainability challenges

Ecological challenge

With the help of the eco-compass, complex environmental data structures such as those obtained from life cycle analysis (→ Life Cycle Assessment) can be visualised in easily understood form. The summarising and comparison of the main improvements and their respective scores transports the complex environmental evaluation into an easily understood framework. The strengths and weaknesses of a new option are directly illustrated by comparison with the reference case taken as a basis. This makes it possible to identify potential improvements and arrange them in order and to prepare and take strategic decisions with the aid of group discussions. In this way the eco-compass serves management as a tool for selecting innovative ecological products and processes in discussion-oriented group processes.

Social challenge

The instrument could also be used for social aspects. By taking account of potential health risks, the instrument in its present form already addresses the social challenge to a certain extent.

Economic challenge to environmental and social management

Eco-innovations are often based on the concept of eco-efficiency. Product or process alternatives can make a contribution to eco-efficient management at several levels in the eco-compass. The first two levels (potential risks to health and environment, resource conservation) may be regarded as strictly ecological, while the other levels involve economic aspects as well. These levels can be used to illustrate aspects of relevance for evaluating the eco-efficiency of a new product or process.

Limitations and weaknesses

Even if the connection with the preceding analysis is basically recognisable, the simplified and easily understood model that permits practice-oriented use within the company may also be one of its main weaknesses. The task of solving conflicts of objectives is only partially addressed, and the links with the instruments of environmental information management are slight. Other weaknesses are the lack of support for means of operationalisation and for quantitative measurement of the environmental contributions.

Further information

Literature

Fussler, C. with James, P. (1996): Driving eco-innovation: a breakthrough discipline for innovation and sustainability. London: Pitman.

Organisations and Internet addresses

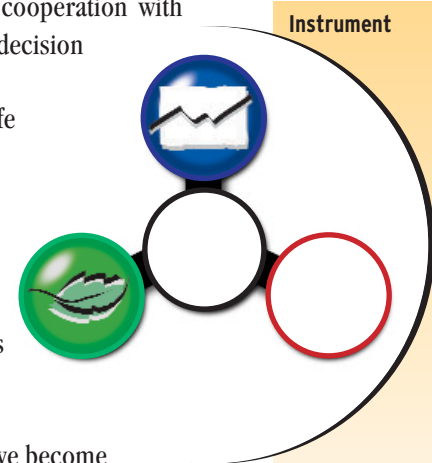
World Business Council for Sustainable Development (WBCSD): www.wbcsd.org

DfE, EcoDesign, Environmentally Sound Design, Green Design, Sustainable Design

Eco-design is concerned with the integration of environmentally relevant issues in product planning, development and design. The aim of designers and developers is to design new and existing products in a way that is environmentally friendly and waste management friendly. When assessing product design, the environmental impacts of the product over its entire life cycle should be considered (“Life Cycle Thinking”) and coordinated with social, economic, technological and legal framework conditions. To this end there is a need for suitable instruments that register the environmental impacts of products (e.g. ➔ Life Cycle Assessments, ➔ Checklists, ➔ Eco-Compass). Extended approaches include preceding analyses (e.g. needs analyses and dematerialisation potential) in the consideration of the life cycle phases. The individual product assessment is followed by a comparison of the environmental impacts of different product alternatives and coordination with other product design requirements.

Design for Environment (DfE) is frequently used as a synonym for eco-design. DfE is a voluntary cooperation programme of the United States Environmental Protection Agency (US EPA) that seeks, in cooperation with industry and other partners, to integrate health and environmental aspects in corporate decision processes. The planning process comprises:

- Multilevel product analysis (materials analysis, customer benefit analysis, ➔ Life Cycle Assessment etc.)
- Product idea creation in workshops with “interdisciplinary” development experts
- Product definition
- Special workshops to raise the environmental awareness of product designers and developers
- Ecological assessment of environmental and recycling suitability of the materials with the aid of ➔ Checklists



In recent years a wide variety of requirements for environmentally sound product design have become established. Examples include product responsibility under Sections 22ff. of the German Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (*KrW-/AbfG*), the increasingly stringent requirements of product liability, legislation like the EU Directive on Waste Electrical and Electronic Equipment (WEEE) or the German End-of-Life Vehicles Ordinance, the spread of product-related ➔ Labels, various design tools (software, ➔ Checklists etc.) and guidelines (DIN guideline on inclusion of environmental aspects in product development and standardisation, ISO 14040 ff. and VDI 2243 “Recycling-oriented Product Development”). In addition to the fundamental pursuit of the hierarchy of objectives “Avoid–Reuse–Recycle–Dispose”, there is in many cases a focus on the following goals: avoidance of waste end emissions/dematerialisation, better material management and product durability.

Strengths and potential for meeting sustainability challenges

Ecological challenge

Product design is considered to have great potential for reducing environmental impacts by anticipation. It requires the earliest possible consideration of environmental impacts in product planning, development and design. This makes it necessary to involve all parties concerned with the product development process and address environmental issues at the strategic planning level as well. In this way eco-design can become a central component of corporate environmental management. By taking account of needs analyses, dematerialisation processes and new product strategies such as service or leasing offerings, this approach addresses topics such as benefit requirements, product uses and changes in attitudes (e.g. “use rather than own”).

Economic challenge to environmental and social management

The integration of economic and ecological aspects in product design reveals potential for improvements in eco-efficiency. The declared aim of this instrument is, by including environmental aspects in product planning, development and design as early as possible, to produce innovative products that sell well and at the same time to reduce production and waste management costs. This is to be achieved by reducing materials and energy consumption and waste and pollutant generation. An accompanying reduction in product weight and diversity of materials leads to lower costs for logistics and storage. At the same time the systematic, life cycle based approach to the product (➔ Life Cycle Assessment) permits reductions in liability risks, waste management costs (that subsequently turn out to be unexpectedly high) and service and repair work.

Integration challenge

The instrument adds ecological aspects to the conventional product criteria such as cost-effectiveness, quality and aesthetic appeal. It can be regarded as a building block for a future “Sustainable Design” that includes social issues as well. To date, however, there is virtually no sign of any applications of sustainable design.

Limitations and weaknesses

Eco-design is a broadening of the horizons of product development. This increases the requirements demanded of a product, and it is possible for conflicts of objectives to occur that present obstacles to holistic ecological product design. There is also an increase in the designer’s product responsibility. This results in a need for the individuals concerned to have or acquire the necessary qualifications. At present the instrument is at a fairly early stage in its development.

Further information

Literature

- Birkeland, J. (2002): Design for sustainability: a sourcebook of integrated ecological solutions. London: Earthscan.
- Burschel, C. (2001): Stichwort: Produktdesign, ökologisches. In: Schulze, W. et al. (2001): Lexikon Nachhaltiges Wirtschaften. Munich: Oldenbourg.
- Charter, M. & Tischner, U. (Eds.) (2001): Sustainable solutions. Developing products and services for the future. Sheffield: Greenleaf.
- Clausen, J. (1995): Ökodesign - Umweltschutz beginnt bei der Produktidee. In: Fichter, K. (1995): Die EG-Öko-Audit-Verordnung. Munich: Hanser.
- German Federal Environmental Agency (Ed.) (2000): Was ist EcoDesign? Ein Handbuch für ökologische und ökonomische Gestaltung. Frankfurt: UBA.
- Lewis, W. & Gertsakis, J. (2001): Design + environment: a global guide to designing greener trade. Sheffield: Greenleaf.
- Office of Technology Assessment (1992): Green Products by Design: Choices for a Cleaner Environment. Washington D.C.: U.S. Government Printing Office.
- Rubik, F. & Teichert, V. (1997): Ökologische Produktpolitik: von der Beseitigung von Stoffen und Materialien zur Rückgewinnung in Kreisläufen. Stuttgart: Schäffer-Poeschel.

Organisations and Internet addresses

- DesignCommunity: www.designcommunity.com
- O2 Global Network: www.o2.org
- Austrian ECODESIGN Information Centre: www.ecodesign.at
- Rocky Mountain Institute (RMI): www.rmi.org
- The Centre for Sustainable Design (CFSD): www.cfsd.org.uk
- United States Environmental Protection Agency (US EPA) - Office of Pollution Prevention and Toxics: www.epa.gov

Eco-Efficiency Matrix, Eco-Efficiency Portfolio

Eco-efficiency analysis, by bringing together ecological and economic parameters, supports the evaluation and comparison of products, processes or companies with regard to eco-efficiency. In particular, it serves to develop and optimise products and processes in terms of the relationship between (economic) value added and environmental impact added (eco-efficiency) and the corporate objectives. The product-specific analysis is based among other things on the benefits of use from the customer's point of view.

Eco-efficiency is determined by ascertaining the environmental impact added and the value added resulting from (e.g.) a product and expressing them as a ratio. A first broad overview of the different environmental impacts of two products is obtained for the ecological dimension. Added impact can be measured using ecological performance evaluation methods (➔ Life Cycle Assessment), physical approaches of environmental accounting (➔ Accounting) or on similar lines to the ➔ Eco-Compass. A variety of ➔ Indicator (systems) may also be used. Various economic performance indicators (e.g. ROI, contribution margin etc.) can be used for the horizontal dimension in the matrix (cf. Figure) depending on the object in view (product, process etc.). The economic performance is set against the ecological performance (impact added) in the form of an eco-efficiency matrix. The eco-efficiency of the alternative products or processes is reflected by their position in the matrix (cf. Figure).

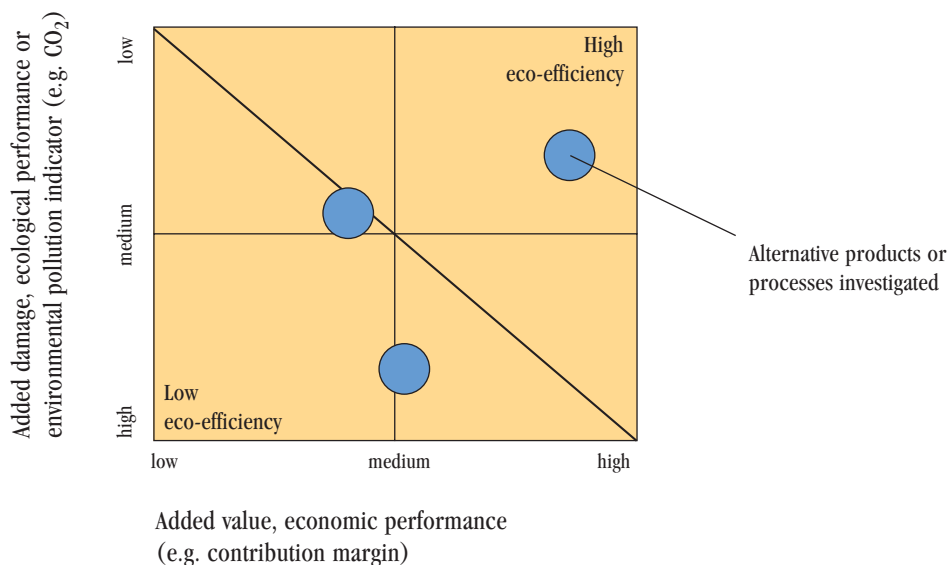
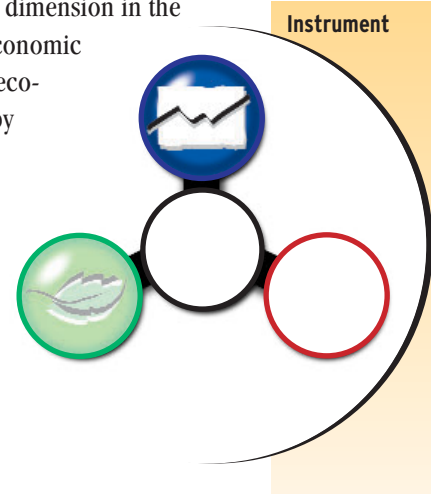


Figure: Eco-efficiency matrix (after Schaltegger & Sturm 1995)



Strengths and potential for meeting sustainability challenges

Ecological challenge

Eco-efficiency analysis can also be used to indicate the ecological effectiveness of product or process improvements. The higher the position of an alternative in the eco-efficiency matrix (cf. Figure), the more eco-effective or environmentally friendly it is than another alternative.

52 Eco-Efficiency Analysis

Social challenge

The possibility of also integrating social aspects in the hitherto ecologically and economically oriented instrument of eco-efficiency analysis when evaluating products and processes is currently being investigated. The intention is to measure social ↻ Indicators for production (accidents at work, traffic accidents, occupational diseases etc.), use (standard of living, health etc.) and recycling, and examine them in relation to each other. This would make it possible to compare the social aspects with the ecological and economic aspects and illustrate them in a “three-dimensional sustainability cube”.

Economic challenge to environmental and social management

The strengths of eco-efficiency analysis basically lie in the (timely) selection of suitable products or processes and formulation of the objectives for research and development. They facilitate eco-efficient optimisation of the product portfolio and improvement of the company's competitive position by means of targeted decisions to invest (↻ Investment Appraisal) in eco-efficient product lines and processes. The eco-efficiency matrix is a tool for showing the measurable, eco-efficient improvement and for easier communication of the results. The closer a product or process is to the top right corner of the eco-efficiency matrix, the more eco-efficient it is (cf. Figure). This makes it possible to identify those weaknesses whose optimisation promises the biggest reductions in negative environmental impacts while having regard to economic aspects.

Integration challenge

Eco-efficiency analysis and the two-dimensional eco-efficiency portfolio make a partial contribution to overcoming the integration challenge. If social aspects can be successfully integrated, it will for example become possible to evaluate a company's product portfolio with the aid of this sustainability instrument. This will permit an integrated approach to the impacts of products and processes on the three sustainability challenges.

Limitations and weaknesses

In view of the high degree of aggregation of data, there is a risk of loss of information and misinterpretation. Limits are also set by the difficulty of quantifying the ecological (and social) impacts of products and processes. In the medium to long term the intention is to develop the instrument into a more widespread and verifiable standard.

Further information

Literature

BASF AG (2000): BASF - Umwelt - Sicherheit - Gesundheit 2000.

Ilinitch, A. & Schaltegger, S. (1995): Developing a Green Business Portfolio. In: Long Range Planning, Vol. 28, No. 2, 29-38.

Kicherer, A. (2001): Die Ökoeffizienz-Analyse der BASF. In: UmweltWirtschaftsForum, Vol. 9, No. 4, 57-61.

Schaltegger, S. & Sturm, A. (1998): Eco-efficiency through Eco-Control. Zurich: VDF.

Weizsäcker, E.-U. von , Lovins, A. & Lovins, H. (1995): Faktor vier. Doppelter Wohlstand – halbiertes Naturverbrauch. Der neue Bericht an der Club of Rome. Munich. Droemer Knauer.

Organisations and Internet addresses

BASF AG: www.basf.de

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/csm

World Business Council for Sustainable Development (WBCSD): www.wbcsd.org

Eco-Rating, Environmental Rating, Social Rating, Sustainability Rating

Eco-rating, by analogy with conventional financial rating, means an external ecology-oriented assessment of companies. The purpose of eco-rating is to express the ecological and/or social performance of companies by means of a highly aggregated evaluation. Eco-rating serves as an aid to decision making (e.g. for investors, consumers).

Ideally an eco-rating should be based on the individual information needs of its users. These information needs determine which items of information are taken into account and how they are evaluated (aggregated). In practice it is usually assumed that the various rating users all have the same information needs.

Strengths and potential for meeting sustainability challenges

Ecological challenge

Eco-rating is intended to assess the ecological performance of companies by means of external comparison. This allows all stakeholders who want to choose between companies (e.g. investors, consumers) to take decisions and, through their choice, to make a contribution to the process of ecological change. This is not possible without a highly aggregated assessment, since few stakeholders can justify the time and effort involved in making a comprehensive assessment of their own. An external eco-rating can help here.

The producers of eco-ratings (e.g. eco-rating agencies) depend here on comparable information about ecological performance. In practice the varying – and in some cases poor – availability of information means questionnaires are commonly used, and the eco-ratings are largely based on qualitative information.

Social challenge

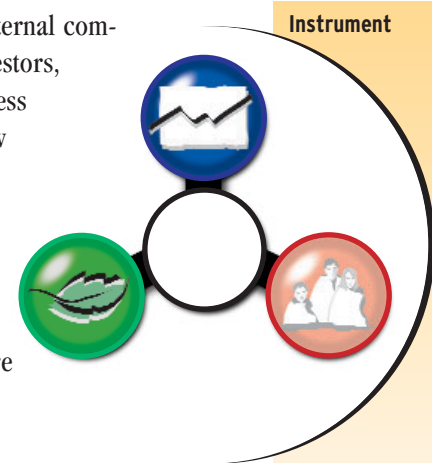
The points mentioned in the section on “ecological challenge” are applicable in much the same way to the social challenge. Where the social challenge is concerned, it is also important to bear in mind that – unlike the case of ecological aspects – there is no widespread definition of good social performance. Today it is common practice to fall back on the stakeholder approach (➔ Stakeholder Value Analysis), which provides a methodological framework for the ratings. To this end the relations between the company and its stakeholders are assessed.

Economic challenge to environmental and social management

Eco-rating is confronted with a dual economic challenge. On the one hand, eco-rating can help the users of ratings to solve an economic problem with regard to obtaining information. As evaluation problems are solved centrally, i.e. only once or a small number of times, the evaluation costs, which consist largely of fixed costs, are spread over several users, making it possible to achieve and justify a higher level of information.

Integration challenge

Eco-rating is often intended to create links between ecological, social and economic performance. In practice this integrating function is rarely successful, and there are two reasons for this. Firstly, the rating is mostly not keyed to the specific interests of the rating users. The ratings are therefore based on the “lowest common denominator”, and economic aspects are only part of the picture. Secondly, few eco-rating agencies currently possess the necessary economic know-how to establish the links between ecological, social and economic performance. There is thus a need for professionalisation of eco-rating providers.



Limitations and weaknesses

In practice information supplied by companies is usually not comparable, since companies not only issue reports about different kinds of information, but also gather and report the information in different ways (e.g. different consolidated groups). Efforts are in progress to harmonise reporting by establishing reporting standards (➔ Reporting). By centralising evaluation of ecological and/or social performance, eco-rating is intended to offer an economic advantage when it comes to obtaining the information. This is only successful if the users of the eco-rating have comparable information needs. The more heterogeneous the information needs, the lower the information value of the ratings, since “objectively” green or socially responsible companies do not exist in practice. For this reason it is true to say that the more different addressees a rating has, the greater the need for explanation. This means that some of the economic advantage is lost. Furthermore, with some of the findings of ratings it is difficult to recognise or understand the assessment method on which they are based. Another weakness of ratings is the fact that they assess the performance of companies in the past and are thus historically oriented. Consequently they can only say very little about future performance.

Further information

Literature

Figge, F. (2000): Öko-Rating. Ökologieorientierte Bewertung von Unternehmen. Berlin: Springer.

Schaltegger, S. & Burritt, R. (2000): Contemporary Environmental Accounting. Issues, Concepts and Practice. Sheffield: Greenleaf.

Organisations and Internet addresses

Ethical Investment Research Service: www.eiris.org

Innovest: www.innovestgroup.com



Oekom-Research: www.oekom.de

Siri Group: www.sirigroup.org

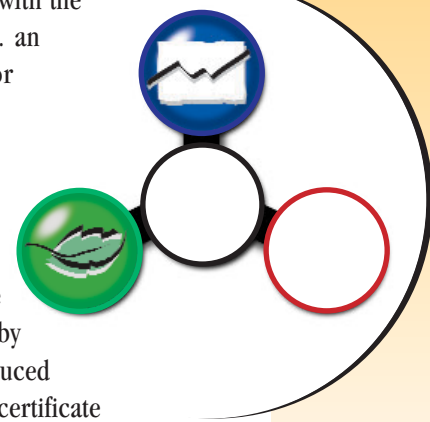
Emission Trading

The purpose of emission certificates is to regulate and steer emissions. Company-internal trading in emission certificates helps to achieve efficient long-term reduction or at least stabilisation of the amount of a substance (e.g. CO₂) emitted by a company.

Before introducing emission certificates it is necessary to determine the maximum level allowed for the company's total emissions of a substance (e.g. CO₂). Company management then puts into circulation a number of certificates corresponding to the total planned emissions for a given substance. These certificates are allocated to the various departments, corporate sectors or locations in accordance with a certain key, e.g. on the basis of current emission levels ("grandfathering"). The certificate holders can then trade the certificates within the company. In other words, the corporate sectors decide whether to reduce emissions and sell certificates, or *vice versa*.

Emission trading depends on the existence of an efficient  Environmental Management Information System and  Accounting sector to handle the issuing and control of certificates and compliance with the emission quotas. It is also necessary to create a platform for trading the certificates, i.e. an internal exchange where the corporate sectors can make their transactions. Applications for internal emission trading already exist for SO₂ and CO₂ emissions.

Instrument



Strengths and potential for meeting sustainability challenges

Ecological challenge

Trading in emission certificates presupposes clear specifications within a company for the total emission quantity of a given substance. The total emission quantity can be steered by means of the total issue of certificates. If the company's total emission quantity has to be reduced at some stage, there are two ways of doing this: either the emission quantity permitted per certificate is reduced, or company management removes a number of certificates from circulation. This permits direct steering of ecological effectiveness.

Economic challenge to environmental and social management

The advantage of emission trading over administrative or technical rules is that it ensures cost-efficient reduction of emissions. Those corporate sectors for which buying certificates is more cost-efficient than reducing emissions will do so. On the other hand, if a corporate sector has more to gain from reducing emissions, it will cut emissions and sell certificates. Thus emission trading encourages implementation of the most cost-efficient emission reduction solution. Emission trading can therefore be expected to bring an improvement in eco-efficiency.

Integration challenge

Trading in emission certificates is a good way of achieving better integration of environmental aspects in conventional management. The process of calculating which emissions should be reduced and which certificates bought or sold can be regarded as an additional commercial task and an internal opportunity. For this reason emission trading is easier to integrate in conventional management than rigid administrative and technical specifications.

56 Emission Trading (within companies)

Limitations and weaknesses

Emission trading is only a suitable solution for environmental impacts that are readily measured and documented. If there are doubts about the measuring system, it is not possible to realise the effectiveness and efficiency benefits. Moreover, emission trading may only be used for environmental impacts whose place of origin is immaterial. Failure to observe this point may result in environmental burdens being shifted to locations where they create or increase negative local and/or regional environmental damage. The establishment of an emission trading system requires a sufficient number of emission sources between which trading can take place. For this reason it is only an option for fairly large companies. If the number of certificates allocated to the corporate sectors is based on current emission levels, there is an undesirable incentive for the corporate sectors to see that their emissions as high as possible before the certificates are issued (in order to get as many certificates as possible). Depending on the method of distribution, the corporate sectors must have sufficient liquid funds before introduction of the certificates to put them in a position to purchase any additional certificates they may need.

Further information

Literature

Kosobud, R. (2000): Emissions Trading. New York: Wiley.

Sorrell, S. & Skea, J. (Eds.) (1999): Pollution for sale: Emissions Trading and Joint Implementation. Cheltenham: Elgar.

Tietenberg, T. (1980): Transferable Discharge Permits and the Control of Air Pollution. A Survey and Synthesis. In: Zeitschrift für Umweltpolitik und Umweltrecht, No. 1, 477-508.

Organisations and Internet addresses

BP Amoco: www.bp.com, www.bpenergy.co.uk

Eye for energy: www.eyeforenergy.com

Shell: www.shell.com

Corporate Volunteering

Employee Volunteering means support by the company for voluntary extra-company activities by employees. Such voluntary activities may be undertaken in a variety of fields (e.g. looking after juveniles in social hotspots, building playgrounds, looking after senior citizens, collecting waste). At present the instrument is used largely for social purposes. This company support is often provided at local or regional level.

The initiative for employee volunteering comes from the company or from the environmental or social organisation. Company support primarily takes the form of giving the employees time off work for some or all of the time spent on their voluntary activities. In some cases companies may also provide non-cash resources and/or take over part of the work of organisation.

Strengths and potential for meeting sustainability challenges

Ecological challenge

In the field of ecological effectiveness, employee volunteering is not very widespread in Europe to date. The instrument can easily be applied to this field, however, and offers benefits similar to those in the social sector (see below). In the USA employee volunteering is in widespread use in the environmental field as well, e.g. employees undertaking voluntary waste collection and waste disposal operations.

Social challenge

Employee volunteering takes place mainly in the social sector. Here human and in some cases material resources are transferred from the company to social institutions. In this way companies make a contribution to improving social effectiveness. The instrument is particularly suitable for documenting a company's position in society, since a transfer of employees is a much more meaningful demonstration of a company's commitment than a cash payment, for example (e.g. → Sponsoring).

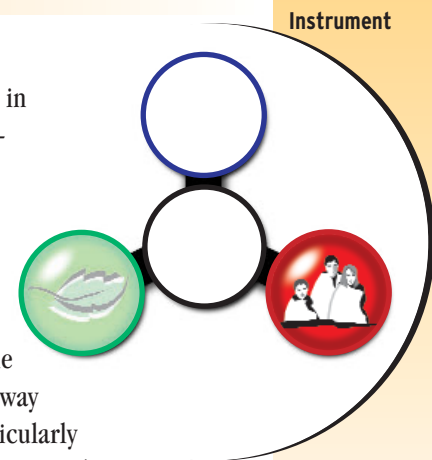
Employee volunteering is very widespread in certain countries, e.g. England and the USA. In these countries there are also volunteering networks and agencies that extend volunteering beyond local authority limits.

If there are experts available within the company who are particularly well suited to the task, employee volunteering may also bring about improvements in the efficiency of social activities, e.g. in discussions with local residents (→ Dialogue Instruments). This enlarges the employees' knowledge and improves their personal and technical qualifications, and also gives them a varied working context, which may increase their motivation.

Limitations and weaknesses

Employee volunteering is not without its problems with regard to personnel management, because although the employee activities are voluntary, there is also a certain obligation if they are performed during working hours. In order to avoid misunderstandings and abuse (e.g. "leisure time" at the company's expense), all concerned should be informed about their duties in connection with employee volunteering.

Sometimes rules and regulations make it impossible to use employee volunteering (certain tasks are firmly assigned to public authorities and may not be dealt with in any other way).



58 Employee Volunteering

Further information

Literature

Schöffmann, D. (Ed.) (2001): Wenn alle gewinnen. Bürgerschaftliches Engagement von Unternehmen. Hamburg: Edition Körber-Stiftung.

Organisations and Internet addresses

Institute for Volunteering Research: www.ivr.org.uk

Körber Foundation: www.usable.de

NonProfit Verlag & Service: www.nonprofit.de

The National Center for Volunteering: <http://www.employeevolunteering.org.uk>

Nokia: www.nokia.com

Volunteermatch: www.volunteermatch.org

EMIS, Corporate Environmental Information System

Corporate environmental information system is the name given to information systems with which a company can acquire, present and analyse data on environmental impacts. It primarily serves within the company as a basis for planning, development, steering and control with the aim of avoiding or reducing company-induced environmental burdens. The environmentally relevant basic data for establishing an environmental management information system come from instruments such as → Life Cycle Assessment, → Substance Flow Analysis or → Accounting. Within the environmental management information system it is possible to draw up a flow chart (cf. Figure) that offers the user a presentation and combination of the basic data. The system is usually designed as an IT system that permits rapid access to the desired information with the aid of a data warehouse. Integration in or compatible networking with other information systems is very advantageous, since this makes it possible to create an instrument that provides integral support for sustainability management decisions. An environmental management information system is an important precondition for interchange of data in the context of → Supply Chain Management and for the effective implementation of → Control. It also supplies the information for an → Audit, the data for generating → Indicators or the basis for preparing → Reports.

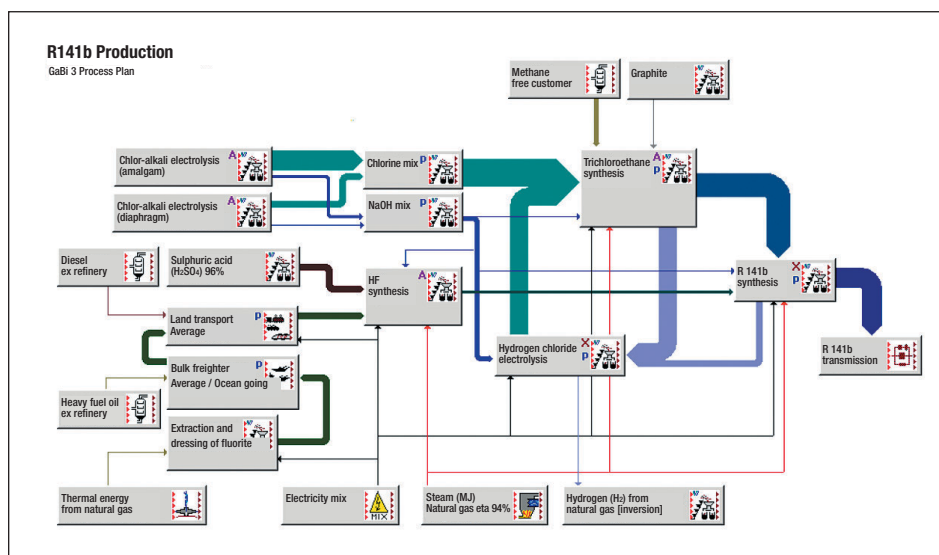
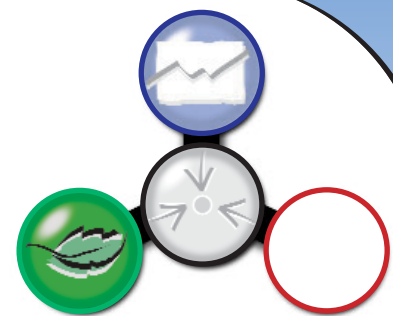


Figure: Model of a process chain illustrated by an environmental management information system (source: Volz 1999)

Concept



Strengths and potential for meeting sustainability challenges

Ecological challenge

The basis for controlling environmental impacts of business enterprises is a knowledge of the relevant data for the sector in question. In some cases such data are easy to handle, but often they are complex, especially in the case of large companies, and involve a good deal of work for preparation and analysis. An environmental management information system makes it possible to provide decision makers in business enterprises with data and information about company environmental impacts in operational form. The better the quality of the environmentally relevant data and information, the better they can be catered for in company decisions. Not until an environmental management information system is employed it is possible to record real ecological effectiveness and demonstrate any improvements due to measures taken by the company. The trend in the environmental protection sector from end-of-pipe technologies to a production-integrated approach makes it difficult in particular to document the environmental impacts of installations. Here too an environmental management information system can offer considerable advantages when it comes to detecting environmental impacts and facilitating their reduction.

60 Environmental Management Information System

Economic challenge to environmental and social management

In many fields the use of information systems today helps to simplify workflows and improve efficiency. Such effects also result from the use of environmental management information systems. The better availability of data and information results in reduced expenditure on analysing the information. In integrated information systems (cf. Integration challenge) the possibility of bringing together economic and ecological data permits the determination and direct control of the eco-efficiency of measures or production flows, for example.

Integration challenge

An enterprise that introduces an environmental management information system normally possesses other information systems as well (e.g. for production, procurement or bookkeeping). One important aspect of integrating environmental management in conventional management lies not in operating several systems in parallel, but in creating systems that are networked as far as possible or a single unified system. This permits simultaneous access to all data. As a result, the information supplied as a basis for decisions is built on the broadest possible foundation of economic and ecological data.

Limitations and weaknesses

The quality of an environmental management information system is limited by the accuracy of the input data. If the environmental management information system is installed separately from other information systems, there is a risk that information about environmental aspects may not be taken into account in decisions and also that data from the other systems are not used in the environmental information system. An environmental management information system should be embedded in an overall strategy for corporate information systems, but this places considerable demands on planning and financial resources in the company. The technical implementation of environmental management information systems is another area that is still at the development stage.

Further information

Literature

- Arndt, H. (1997): Betriebliche Umweltinformationssysteme. Wiesbaden: Gabler.
- Bullinger, H.-J., Hilty, L., Weller, A. & Rautenstrauch, C. (Eds.) (1998): Betriebliche Umweltinformationssysteme in Produktion und Logistik. Marburg: Metropolis.
- Haasis H.-D., Hilty, L., Kürzl, H. & Rautenstrauch, C. (Eds.) (1995): Betriebliche Umweltinformationssysteme (BUIS). Marburg: Metropolis.
- Löchelt, H. (2000): Computergestütztes betriebliches Umweltinformationssystem: Konzept und Realisierung. Wiesbaden: DUV.
- Möller, A. (2000): Grundlagen stoffstrombasierter Betrieblicher Umweltinformationssysteme. Bochum: Projekt Verlag.
- Volz, T. (1999): Integration systematischer Analyse und Prognose in die Ganzheitliche Bilanzierung. Instrumentarium zur rechnergestützten Modellierung. Aachen: Shaker Verlag.

Organisations and Internet addresses

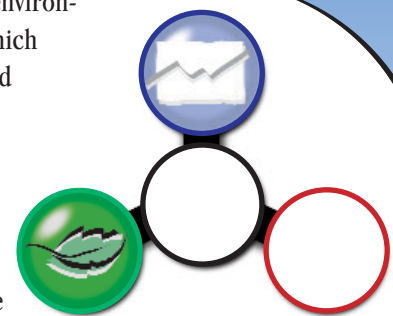
- Fraunhofer Institute for Industrial Engineering (IAO): www.buislab.iao.fhg.de and www.bum.iao.fhg.de/intus
- German Federal Environmental Agency (UBA): www.umweltbundesamt.de
- Humboldt University Berlin, Institut für Wirtschaftsinformatik: www.wiwi.hu-berlin.de/~arndt/UIS/buis.html
- Information Service for Innovation and Technology Analysis (IDTA): www.idta.de
- Internet list for EMIS, Fraunhofer-Gesellschaft: www.ikarus.iao.fhg.de/Navigation.cfm
- PE Europe: www.gabi-software.de
- Retec: www.retec.com
- Ricoh: www.ricoh.co.jp

EMS, ISO 14001ff., Eco-Management and Audit Scheme (EMAS)/ EC Regulation No. 761/2001

Management systems coordinate and systematise business activities with the aid of defined and documented steering and control mechanisms. The aim is to improve the company's organisation and performance and to support compliance with legal requirements. To this end responsible persons are appointed, the organisational structure is adapted, procedures for laying down behavioural rules, approaches and methods are drawn up, and objectives and measures are formulated. The framework for the business activities is provided by the corporate policy in the form of ➔ Guidelines or corporate principles. In order to check the functioning of the system, regular ➔ Audits and system checks are performed. Following the external ➔ Audit, which is performed by an independent expert, the management system can be certified or validated.

Depending on emphasis, one can distinguish environmental and ➔ Social Management Systems. An environmental management system (EMS) supports environmentally oriented company management and the registration and evaluation of the company's environmental impacts. The best known sets of rules for environmental management systems are the revised EMAS Regulation (also known as EMAS II), which is valid throughout the EU, and the private-sector standards series DIN ISO 14001 ff., valid worldwide. The EMAS II Regulation is a revised version of the EMAS Regulation that came into force in 1995. Participation in both systems (ISO 14001 ff. and EMAS) is possible, and is open to all industries and types of company. The two environmental management systems are of similar structure and one is part of the other (EMS in EMAS must be structured as in ISO 14001ff.). As well as the different geographical scope, a further difference is that ISO 14001ff., unlike EMAS, does not require any active communication with the stakeholders, e.g. in the form of an environmental statement (➔ Reporting). Both standards prescribe system audits (➔ Audit); EMAS goes into more detail about material requirements.

Concept



One concern of EMAS is that certified companies be granted procedural concessions by the authorities. Such concessions are also being granted increasingly to companies that have established an EMS pursuant to ISO 14001 ff. In order to increase awareness of EMAS, the revised regulation introduced the EMAS logo, which – like the ISO logo – can be used in advertising for products and services (e.g. on letterheads or in sales literature). On the basis of both sets of rules, the workflow of an EMS involves five basic stages:

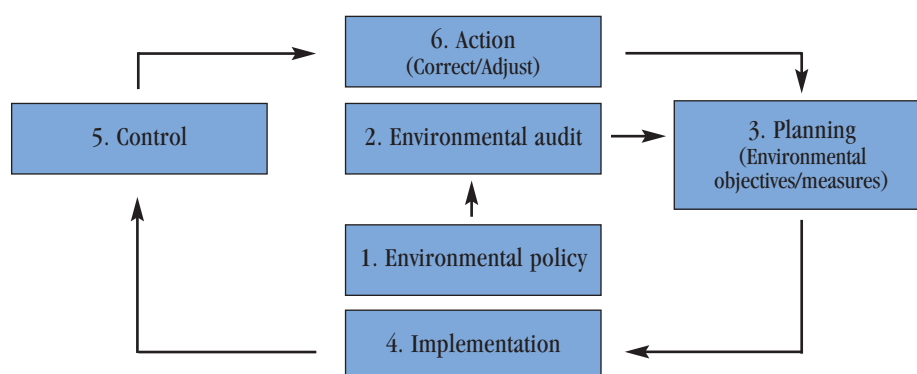


Figure: Basic workflow of an environmental management system

Strengths and potential for meeting sustainability challenges

Ecological challenge

Thanks to the systematic approach to environmentally relevant activities, management can identify and eliminate ecological deficits and ensure better control and documentation of the environmentally relevant business activities.

62 Environmental Management System

The fact that an EMS is embodied in the organisational structure and business processes supports a continuous improvement in corporate environmental protection. As a rule, evidence of this is required for the certification sought by the company. In the case of EMAS the prescribed environmental statement (➔ Reporting) is intended to give interested stakeholders the opportunity of checking this and to increase the company's motivation to promote ecological optimisation processes within the company.

Economic challenge to environmental and social management

The principal aim of an EMS is better identification and control of the environmental impacts originating from the company. However, such systems can also help to identify and exploit cost savings that can potentially be achieved through environmental measures. Moreover, the systematic regulation of corporate environmental aspects can make it possible to identify and reduce environmental and liability risks, and also demonstrate compliance with statutory environmental provisions and the satisfaction of social environmental interests. Through certification, the EMAS and/or ISO logo and, in the case of EMAS the environmental statement (➔ Reporting), the company can to some extent influence the corporate or product image and exploit competitive advantages.

Integration challenge

It would make sense to combine the different management systems from a substantial and structural point of view. This would make it possible to cater for and control ecological, social and economic aspects to the same extent. In practice, however, comprehensive integration does not usually take place. In many cases environmental management systems are merely linked with management systems such as quality management and occupational safety and health. While such integration is useful and valuable, because it takes advantage of many synergies, it is not sufficient for a sustainability oriented system. Concepts for a sustainability management system such as the Sustainable Development Management Framework (SDMF) are isolated cases to date.

Limitations and weaknesses

Weaknesses lie in the inadequate integration of the various (environmental, social and financial) management systems. Isolated use of an EMS as a parallel system is frequently encountered. This does not integrate specific environmental objectives in the usual management decisions, and often results in interactions and synergies being overlooked. In most cases it has not proved possible to achieve the positive market effects that were hoped for in the mid 1990s.

Further information

Literature

- Dorn, D. (Ed.) (1998): Umweltmanagementsysteme: Kommentar zu DIN EN ISO 14001 ff. und der EG-Öko-Audit-Verordnung. Berlin: Beuth.
Fichter, K. (1995): Die EG-Öko-Audit-Verordnung. Mit Öko-Controlling zum zertifizierten Umweltmanagement. Munich: Hanser.
Krinin, H. & Meinholz, H. (1997): Einführung eines Umweltmanagementsystems in kleinen und mittleren Unternehmen: ein Arbeitsbuch. Berlin: Springer.
Müller-Christ, G. (2001): Umweltmanagement: Umweltschutz und nachhaltige Entwicklung. Munich: Vahlen.
Schulz, W. et al. (Ed.) (2001): Lexikon Nachhaltiges Wirtschaften. Munich: Oldenbourg.
Tibor, T. with Feldman, I. (1996): ISO 14000: A Guide to the New Environmental Management Standards. Chicago: Irwin Professional Publisher.

Organisations and Internet addresses

- Association of Independent Enterprises (ASU): www.asu.de
EU Commission, Directorate General Environment: europa.eu.int/comm/environment/emas
German Federal Environmental Agency (UBA): www.umweltbundesamt.de
Global Reporting Initiative (GRI): www.globalreporting.org
International Network for Environmental Management (INEM): www.inem.org
ISO 14001: www.iso14000.com & www.iso.ch
Shell, Sustainable Development Management Framework (SDMF): www.shell.com
Umweltgutachterausschuss beim BMU: www.umweltgutachterausschuss.de Umweltgutachterverzeichnis: www.ihk.de/dau/inside.htm

Value-based Environmental Management

The environmental shareholder value approach combines environmental management measures with the shareholder value approach. Shareholder value is taken to mean the market value of the company's equity based on the cash value of the expected free cash flows. The purpose of the environmental shareholder value approach is to identify those environmental management measures which are not only ecologically effective, but also increase shareholder value.

Environmental shareholder value compares the environmental management measures with the value drivers of shareholder value and, if possible, quantifies their influence on the latter. Where a measure has conflicting effects on different value drivers (for example, a measure may both promote sales and increase risks), it is necessary to weigh up the conflicting interests and determine the overall influence on shareholder value.

Strengths and potential for meeting sustainability challenges

Ecological challenge

The environmental shareholder value approach only addresses ecological effectiveness indirectly. However, since this approach gives preference to those environmental protection measures that are economically advantageous, it enables them to be implemented in the long term and thereby exert their positive ecological impact on a lasting basis.

Social challenge

Social issues are not explicitly addressed in the environmental shareholder value approach. They may however be included indirectly, for example in cases where social acceptance is affected by environmental management measures and this has an impact on the value drivers of shareholder value (e.g. greater risks put pressure on discount rate). Cf. the → Stakeholder Value Analysis approach as an approach that links shareholder value and social aspects.

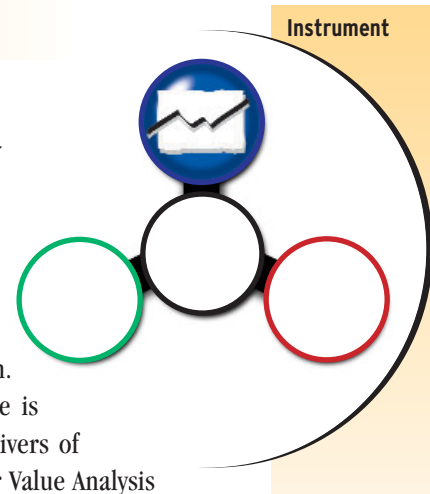
Economic challenge to environmental and social management

The environmental shareholder value approach is interesting from an economic point of view in particular. It makes a targeted search for *potential win-win situations*. Properly applied, the approach results in an increase in the company's value from the point of view of the shareholders (shareholder value). In practice the task of assessing the impacts of environmental management measures on the value drivers of shareholder value is a great challenge. It is not, however, a specific challenge of the environmental shareholder value approach, but one that arises whenever the impact of measures on the value of the company is investigated. Although monetarisation of the economic impacts of environmental management is desirable, even a qualitative description of relationships in practice may be very informative and permit prioritisation of measures. Prioritisation of economically advantageous environmental protection measures usually forms a basis for increasing eco-efficiency.

Limitations and weaknesses

The environmental shareholder value approach only achieves as much environmental protection as the basic economic conditions permit. From the point of view of the economy as a whole, this may be suboptimal. Environmental shareholder value frequently overlooks the value of entrepreneurial flexibility (the Environmental Option Value approach has been developed for this purpose).

The environmental shareholder value approach primarily undertakes an economic prioritisation of environmental management measures. From an "ecological" point of view this is both a risk and an opportunity. The risk is due to the fact that the economic priorities arrived at for potential environmental management measures may differ from



64 Environmental Shareholder Value

the ecological priorities. It is possible that the most urgent problems from an ecological point of view may not be tackled first. However, since the measures taken are also economically interesting, it may be assumed that they will meet with less resistance within the company and will be continued on a long-term basis.

Further information

Literature

Blumberg, J., Korsvold, Å. & Blum, G. (1997): Environmental Performance and Shareholder Value. Geneva: WBCSD.

Figge, F. (2001): Wertschaffendes Umweltmanagement. Frankfurt: CSM/PriceWaterhouseCoopers.

Schaltegger, S. & Figge, F. (1997): Environmental Shareholder Value. Basel: WWZ.

Schaltegger, S. & Figge, F. (1997): Environmental Shareholder Value. Success with Corporate Environmental Management. In: Eco-Management and Auditing, Vol. 7, No 1, 29 - 42.

Organisations and Internet addresses

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/csm

Environmental/Sustainability Guideline, Environmental/Sustainability Policy, Vision, Charter

A company uses a guideline to set out in writing the essential aspects of a desired state of affairs. Guidelines describe corporate management principles and key items for company activities without necessarily characterising a target situation. Models and guidelines are often used synonymously, however. They define a company's rules of conduct and its fundamental values (guiding framework). Guidelines and models describe the company's image of itself and its inner motivation including meeting the identified corporate challenges (mission). Communication of the corporate principles in the form of guidelines, e.g. in Reports, supports the development of a corporate identity, image building and the motivation of the company's employees.

Strengths and potential for meeting sustainability challenges

Ecological challenges

Environmental guidelines form a basis for building up a corporate environmental culture. They may raise employees' awareness of common ideas about values and standards, and influence attitudes and behaviour in connection with corporate environmental protection. They also set out to reinforce employee identification with the environmental objectives and the entire company (vision). In this way guidelines create a basis for increasing the ecological effectiveness of the company's performance.

In addition to fulfilling this largely internal function, a guideline also gives the company an environmentally oriented image in relation to the outside world as well. Such a guideline can have a positive influence on public perception of the company and its products.

Environmental guidelines are a declaration and a commitment by the senior management level to ecologically oriented management. This foundation can be used for planning and implementing further environmental protection measures.

Social challenge

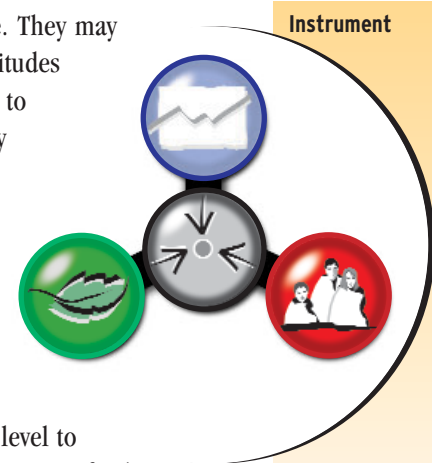
The term "social guideline" or similar is rarely used. Companies nevertheless address various social challenges in their corporate policy guidelines. The instrument communicates the social responsibility that the company wishes to adopt in relation to its employees and society. Here too social guidelines – in the same way as in the ecological challenge – may have a positive impact on employee attitudes.

Economic challenge to environmental and social management

Eco-efficiency and social efficiency may be formulated as objectives in guidelines. To put these objectives into practice it is possible to increase employee motivation and awareness, encourage identification with the company etc. (➔ Incentive System) and promote the introduction of (e.g.) ➔ Eco-efficiency Analyses and other instruments.

Integration challenge

The instrument achieves integration of content by linking corporate policy with the societal model of "sustainable development". Corporate implementation of the challenges of sustainable management calls for suitably formulated corporate guidelines or models. These should be integrated in the company's overall policy and may focus on various key points: e.g. responsibility principle, recycling principle and cooperation principle. Possibly the most important initiative developing sustainability reporting guidelines for organisations is the Global Reporting Initiative (GRI).



Limitations and weaknesses

Guidelines should be designed and worded on a company specific basis, should be credible and easily understood, and should encompass all relevant aspects. The difficulty lies in not overloading the reader with information, but at the same time not being too brief and meaningless. A suitable balance must be found.

Guidelines are either pure statements of intent or manuals that assist in establishing and maintaining sustainability management. In the first case they are not a substitute for concrete activity by the company, but act as a guide for such activity. Without measures to implement and achieve the objectives described and targeted in the guidelines, companies can fall into a credibility trap. In the second case they serve as an assisting tool but do not replace or guarantee action as such.

Further information

Literature

Kanning, H. & Müller, M. (2001): Bedeutung des Nachhaltigkeitsleitbildes (sustainable development) für das betriebliche Management. In: Baumast, A. & Pape, J. (Ed.) (2001): Betriebliches Umweltmanagement. Theoretische Grundlagen; Praxisbeispiele. Stuttgart: Ulmer.

Bleicher, K. (1994): Normatives Management: Politik, Verfassung und Philosophie des Unternehmens. Frankfurt/Main: Campus Verlag.

Gausemeier, J. & Fink, A. (1999): Führung im Wandel - Ein ganzheitliches Modell zur zukunftsorientierten Unternehmensgestaltung. Munich: Hanser.

Organisations and Internet addresses



“Eco Radar Project” of the German Institute for a Sustainable Economy (DKNW): www.oekoradar.de

Global Reporting Initiative (GRI): www.globalreporting.org

Incentive systems are business management instruments designed to reduce negative behaviour and increase the motivation of employees to achieve performances in line with the corporate objectives. Incentives are opportunities created to enable employees to increase their personal benefit. They may be of a material (e.g. money payments) or non-material nature (e.g. assignment of more interesting tasks). An important factor when establishing incentive systems is the choice of yardstick, i.e. the criterion for which incentives are to be created (e.g. sales increase).

Incentive systems exist in every business enterprise (“compulsory” incentive systems, e.g. pay system; cf. Figure) and are a fundamental precondition for its proper functioning. Planned modifications to and control of incentive systems makes them into management instruments that can be used to achieve a wide variety of objectives.

Modified or additional incentive systems (“optional” incentive systems) are possible at all levels in an enterprise, but their features vary depending on the level. An incentive system for top management has different components (e.g. share of sales) from a scheme for the operative level (e.g. system of bonuses for work results).

Incentive systems play an important role in the context of  Control or company  Suggestion Schemes, for example.

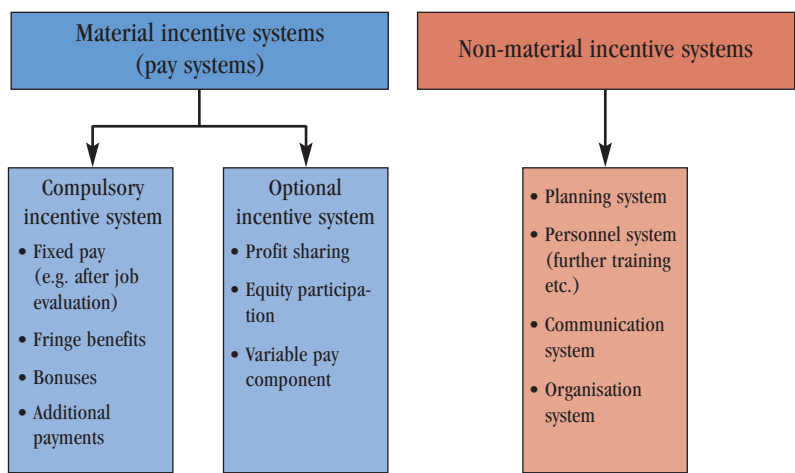
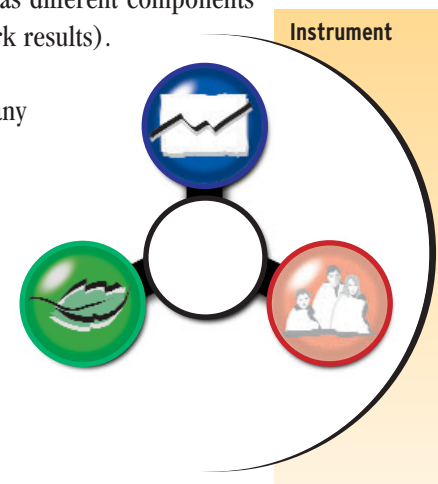


Figure: Types of incentive systems (after Becker 2001)



Strengths and potential for meeting sustainability challenges

Ecological challenge

Incentive systems are particularly suitable for achieving environmental protection objectives. Simply introducing flexible pay components (e.g. bonuses) for savings in material or energy creates additional incentives to reduce environmental burdens and increase ecological effectiveness. Within incentive systems there are various ways of steering ecological effectiveness that can be influenced by the employees (cf. Figure).

Social challenge

Creating and controlling incentive systems can also help to improve social effectiveness. On the one hand incentives can be introduced to bring about improvements in social issues (e.g. incentives to reduce accident figures). On the other, it is also possible to establish incentives for measures that improve social aspects within the company. For example, one could hold out the prospect of amenity/recreation rooms as an incentive to achieve a certain objective.

68 Incentive System

Economic challenge to environmental and social management

The purpose of direct control of behaviour is usually to increase economic success. In order to save raw materials or energy or to reduce accident figures (reducing negative environmental or social impacts) it is possible to offer incentives (e.g. bonuses). If the additional value added as a result of the reduction in negative impacts is greater than the bonus awarded, the payoff for the company is an increase in eco-efficiency or social efficiency. Thus the introduction of the incentive system can often be effected without any increase in costs for the company, or may even be accompanied by a reduction in costs.

Integration challenge

Ideally, an incentive system integrates all relevant objectives of the business enterprise. Since the instrument is always present in the company and forms a basis for the efficient use of other management instruments, it is also indispensable for corporate sustainable development. However, no sustainable social strategy for it exists yet.

Limitations and weaknesses

Incentive systems are widespread instruments that exist in every business enterprise. Good control of employees is very difficult, however. The creation of incentives for specific levels within the company may create a positive context for the relevant level, but may also be perceived by other levels also involved as unequal treatment. Moreover, it has to be noted that the introduction of material incentive systems may sometimes crowd out the intrinsic motivation ("crowding-out effect"). Implementing a consistent incentive scheme is therefore a difficult and demanding task. The incentives must be tailored to the needs of the addressees.

Further information

Literature

Becker, F. (2001): Anreizsysteme als Instrumente der strukturellen Mitarbeiterführung. In: Antoni, C., Eyer, E., Kutscher, J. (Ed.): Das flexible - Unternehmen. Düsseldorf: Symposium.

Bühler, W. & Siegert, T. (Eds.) (1999): Unternehmenssteuerung und Anreizsysteme. Stuttgart: Schäffer-Poeschel.

Seidel, E. (1990): Anreize zu ökologisch verpflichtetem Wirtschaften. In: Schanz, G. (Ed.) (1990): Handbuch Anreizsysteme in Wirtschaft und Verwaltung. Stuttgart: Poeschel, 171-189.

Organisations and Internet addresses

Institute for Applied Innovation Research (IAI): www.iai-bochum.de

St. Norbert College, Wisconsin: www.snc.edu/socsci/chair/336/piprcom.htm

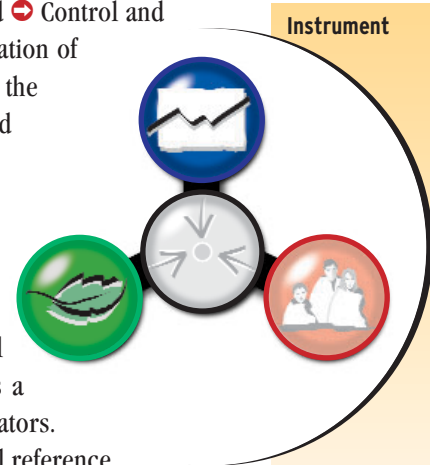
Environmental Indicator, Social Indicator, Eco-efficiency Indicator, Sustainability Indicator

Indicators are compressed representations of facts that can be recorded in quantitative form. They may be divided into absolute indicators and relative indicators (ratio indicators). Absolute indicators are used to describe a status or situation, and may take the form of individual indicators, means, sums and differences. Relative indicators show the ratio between two or more values to make them easier to grasp and compare.

Indicator systems can be created to improve the interpretation power of indicators. An indicator system consists of various mutually supplementary indicators between which there is a logical objective connection. It has a purpose-oriented structure, is geared to a common objective and helps cater better for any interactions between individual indicators. The aim is to avoid ambiguities and facilitate more precise interpretation of the information.

Indicators and indicator systems are “operational” management tools of ➔ Accounting and ➔ Control and are used in planning, steering and control processes. The selection, grouping and presentation of even complex relationships and structures in quantitative form are intended to provide the fastest and broadest overview possible and support management with purpose-oriented knowledge in the decision making process. In this context indicators and indicator systems also have the function of making it easier to work out targets for the lower levels in the hierarchy and thereby permit effective and meaningful controls. Indicators are also used in ➔ Benchmarking and as communication aids in ➔ Reporting.

The various challenges can be addressed with the aid of environmental indicators, social indicators and eco-efficiency indicators. Indicators which quantify a situation that exerts a direct or indirect influence on the natural environment are known as environmental indicators. In the cases of relative indicators, where absolute base values are seen in relation to general reference parameters, at least one of the values is usually based on an ecological situation. Indicators that provide a synoptic description of the social performance of companies are less widespread than economic or ecological indicators. Nevertheless, the debate about social accounting (➔ Accounting) in the 1970s and 1980s, and especially the debate about sustainable development in the 1990s gave a boost to the development of suitable social indicators. Eco-efficiency indicators establish a relationship between economic performance and environmental burdens (environmental impact added).



Strengths and potential for meeting sustainability challenges

Ecological challenge

With the aid of environmental indicators it is possible to make an assessment of the ecological effectiveness and/or eco-efficiency of the environmental performance of business enterprises. Direct measurement of the improvement in ecological performance is possible using one of the three categories of environmental indicators (as set out in ISO standard 14031 “Environmental Management – Environmental Performance Assessment”):

- *Environmental performance indicators* or *environmental operational indicators* are based on the company’s input-output balance sheet. They describe the environmental impacts caused by the company in terms of the operational substance and energy flows and also the infrastructure and transport sectors (e.g. waste quantity, energy consumption or emissions), and thereby provide information about the development of the company’s ecological performance.

The other two environmental indicator categories provide indirect information about the environmental burdens generated by the company.

- *Environmental condition indicators* describe the state of the natural environment around the company and can be divided into sectors such as air, water, soil, landscape, humans, flora, fauna (e.g. quality of the water in a nearby lake). From this state it is possible to draw conclusions about the burdens generated by the company that have an impact on natural systems.
- *Environmental management indicators* are used to assess the capacity of the environmental management system (e.g. number or training of environmental protection personnel). Here too, the connection with the improvement in environmental impacts can only be determined indirectly. In addition, some environmental management indicators from the ISO standard, like safety and health, relate mainly to the social challenge.

Social challenge

Social indicators supply information on the extent to which company activities can be regarded as socially effective and socially efficient. Individual organisations such as Global Reporting Initiative (GRI), World Business Council for Sustainable Development (WBCSD), Council on Economic Priorities (CEP), the United Nations Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting (UN ISAR), New Economics Foundation (NEF) and the Institute for Social and Ethical AccountAbility issue guides and make recommendations on indicators that describe the company's social performance.

Examples of indicators that reflect the social performance of business enterprises relate to:

- Companies (e.g. ethical/moral standards; bribery and corruption)
- Personnel (e.g. occupational safety; diversity of personnel with regard to gender, origin, age; freedom of union membership)
- Local and global population (e.g. relations with public; transfer of skills and knowledge)
- Suppliers (e.g. purchasing criteria; partnerships and their basic principles)
- Customers (e.g. standards for ♻️ Label; pack labelling and advertising)

Economic challenge to environmental and social management

Indicators for meeting the economic challenge may reflect not only the relationship between environmental or social impact and the value added or economic performance (different kinds of units, e.g. EUR/kg), but also, in the form of an ecologically induced financial indicator, the relationship between environmental or social costs and total costs, for example (same, financial units, e.g. EUR/EUR).

Integration challenge

The term "sustainability indicator" has yet to find widespread use in business management contexts. Nevertheless, indicator systems with their multidimensional view of company performance have the potential to draw attention to integration efforts. The Global Reporting Initiative (GRI) proposes a set of core indicators and additional indicators for all sustainability dimensions.

Limitations and weaknesses

A basic weakness of some indicators is their limited information value. This is largely determined by the quality of the underlying indicator or information system (data collection, ♻️ Environmental Management Information System, ♻️ Accounting). In this connection sensible selection of the indicators and the way they are formed, i.e. systematic grouping of information and the correctness of the initial data, are of central importance. The risks involved lie, for example, in misinterpretation or manipulation. Indicator systems, by making clear the dependencies between the system elements, can limit the risk of misinterpretation due to use of isolated indicators. It must also be noted that indicators often relate to specific times in the past. The preparation of time series, *actual/actual* or *target/actual* comparisons and target values for improving indicator information value therefore plays a very important role.

As a basic principle, every indicator system must be specifically keyed to the objectives and attributes of the company in question. For this reason, generally recommended indicators should as a rule be adapted to the individual company and supplemented by other indicators of an industry or company specific nature. This is an obstacle to standardisation efforts. Owing to further differences in data collection methods and calculation bases it is difficult to compare companies, products and production processes on the basis of indicators (➔ Benchmarking). This makes itself felt in the case of social and economic indicators in particular, as they are frequently more specific to locations and cultures than environmental indicators. One fundamental problem of environmental indicators and social indicators is that not all situations are (readily) measurable and quantifiable.

Further information

Literature

- Clausen, J., Kottmann, H. & Loew, T. (1999): Umweltmanagement mit Kennzahlen. Munich: Vahlen.
- DIN EN ISO 14031 (1999): DIN EN ISO 14031 Umweltmanagement - Umweltleistungsbewertung. Berlin: DIN.
- German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (Eds.) (1997): Leitfaden Betriebliche Umweltkennzahlen. Bonn: BMU.
- German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (Eds.) (1997): Sachstandsanalyse Betriebliche Umweltkennzahlen. Berlin: UBA.
- Goldmann, B. & Schellens, J. (1993): Betriebliche Umweltkennzahlen und ökologisches Benchmarking. Cologne: Gutke.
- Husseini, A., Barthel, M., Senatulya, C., Stans, J. & Hortensius, D. (2001): Environmental Management and ISO 14000. Geneva: ISO.
- Loew, T. & Hjálmarsson, H. (1996): Umweltkennzahlen für das betriebliche Umweltmanagement. Berlin: IÖW.
- Schaltegger, S. & Burritt, R. (2000): Contemporary Environmental Accounting. Sheffield: Greenleaf.
- Staehele, W. (1969): Kennzahlen und Kennzahlensysteme als Mittel der Organisation und Führung von Unternehmen. Wiesbaden: Gabler.
- Watney, D., & O'Reilly, M. (2000): ISO 14031: a practical guide to developing environmental performance indicators for your business. London: Stationery Office

Organisations and Internet addresses

- Centre for Sustainability Management (CSM): www.enviro-accounting.de
- Environmental Management Accounting Network (EMAN): www.eman-eu.net
- German Federal Environmental Agency (UBA): www.umweltbundesamt.de
- Global Reporting Initiative (GRI): www.globalreporting.org
- Institute for Ecological Economy Research (IÖW): www.ioew.de
- Institute for social and ethical accountability: www.accountability.org.uk
- International Institute for Sustainable Development (IISD): www.iisd.org/measure
- International Organization for Standardization (ISO): www.iso.ch
- New Economics Foundation (NEF): www.neweconomics.org
- World Business Council for Sustainable Development (WBCSD): www.wbcsd.org



Ecological Investment Appraisal

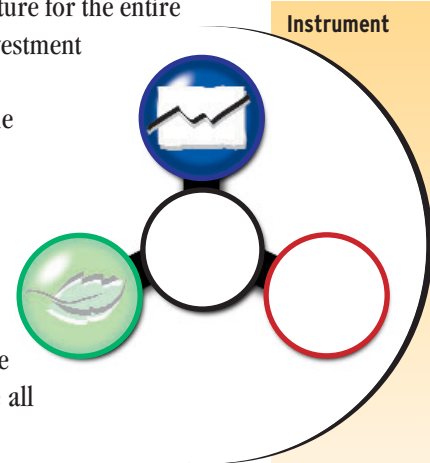
Investment appraisal assesses the benefits of a planned investment. As a rule this is done from a financial point of view, but it can also be performed from a purely ecological standpoint. Investment appraisal can support various selection decisions. In the first instance there may be a need to examine the expected probability of a project under consideration with the aim of clarifying whether it is basically to be realised at all (determining absolute advantages). It also supports a comparison of different investment alternatives (relative advantages). Calculation is undertaken using static or dynamic methods. Unlike static methods, dynamic ones also take account of the difference in time between expenditure and income, in other words the expenditure and income is discounted over the useful life of the investment. Unlike cost accounting, investment appraisal is future-oriented and supplies a preliminary costing for an investment. Investment appraisal is closely related to ➔ Budgeting, which relates to a given (short-term) period. It is an information tool of ➔ Accounting that forms a basis for budgeting.

For all the methods mentioned, it is necessary to determine or estimate income and expenditure for the entire useful life or at least for part of it. Two aspects in particular are important in economic investment appraisal in connection with environmental aspects:

- The need to take account of all environment-induced income and expenditure in the case of “conventional” environmentally relevant investments (e.g. a production technology with reduced water consumption).
- Appraisal of the ecological benefits of an investment that is made primarily with the aim of increasing ecological effectiveness (e.g. switching to eco-power (wind energy)).

A sensitivity analysis reveals how the profitability of the investment varies with changes in the principal cost headings. For this purpose only the cost component in view is altered, while all other components remain unchanged.

Investment appraisal may also be of a purely ecological character and have the function of appraising the ecological effectiveness of a planned project. The ratio of environmental relief to environmental burdens, e.g. due to an environmental protection measure, is assessed by calculating the ecological payback period (EPP) or the ecological advantage ratio (EAR). The *EPP method* permits calculation of the *elapsed time* until the ecological burden caused by an investment (e.g. construction of a sewage treatment plant) is cancelled out by the ecological relief resulting from the reduced environmental impacts during normal operation. If this period is shorter than the useful life of the project, the investment is ecologically advantageous. The *EAR method* yields a ratio of the reduction in harmful environmental impacts arising from an project over its entire useful life to the harmful environmental impacts it causes. If this *ratio* is greater than 1, the investment is advantageous. Both methods belong to the static category of investment appraisal approaches, in other words the (saved) ecological impacts are not discounted over the useful life of the investment.



Strengths and potential for meeting sustainability challenges

Ecological challenge

By taking account of *all* cost-relevant environmental impacts over the useful life of the investment, e.g. waste charges, energy costs etc., it is possible to achieve an absolute improvement in resource conservation. Ecologically oriented investment appraisal (➔ Accounting, ➔ Substance Flow Analysis) thus helps increase ecological effectiveness by revealing the contribution made by environmental impacts to the income and expenditure for a project. It can also be linked to material flow accounting and material flow cost accounting (➔ Substance Flow Analysis). The results of the EPP and EAR methods give a direct indication of the ecological “profitability” of a project, thereby enabling the investor to take account of the change in ecological effectiveness in his decision.

Economic challenge to environmental and social management

Investment appraisal primarily makes it possible to meet the economic challenge. Including the ecological impacts in the economic calculations of the investment appraisal enables the company to increase eco-efficiency. The techniques described above show directly the contribution that environmentally relevant impacts of an investment make to the expected economic success of the entire project. Basic instructions for the use of ecologically oriented investment appraisal methods can be found in the “Environmental Cost Accounting” guide due to be published shortly by the German Federal Environmental Agency (UBA) (➔ Cost Accounting).

Integration challenge

Investment appraisal is a “tried and tested” business management instrument. Integrating ecological aspects in an instrument of this kind makes a special contribution to the overall integration of sustainable development issues in conventional management. Generally speaking a familiar, proven instrument tends to meet with better acceptance than newly developed instruments.

Limitations and weaknesses

Investment appraisal often has to make assumptions about the future development of income and expenditure and/or positive and negative environmental impacts. In practice this gives rise to a greater or lesser degree of uncertainty about the results of the investment appraisal. This uncertainty is a feature of investments in the environmental sector in particular, since here profitability depends heavily on political requirements. The investor must take account of this uncertainty in his calculations in order to avoid incorrect assessments. Conventional investment appraisal can only take account of those impacts of the planned investment that can be valued in monetary terms. Non-monetary aspects have to be analysed with the aid of other instruments.

Further information

Literature

Bennett, M. & James, P. (Eds.) (2000): *The Green Bottom Line*. Sheffield: Greenleaf.

German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (2003, forthcoming): *Guide to Environmental Cost Management*. Berlin: UBA.

German Federal Environmental Ministry (BMU) & German Federal Environmental Agency (UBA) (Eds.) (1996): *Handbuch Umweltkostenrechnung*. Munich: Vahlen

Schaltegger, S. & Burritt, R. (2000): *Contemporary Environmental Accounting*. Sheffield: Greenleaf.

Organisations and Internet addresses

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/cea

German Federal Environmental Agency (UBA): www.umweltbundesamt.de

Environmental Management Accounting Network (EMAN): www.eman-eu.net, www.eman-ap.net

Eco Label, Environmental Symbol, Fair Label

A label in this context is a seal (text and/or image) which can usually be seen on a product, its packaging or in the advertising for the product. It stands for and guarantees compliance with an agreed standard (e.g. satisfaction of quality, environmental or social requirements) and thus serves to provide the customer with rapid, highly compressed information.

Like packaging, brands and labels are increasingly determining the profile and success of many goods offered in the market. Labels are intended to support ecological and social marketing (➔ Marketing) by ensuring that a product stands out from the mass and is recognised. In some cases label may be used in or referred to in ➔ Reporting. Labels point out *quality* and *control* of the product and the *product responsibility* of its supplier, and in this respect they have a confidence-inspiring effect. Sometimes also indicate the origin of the product. Labels are helpful where the ecological or social quality benefits of a product are not immediately visible. To continue inspiring trust in the long term, a label must comply with the general requirements for (product) labels. These are independence, verifiability, plausibility and transparency. Instruments such as ➔ Life Cycle Assessment, Environmental ➔ Accounting or ➔ Indicators are used to collect the information necessary for assessing environmental, social or sustainability quality.

There are various options when it comes to choosing a label. Labels may be identical to the product brand or may be awarded as a supplement to the brand. Companies can build on their credible image and design their own label (e.g. Naturkind). It is also possible to adopt labels of impartial institutes (e.g. Öko-TEX Standard 100), government institutions (e.g. The Blue Angel, EU Eco-Label), NGOs (e.g. WWF-Panda, Fairtrade Labelling) or producer associations (e.g. Bioland, Demeter, EcoVin). As well as straightforward association

symbols there are quality symbols awarded by the German Institute for Quality Assurance and Certification (RAL). Test symbols presuppose testing by appropriate institutions. The use of an externally tested label requires certification and an ➔ Audit.

An (eco) label is the result of a multistage process (cf. Figure 1), by means of which the label as a condensed (environment-oriented) overall verdict acquires its information content. The central steps are *appraisal of the item* (product, product range) on the basis of selected criteria, *information compression* (summarising appraisal data in super-criteria and finally in a label) and *awarding the label*. All steps must be transparent and plausible for the external observer.

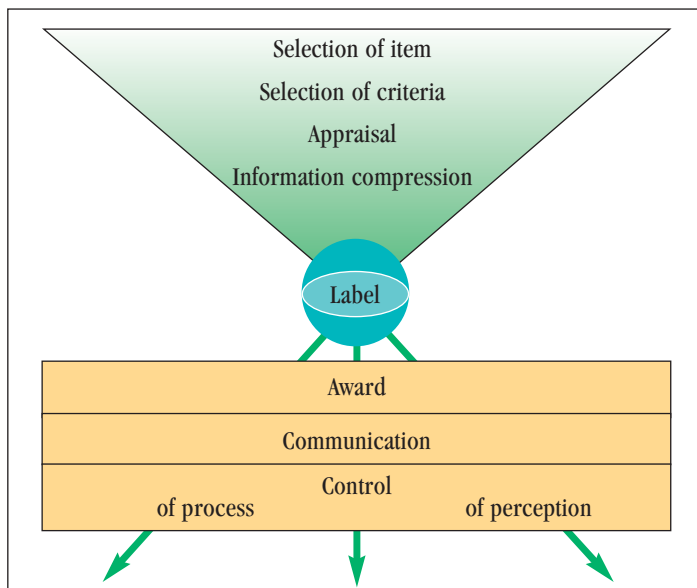
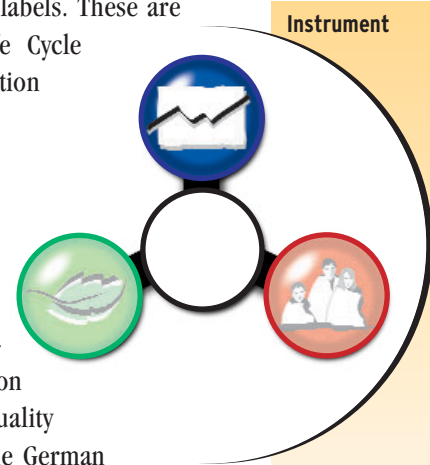


Figure 1: Ideal workflow for an (eco) labelling process (after Hansen & Kull 1995, 416)

The value of a label can essentially be measured in terms of two determinants, its *awareness rating* and its *credibility*.

Strengths and potential for meeting sustainability challenges

Ecological challenge

The term “eco label” is the short version of “environment-related award”, and it visualises and documents compliance with an agreed ecological standard (e.g. production or extraction standard). A company that is already using or trying to obtain an eco label (cf. Figure 2) for its products is obliged under the standards for the label to produce in an environmentally friendly fashion and thus to be ecologically effective.

Eco label awards have grown important in → (Eco)Marketing as a key signal and “quasi guarantee” of ecological product quality. Eco labels help the customer to make an environmentally friendly choice without much effort and hence to actively reduce environmental burdens. In this way labels help increase ecological effectiveness.



Figure 2: Examples of eco labels from various industries

- (1) “The Blue Angel” environmental symbol: jury environmental symbol, RAL - Deutsches Institut für Gütesicherung (www.blauer-engel.de)
- (2) EU environmental symbol “Euroflora”: European Union, Directorate General XI (europa.eu.int/ecolabel)
- (3) “Eco-Label” for organic farming products: Öko-Prüfzeichen GmbH (www.oepz.de and www.bio-siegel.de)
- (4) “Füllhorn”: own brand of REWE trading group (www.rewe.de)
- (5) “Bioland”: BIOLAND-Verband für organisch-biologischen Landbau e.V. (www.bioland.de)
- (6) “Naturkind”: Tengelmann group bio-brand (www.tengelmann.de)
- (7) “Certified Natural Cosmetics”: BDIH Bundesverband Deutscher Industrie- und Handelsunternehmen für Arzneimittel, Reformwaren, Nahrungsergänzungsmittel und Körperpflegemittel e.V. (www.kontrollierte-naturkosmetik.de)
- (8) “Naturland”: Naturland-Verband für naturgemäßen Landbau e.V. (www.naturland.de)
- (9) “Naturtextil”: International Natural Textile Association (INV) (www.naturtextil.com)
- (10) “GuT”: Carpets Tested For A Better Living Environment (www.gut-ev.de)
- (11) “Green Electricity Label”: Grüner Strom Label e.V. (www.gruenerstromlabel.de)
- (12) “natureplus”: natureplus e.V. (www.natureplus.de)
- (13) “AUB”: Association for Environmentally Sound Construction Products (AUB) (www.baunetz.de/arch/aub)
- (14) “Recommended by IBR”: Rosenheim Institute for Building Biology (www.baubiologie.org)

Social challenge

Social labels (cf. Figure 3) provide a means of easy communication to the outside world that the products observe and comply with social standards (e.g. abolition of child labour, fair pay, etc.) and thus of consolidating the company’s social acceptance and the legitimization of its activities and also of improving social effectiveness.



Figure 3: Examples of various social labels

- (1) “TransFair”: Verein zur Förderung Fairen Handels mit der „Dritten Welt“ e.V. (www.transfair.org)
- (2) “Rugmark”: Initiative against illegal child labour in carpet production, Rugmark/TransFair e.V. (www.rugmark.de)
- (3) “Care & Fair”: Care & Fair - An Initiative Against Child Labour (www.care-fair.com)
- (4) “Hand in Hand”: Rapunzel Naturkost (www.rapunzel.de)
- (5) “FLP”: Flower Label Program, flower production that is personnel and environment friendly (www.fian.de)

Economic challenge to environmental and social management

Labels are intended as a ➔ Marketing tool for enhancing the company's standing or for targeted promotion of a product's sales. Labels are thus intended to increase economic effectiveness. At the same time, by virtue of the obligations (standards) arising from the label, they impose on the company requirements regarding its behaviour in ecological or social matters. These two properties give rise on the one hand to the above-mentioned improvement in ecological and social effectiveness and on the other to an overall increase in eco-efficiency or social efficiency. For example, if a company uses energy-efficient systems conforming to the GED energy label (cf. Figure 4) that do the same work with less energy input or consumption, this not only cuts the added environmental damage, but usually also boosts sales, thereby increasing eco-efficiency – the ratio of added value to added damage – from both sides.

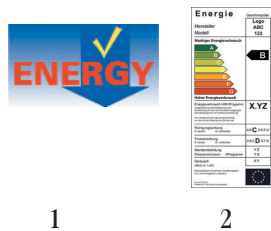


Figure 4: Examples of labels identifying products with optimised energy consumption

- (1) Energy label of GED: German Energy Label Association (GED) (www.energielabel.de)
- (2) EU energy label (Euro-Label): EU Commission

Integration challenge

There are only very isolated examples of (sustainability) labels offering complete integration of all three of the foregoing sustainability challenges. One example of the integration of ecological, social and economic aspects is the FSC seal (cf. Figure 5), which stands for sustainable management of forests and timber production. The standards are based on the Agenda 21 which was passed in Rio de Janeiro in 1992. The PEFC seal is similar to the FSC seal in terms of its objectives and orientation to the European region, but less far-reaching. The two systems differ in control procedure, opportunities for third-party participation, standards and geographical distribution (FSC: global, PEFC: European).



Figure 5: Examples of labels that seek to take account of the three aspects of sustainability

- (1) "FSC signet": Forest Stewardship Council (www.fscoax.org)
- (2) "PEFC signet": Pan European Forest Certification (www.pefc.org)

As yet there are no (sustainability) labels or standards that describe the quality or degree of the integration of "effectiveness management" (environmental and social management) and "efficiency management" (economic environmental and social management) in conventional economic management.

Limitations and weaknesses

The crucial factor for the acceptance and hence the success of a label is its credibility and/or the trust that people have in the label. *Acquiring trust* requires the label to be in use for a long time – today most of the more credible labels have been in existence for more than 10 years. Since there is a correlation between credibility and awareness, any mistrust of unfamiliar labels must to some extent be combated through sheer publicity.

Separation of awarding organisation and label user tends to hold better promise of success than where a company establishes a label of its own. Even joint labels of ecologically oriented companies do not generally achieve the good reputation of labels of neutral organisations. Independent environmental symbols have the further advantage that the company does not have to do the work of building up the brand itself. By contrast, the benefit of an ecological own brand lies in its *exclusivity*. This ensures a high degree of differentiation. In certain cases the two benefits can be combined by supplementing an own brand with recognised labels of neutral organisations.

Designing, introducing and maintaining a sustainability label are tasks involving a good deal of work. A sustainability label must be independent and, unlike the existing labels, must be designed as a “process label” that makes it possible to update the criteria in line with the ongoing sustainability process. Not only experts, but also the relevant social groups must be integrated in this process.

Further information

Literature

- Eberle, U. (2001): Das Nachhaltigkeitszeichen: Ein Instrument zu Umsetzung einer nachhaltigen Entwicklung? Freiburg: Öko-Institut.
- Hansen, U. & Kull, S. (1995): Öko-Label als umweltbezogenes Informationsinstrument: Begründungszusammenhänge und Interessen. In: Hansen, U. (Ed.): Verbraucher- und Umweltorientiertes Marketing: Spurensuche einer dialogischen Marketingethik, Stuttgart: Schäffer-Poeschel, 405 – 421.
- Spiller, A. (1999): Umweltbezogenes Wissen der Verbraucher: Ergebnisse einer empirischen Studie und Schlussfolgerungen für das Marketing. Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaften der Gerhard-Mercator-Universität – Gesamthochschule Duisburg.
- German Federal Environmental Agency (UBA) (Ed.) (1998): Assessing the Success of the German Eco-Label. Examination of the effectiveness of the label from the viewpoint of companies using the label and chosen experts. 61/98. Berlin: UBA

Organisations and Internet addresses

- Association for Promotion of Fair Trade with the “Third World” (Verein zur Förderung des Fairen Handels mit der „Dritten Welt“ e.V.): www.transfair.org
- The Blue Angel: www.blauer-engel.de
- Die Verbraucherinitiative e.V., Bundesverband: www.label-online.de and www.verbraucher.org
- European Consumer Centre (EVZ), Kiel: www.evz.de
- Federal Association for Environmental Advice (Bundesverband für Umweltberatung e.V.): www.umweltberatung.org
- Federal Ministry of Consumer Protection, Food and Agriculture: www.verbraucherministerium.de
- German Institute for Quality Assurance and Certification (RAL): www.ral.de
- Informationsstelle Bio-Siegel, Öko-Prüfzeichen GmbH: www.bio-siegel.de
- Oeko-Test Verlag GmbH: www.oekotest.de
- Schadstoffberatung Tübingen: www.schadstoffberatung.de/infobaum/prodlabe.htm
- Swiss Foundation for the Practice of Environmental Protection (PUSCH): www.labelinfo.ch
- Textile Kette Deutschland: www.texweb.de
- Vanselow, A.: www.umweltzeichen.de
- World Wide Fund (WWF) for Nature: www.wwf.org

LCA, Environmental Performance Evaluation, Ecobalance

Life cycle assessment is an instrument for registering, evaluating and representing environmental impacts resulting from products, processes or the entire company (cf. also ➔ Accounting). As an environment-related information and decision instrument it forms a basis for comparisons (➔ Benchmarking), objectives, ➔ Control and identification of weaknesses, and internal and external communication processes (e.g. for ➔ Reports).

Examples of guides to performing life cycle assessments are ISO standards 14040 to 14043. Life cycle assessment begins with the goal and scope definition (scoping), and on the basis of a flow chart of material and energy flows it compiles an inventory (inventory analysis) of volume flows recorded (input-output analysis). In the case of life cycle assessment the term analysis relates to flow parameters measured in physical units (➔ Substance Flow Analysis) and not to monetary amounts (as in company ➔ Accounting). In particular, life cycle assessment concepts differ with regard to accounting scope (product, process, company) and the methods used to value the inventory (inventory analysis).

In the classification, the individual environmental impacts in the form of impact categories (such as climate warming, stratospheric ozone depletion, photosmog, eutrophication etc.) are allocated to each substance recorded and each energy source. Valuation of different emissions is performed by multiplying the amount emitted by a weighting factor. There are many models for determining weighting factors. The evaluation process finally values the results of the inventory analysis and classification, usually in the form of verbal arguments. However, it is also possible to use ➔ Checklists or ➔ ABC Analysis, for example.

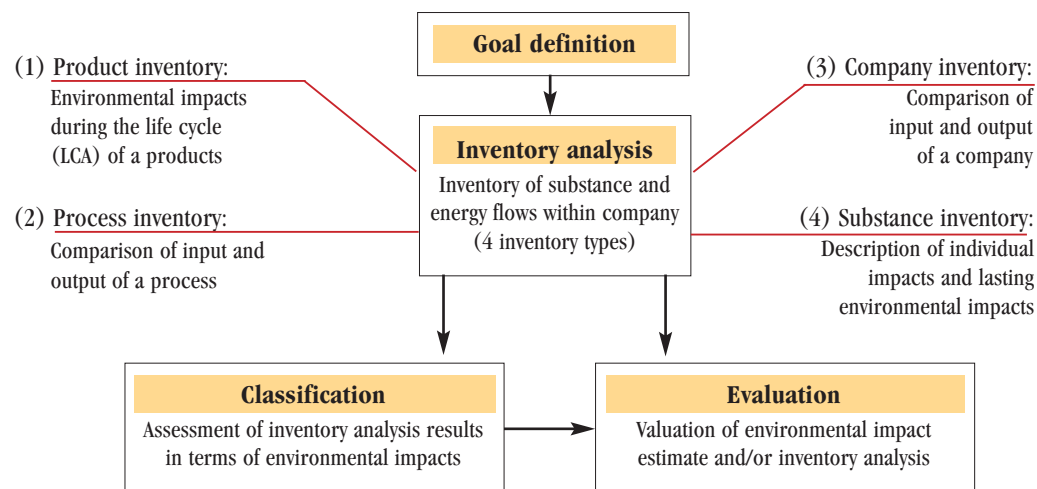
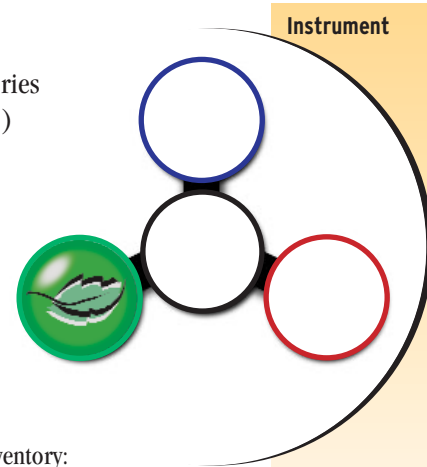


Figure: Procedure for compiling a life cycle assessment, including inventory types (after Federal Environmental Agency 1992)

Strengths and potential for meeting sustainability challenges

By definition the instrument addresses the ecological challenge only.

Ecological challenge

Life cycle assessment represents the environmental impact of a company, unit, process or product. In this way it supplies the company with important information for the establishment and expansion of an environmental information system (➔ Corporate Environmental Information System). By recording and representing complex situations, life cycle assessment can help operational management to set priorities and avoid undesirable developments (steering function). As a basis of information for company management, life cycle assessment thus supports a

80 Life Cycle Assessment

forecast of ecological consequences and timely initiation of precautionary measures. It also forms a useful supplement to the environmental audit (➔ Audit). The wide variety of uses to which it can be put in the company makes life cycle assessment an instrument that can ideally provide a basis of information for improving ecological effectiveness.

Limitations and weaknesses

Various environmental impacts, especially where they do not relate specifically to an individual substance flow (e.g. reduction in biodiversity), cannot normally be evaluated and compared using life cycle assessment. Compiling the inventory data often involves a good deal of time and human and financial resources. LCAs for the entire product life cycle require a massive amount of input, which means that only large companies are in a position to bear the costs. Moreover, final use and disposal lie in the future, so that estimates of their remaining environmental impacts are subject to uncertainty. Widely available computer programs offer databases containing basic data on average emissions arising in industry for upstream and downstream stages (raw materials, intermediate products, waste management processes). This reduces the cost of compiling a life cycle assessment, but considerably limits the quality of the data and the information value.

Further information

Literature

- German Federal Environmental Agency (UBA) (1992): Ökobilanzen für Produkte: Bedeutung – Sachstand – Perspektiven. Berlin: UBA.
- German Federal Environmental Ministry (BMU) & German Federal Environment Agency (UBA) (Eds.) (2001): Handbuch Umweltcontrolling. Munich: Vahlen.
- Heijungs, R., Guinée, J. & Centrum voor Milieukunde (Ed.) (1992): Environmental life cycle assessment of products: October 1992. Leiden: Centrum voor Milieukunde.
- International Organisation for Standardisation (2000): Environmental management – life cycle assessment. Geneva: ISO.
- Möller, A. (2000): Grundlagen stoffstrombasierter Betrieblicher Umweltinformationssysteme. Bochum: Projekt Verlag.
- Schaltegger, S. (1997): Economics of Life Cycle Assessment (LCA). Inefficiency of the Present Approach. In: Business Strategy and the Environment, Vol. 6, No. 1, 1-8.
- Schaltegger, S. & Sturm, A. (2000): Ökologieorientierte Entscheidungen im Unternehmen. Ökologisches Rechnungswesen statt Ökobilanzierung: Notwendigkeit, Kriterien, Konzepte. Download: www.uni-lueneburg.de/csm

Organisations and Internet addresses

- Centre of Environmental Science (CML), Leiden University Institute: www.leidenuniv.nl/interfac/cml
- Life Cycle Assessment Links: www.life-cycle.org
- Society of Environmental Toxicology and Chemistry (SETAC): www.setac.org
- German Federal Environmental Agency (UBA): www.umweltbundesamt.de
- U.S. Environmental Protection Agency (US EPA): www.epa.gov

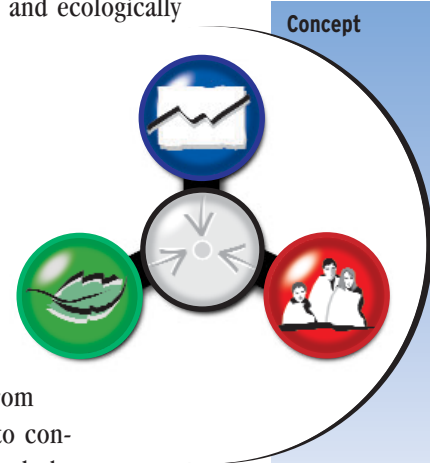
Eco-Marketing, Social Marketing, Sustainability Marketing

Marketing is a concept for sales-oriented corporate development. Environmental (or social) marketing has the additional purpose of environmentally (or socially) oriented corporate development. The topics in view here are product design, pricing, advertising and distribution of the goods. The objectives and methods of environmental and social marketing go beyond those of conventional marketing, in that they seek, for example, to reduce environmental burdens and socially undesirable impacts over the entire life cycle of the products, from cradle to grave or to reuse (➔ Life Cycle Assessment, ➔ Social Accounting, ➔ Product Line Analysis). In this respect eco-marketing is faced with special tasks of informing about product qualities, product constituents, product use, disposal, care or repair. A central requirement of environmental and social marketing is the credibility of the arguments. Environmental and social advantages must be communicated in a transparent, plausible and reliable manner (e.g. with the aid of a ➔ Label). Environmental and social marketing can supplement economic functions by taking on the following tasks:

- Catering to conventional consumer wishes in an ecologically and socially effective and ecologically and socially more efficient way
- Fulfilling nature and environment oriented and social consumer wishes
- Encouraging people to reflect on their needs
- Promoting sustainable consumer and disposal behaviour

Eco-marketing gained considerably in importance in the late 1980s with the growth of environmental awareness in society. An initial euphoria in the nineties was followed by a phase of declining activities. Since the BSE crisis in 2000 there has been, at least in the food sector, a noticeable revival of eco-marketing through the natural food trade.

As in conventional marketing, the functions of environmental and social marketing range from obtaining information (market research) through planning and implementing measures to controlling them (➔ Control, ➔ Sustainability Balanced Scorecard). A distinction must be made between strategic and operational marketing. Strategic marketing is concerned with market segmentation to identify attractive customer groups and positioning the company compared with the competition. Operational eco-marketing implements the positioning of the marketing mix. Here, in the context of product policy, the focus is on optimising ecological properties (reusability, long life, economy, dematerialisation, regionality, seasonality etc.) for both the core product and its packaging. Distribution decisions also involve issues relating to environmentally sound sale and transport of the goods. Today social issues play an important role, especially in production (e.g. child labour, minimum pay, working conditions). Price policy decisions are made as in conventional marketing. Great importance is attached to the selection and design of communication instruments, in order to catch attention and to credibly convey information about the ecological or social benefits. This applies particularly to brand policy and the use of ➔ Labels for products. Dialogue communication instruments (hotline, after-sales care, customer forum etc.) are growing increasingly important.



Strengths and potential for meeting sustainability challenges

Ecological challenge

The function of corporate eco-marketing is not primarily to promote environmental awareness, but to overcome obstacles to action and gaps in information (e.g. indicate benefit advantages) in order to influence the buying behaviour of potential customers on the basis of their existing environmental awareness. It is important to pay attention to synergies between ecological benefits and other advantages, so as to appeal to economic customer motives as well, for example via the economical characteristics of appliances. Individual advantages are found especially in the fields of taste and health. In the fields of product development, packaging and product logistics the focus is on ecological optimisation of products (➔ Life Cycle Assessment, ➔ Eco-Design). However, ecological benefits take

effect if they contribute to an attractive differentiation from the customer's point of view. In order to achieve a broad ecological impact, eco-marketing must also address the "normal consumer" and offer products that are "suitable for the mass market". Eco-marketing benefits from a product image tending towards pleasure and quality of life. By contrast, appeals to environment-related anxiety motives mostly create resistance on the part of the consumer.

Social challenge

Social marketing relies on compliance with social standards in product manufacture, since in the customer's eyes credibility is inseparable from humane production conditions (➔ Product Line Analysis, ➔ Social Accounting). To date there is no clear proof of whether guaranteeing above-average social standards also encourages consumers to pay more for the product. Unlike high ecological quality (healthy, economical etc.), high social quality does not make a direct contribution to increasing consumer benefit (consumer enjoyment). This means that a readiness to pay more can only be expected from socially committed customers. Fair trade products (e.g. TransFair; ➔ Label) show that at least a niche market exists for such products. As in eco-marketing, a contribution to increasing social effectiveness can be expected in social marketing as well. There is often a close connection between eco-marketing and social marketing. For example, credible marketing of natural textiles produced using exploitative child labour is evidently impossible using the ecological argument if the production path is known.

Economic challenge to environmental and social management

Eco-marketing, like conventional marketing, seeks to increase sales and the resulting profit. In addition, however, eco-marketing aims at exclusive promotion of products from environmentally sound (and humane; cf. social challenge) production. It also offers opportunities for differentiation that go beyond those of conventional marketing strategies, provided it is successful in activating potential customers' readiness to pay. Eco-marketing and social marketing can only market products on a lasting and credible basis if such products offer genuine advantages in terms of environmental and social impacts. If these marketing efforts are successful, the company combines an improvement in the environmental quality of its products with increased profit. Marketing measures can thus lead to an increase in both eco-efficiency and social efficiency.

Integration challenge

As already mentioned in the three challenges described above, the need to observe not only ecological and economic, but also social aspects is – at least implicitly – important for credible and successful marketing that makes reference to sustainability. Ecological success is coupled to economic success. Only sales successes result in the spread of environmentally friendly product alternatives. Thus right from the outset eco-marketing implies the integration of economic and ecological aspects if sales successes are also to be reflected in profits. The price should therefore be calculated so as to avoid, at least in the medium term, any cross-subsidising of ecological offerings by conventional products – either by positioning the product in the exclusive high-price sector, or by attractive prices that are offset by economies of scale. In many cases high prices for ecological products (especially in the clothing and food sectors) are due not so much to their additional ecological quality as to the small size of the batches and the fixed costs of development and control. In this respect scope therefore exists for large economies of scale in the field of ecological mass marketing. Compliance with social standards is a central concern of social marketing and also, to safeguard sales, a necessary (secondary) condition of eco-marketing. At present, however, it is only in niche segments that it generates a readiness to pay more.

Thus at least in a rudimentary fashion the concept of eco-marketing is already integrating requirements relating to ecological effectiveness, social effectiveness, eco-efficiency and social efficiency, and is thereby making a contribution to corporate sustainable development.

Limitations and weaknesses

It is only in a minority of consumers that a decision to buy is supported by purely idealistic motives (“for the sake of the environment” etc.). Thus larger target segments can only be addressed if transparency of individual benefits for the customer can be ensured. Success here is tied to the credibility of the company and its entire spectrum of offerings. Companies that market ecological or social product lines in parallel with conventional lines make a less credible impression. Moreover, positioning innovations in eco-marketing usually requires a good deal of patience and large launch budgets. Companies that have sought to use eco-marketing for rapid exploitation of environmentally aware customer potential by means of supplementary product lines have had some very sobering experiences. A further problem may arise with the need to prove the ecological superiority of products. Methodologically thorough recording using product-specific ecological performance evaluations (LCA, → Life Cycle Assessment) involves a lot of work. Verification of ecological and social qualities that are not visible also gives rise to costs and is often incomplete.

Further information

Literature

- Belz, F. (2001): Integratives Öko-Marketing. Erfolgreiche Vermarktung von ökologischen Produkten und Leistungen. Wiesbaden: Gabler.
- Fuller, D. (1999): Sustainable Marketing. Thousand Oaks, CT: Sage.
- Hansen, U. (Ed.) (1995): Verbraucher- und Umweltorientiertes Marketing. Spurensuche einer dialogischen Marketingethik. Stuttgart: Schäffer Poeschel.
- Lichtl, M. (1999): Ecotainment: Der neue Weg im Umweltmarketing. Vienna: Ueberreuter.
- Meffert, H. & Kirchgeorg, M. (1998): Marktorientiertes Umweltmanagement. 3rd edition. Stuttgart: Schäffer-Poeschel.
- Peattie, K. (1992): Green Marketing. London: M+E.
- Schaltegger, S. & Petersen, H. (2001): Marktorientiertes Umweltmanagement. Lueneburg/Hagen: CSM/FernUniversität Hagen.
- Spiller, A. (1996): Ökologieorientierte Produktpolitik. Marburg: Metropolis.
- Villiger, A., Wüstenhagen, R. & Meyer, A. (2000): Jenseits der Öko-Nische. Basel: Birkhäuser.

Organisations and Internet addresses

- Institut für Markt-Umwelt-Gesellschaft (imug) e.V.: www.imug.de
- J. Ottman Consulting: www.greenmarketing.com
- US EPA: www.epa.gov/ecocommunity/tools/econaff6.pdf



86 Product Line Analysis

such as life cycle assessments, are used for the individual segments of PLA and are not the sole instrument employed. PLA does not lay down any obligatory requirements for the collection and evaluation of information, but works with verbal recommendations as its result. It thus dispenses with an aggregated, unidimensional parameter.

The procedure originally regarded as ideal for PLA has changed in the course of time. These days the investigation procedure in many areas is similar to the workflow of a ➔ Life Cycle Assessment for a product.

Strengths and potential for meeting sustainability challenges

Ecological challenge

The following criteria for use in PLA are suggested for assessing environmental impacts. With their assistance it is basically possible to achieve ecological optimisation of products and increase ecological effectiveness. The suggested criteria are:

Raw materials	Environmental media	Nature
<ul style="list-style-type: none">• Energy input• Raw material consumption• Land depletion• Water consumption• Water quality• Waste generation	<ul style="list-style-type: none">• Immission situation• Pollutant inputs into soil• Emissions of liquid pollutants• Effect on temperature, radiation and wind	<ul style="list-style-type: none">• Flora• Fauna• Influences on coherent habitats

Social challenge

In the product line matrix, social aspects are registered with the aid of the criteria work quality, individual freedoms and overall societal aspects. At the next level of analysis these criteria are broken down into subcriteria:

Work quality	Individual freedoms	Overall societal aspects
<ul style="list-style-type: none">• Quality of work• Job satisfaction• Accidents at work• Pollution exposure	<ul style="list-style-type: none">• Individual freedom of decision-• Health, well-being• Dependence on environmental conditions	<ul style="list-style-type: none">• Flexibility, capacity for change• Employment organisation• National dependence

This makes it possible to choose the product or process alternatives that are socially more effective than others in the selected areas.

Economic challenge to environmental and social management

PLA is used to examine economic criteria such as allocation and distribution aspects. However, it does not directly combine economic-ecological or economic-social aspects from an efficiency point of view. Instead the product line matrix provides separate information about ecological, social and economic potential for improvement, and taken together this may indicate eco-efficient and socially efficient options for action.

Integration challenge

The integration challenge is addressed by the inclusion of the three dimensions nature, society and economy. The clearly structured presentation in the product line matrix makes it possible to provide information for decision processes so that development processes for products or processes are geared to sustainable management, i.e. take account of all challenges.

Limitations and weaknesses

The selection of criteria and the evaluation of information in PLA can be designed to suit the specific situation. This results in a certain arbitrariness of design. Depending on the composition of the decision making bodies that are responsible for the analysis and evaluation procedure, investigations of the same product may produce different results. There is also a risk that the selection of criteria may exclude relevant problem areas. Thus there are limits on the extent to which comparisons can be made between different companies with similar products or processes.

As in the case of product-specific ➔ Life Cycle Assessments or ➔ Social Accounting, problems also arise in PLA in connection with criteria that cannot be measured directly and with limited capacity for acquiring and processing information. In the case of PLA these problems are greater, because its complexity is increased by its multidimensional nature. There are various ways of designing PLA in the interests of a compromise between complexity and practicability.

Further information

Literature

German Federal Environmental Agency (UBA) (Ed.) (1997): Produktlinienanalyse Waschen und Waschmittel. Berlin: UBA.

Projektgruppe Ökologische Wirtschaft (Ed.) (1987): Produktlinienanalyse: Bedürfnisse, Produkte und ihre Folgen. Cologne: Kölner Volksblatt Verlag.

Rubik, T. & Teichert, V. (1997): Ökologische Produktpolitik: von der Beseitigung von Stoffen und Materialien zur Rückgewinnung in Kreisläufen. Stuttgart: Schäffer-Poeschel.

Sekul, S. & Sieler, C. (1995): Die Produktlinienanalyse. Die Prüfung der Umweltverträglichkeit. In: Wirtschaftswissenschaftliches Studium, Vol. 24, No. 8, 417-420.

Organisations and Internet addresses

The Institute for Applied Ecology (Öko-Institut): www.oeko.de



Eco Quality Circles, Environmental Circles

The quality circle (QC) originating from the concept of TQM (→ Total Quality Environmental Management) embodies a model for improving the quality of work results and fostering further training of employees through discussion in groups. Because product quality and environmentally relevant properties are closely related, extending quality circles to include environmental topics does not cause any problems. One difficulty when dealing with QC consists in the problem of distinguishing it from other group models, as the characteristics of QC are not used consistently in the literature. Quality circles are regular discussion groups of some five to ten employees from the lower level of the hierarchy who come from the same work sector. The discussion groups are a permanent institution and normally take place during working hours. They discuss problems from the work sector in question and draw up proposals for solutions. If necessary, the quality circles are supported by specialists. The meetings are chaired by a specially trained employee, e.g. a line foreman. Implementation and control of proposed solutions may be undertaken by the members of the quality circle. The results of the quality circle may be included in the → Suggestion Scheme. Quality circles are used in medium and large enterprises in particular, where groups of the size described are available within a work sector. Examples of other group oriented instruments that may also be employed within the company include future workshops or the “Open Space” method.

Strengths and potential for meeting sustainability challenges

Conventional quality circles for economic issues can be extended to take in environmental or social issues. On the other hand it is also common to find separate quality circles for environmental and quality issues. Quality circles for social issues are very rare as yet.

Ecological challenge

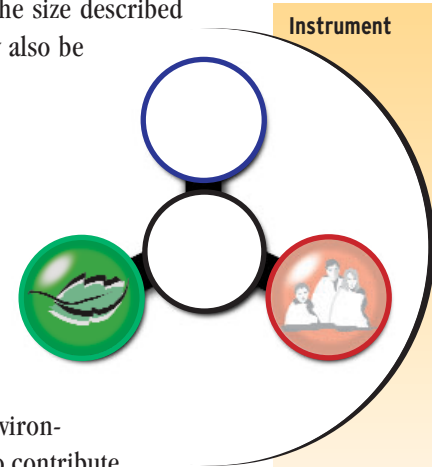
The primary purpose of environmental circles is to solve problems in the corporate environmental protection field. Employees directly concerned with the workflow can be expected to contribute practical suggestions for reducing environmental burdens. Thus environmental circles can help reduce harmful environmental impacts and increase ecological effectiveness.

Social challenge

Quality circles make an internal contribution to meeting the social challenge as well. The explicit involvement of employees in the task of solving company problems usually increases their motivation and identification with the activities and objectives of their sector. This may result in an improvement in the working climate and an increase in internal social effectiveness.

Integration challenge

Quality circles have long been a tried and tested instrument of employee management. In view of their great acceptance, such instruments are highly suitable for integrating sustainability issues. Quality circles make use of the knowledge of those directly concerned about the situation at the workplace to identify and solve environmental, social and quality problems. They promote employee identification with the corporate objectives and creativity in the search for solutions. By this means it may be possible to solve or at least minimise problems within a short space of time and without further investigation. Thorough discussion of a sector among its employees makes it possible to identify problems in the ecological, economic and social fields, since circles are not generally tied to particular topics. Although a clearly defined framework is very important for the success of a circle, it is still possible to deal with several topics. Thus integration of ecological, economic and social aspects is possible with this instrument, though in practice it is not very widespread. Nevertheless this instrument, like → Dialogue Instruments, can be expected to have great potential for solving future problems.



Limitations and weaknesses

Quality circles reach their limits where problems cover several work sectors and specialised knowledge is needed to solve them. Moreover they can only be used if the employees accept this instrument. Another essential is that the management levels must also be prepared to look seriously at the results of the quality circles and implement them where appropriate.

Further information

Literature

Antoni, C. H. (1990): Qualitätszirkel als Modell partizipativer Gruppenarbeit. Bern: Hans Huber.

Bungard, W., Wiendieck, G. & Zink, K.J. (1992): Qualitätszirkel im Umbruch. Ludwigshafen: Ehrenhof.

Franke, I. (1996): Umwelt-Zirkel als Instrument einer umweltbewußten Unternehmensführung. In UmweltWirtschaftsForum, Vol. 4, No. 00, 43-49.

Organisations and Internet addresses

American Society for Quality: www.asq.org

German Society for Quality (DGQ): www.dgq.de

The Japanese Society for Quality Control: www.jsqc.com

Kaizen Institute: www.kaizen-institute.com

Environmental Report, Eco Report, Environmental Statement, Eco-efficiency Report, Social Report, Sustainability Report

As part of the business communication process, reports serve to provide written information and to document internal and external situations. They help to communicate corporate performance to internal and external interest groups. The aim is to improve the corporate image and to increase credibility and trust on the part of target groups by ensuring greater transparency. Regular reporting can demonstrate the effectiveness of the ecological, social and economic improvements brought about by management. Offensive communication also makes it possible to increase social acceptance and to distinguish the company from competitors. The internal benefit lies in employee motivation, the documentation of environmental strategy, cost reduction successes, reduction of accident risks etc.

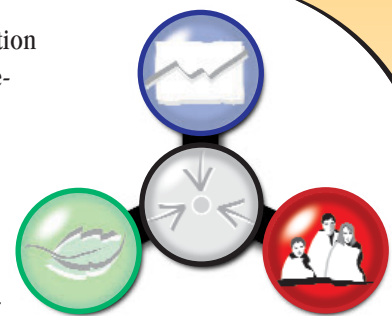
In the preparation of business reports (cf. DIN 33922, for example), certain communication and presentation principles may serve the author as orientation and decision aids (comprehensibility, completeness, comparability, continuity etc.). Communication of corporate performance can be supported by ➔ Indicators, for example.

Depending on the type, reports may contain economic, social and/or ecological information (➔ Life Cycle Assessment, ➔ Accounting, ➔ Social Accounting). Report types not yet in widespread use are social reports, eco-efficiency reports and sustainability reports. Sustainability reports seek to achieve integrated documentation of the various aspects of sustainable development.

Environmental reports are taken to mean corporate publications which inform interested groups about issues of ecological relevance for a business enterprise. Environmental statements are specific environmental reports that have to be drawn up by all companies taking part in EMAS (➔ Environmental Management System) to inform the public and other interested parties about the company's environmentally relevant activities. The contents of the environmental statement are specified in Annex III to the EC Regulation. In the interests of greater credibility an independent external environmental verifier checks that the performance documentation is correct and that it complies with the requirements of the EC Regulation (➔ Audit). This is confirmed by the validation statement.

Compared with other environmental reports, environmental statements have regulated procedures and content rules, and can therefore be regarded as the first approach to standardisation for environmental reports. They have a considerable influence on the basic structure of other environmental reports. There is no generally valid standard containing criteria for the content of the various kinds of reports. Individual industries (banks, chemical industry) have however published guidelines giving details of relevant environmental aspects to be mentioned in the report. Institutions such as the Global Reporting Initiative (GRI), the World Business Council for Sustainable Development (WBCSD), the Institute for Ecological Economy Research (IÖW) or the German Institute for Environment, Market and Society (imug) provide suggestions for the design of sustainability reports. GRI is currently developing as the main initiative harmonising and developing a widely accepted standard of sustainability reporting.

Instrument



Strengths and potential for meeting sustainability challenges

Ecological challenge

Disclosure of corporate environmental performance is intended to make the practical environmental efforts of business enterprises more transparent and plausible for interested parties. The aim is indirectly to provide stronger motivation for enterprises to minimise environmental impacts and increase ecological effectiveness. The standardisation of the environmental statements is designed to improve the credibility of corporate communication. In addition, environmental reports are considered to have a planning and control function, since they point out the strengths and weaknesses of business enterprises.

Social challenge

Social reports describe objectives, measures and achievements and the resulting impacts of the employee-related and socially relevant activities of the company. This instrument enables enterprises to inform interested parties about social measures and expenditure that would not be covered by conventional accounting. The greater transparency is also intended to increase the social efforts of business enterprises. Social reports are also said to have a steering function that extends the range of business planning and control instruments by ensuring that decisions relating to the company also take account of social objectives.

In general, companies satisfy the information needs of stakeholders by publishing a various kinds of reports (environmental reports, social reports etc.) and show a sense of responsibility by providing interested parties with the desired information. The aim is to increase the credibility of corporate communication and increase trust in the company with a view to safeguarding its long-term legitimation.

Economic challenge to environmental and social management

Companies' financial reports are increasingly taking up and incorporating ecological issues. Conversely, environmental reports are also reporting on economic aspects (cf. VDI 3800, for example). In isolated cases companies also prepare eco-efficiency reports which describe the relationship of economic performance to environmental impact added (or specific environmental impact indicators). In this way they communicate the company's efforts to manage the business in an ecologically efficient manner.

Integration challenge

Sustainability reports pursue a strategy of integrated environmental, social and financial accounting, continuous and worldwide reporting on local and global environmental impacts, and internal and external performance evaluation. This integrated presentation of the various challenges of sustainable management seeks to provide the stakeholders with appropriate information about the extent and way in which companies take a combined approach to the various challenges. Isolated companies are already attempting to use sustainability reports to document the way they are addressing the issue of sustainable management. In addition to the documentation function, sustainability reports also possess a planning and control function.

Strengths and weaknesses

One major weakness in the largely voluntary and non-standardised reporting is the difficulty of ensuring that the reports are credible. By laying down in the regulation the defined minimum requirements that must be satisfied by an environmental statement, EMAS (↻ Environmental Management System) seeks to improve this state of affairs. General recommendations for improving credibility draw attention to the principles of proper (financial) reporting (completeness, comprehensibility etc.), the possibility of external verification of the report, and the involvement of the stakeholders. The latter can for example be achieved by means of written appraisals of the report by the stakeholders and by publishing statements by employees in the report.

A fundamental problem lies in the fact that companies still do not know enough about the information needs of the various interest groups. For this reason it is frequently recommended that stakeholders be involved as early as possible to take appropriate account of their expectations, interests and needs. The associated call to communicate the business data in the reports in a stakeholder-oriented fashion focuses attention on identifying and catering to the relevant interest groups and their information needs. Some people see risks in disclosing information, for example to competitors.

Further information*Literature*

- Bennett, R. & James, P. (Eds.) (1999): Sustainable measures: evaluation and reporting of environmental and social performance. Sheffield: Greenleaf.
- Hoffmann, N. (1999): Ökologisch-orientierte Unternehmensberichterstattung: ein Instrument zur Unterstützung des Umweltschutzmanagements und zur Publizität betrieblicher Umweltauswirkungen. Frankfurt/Main: Lang.
- Institut für ökologische Wirtschaftsforschung & Institut für Markt - Umwelt - Gesellschaft (Ed.) (2002): Nachhaltigkeitsberichterstattung - die Praxis glaubwürdiger Kommunikation zukunftsfähiger Unternehmen. Berlin: Schmidt.
- Schaltegger, S. (1997): Information Costs, Quality of Information and Stakeholder Involvement – the necessity of international standards of ecological accounting. In: Eco-Management and Auditing, Vol. 4, 87-97.
- Steven, M., Letmathe, P. & Schwarz, E. (1997): Umweltberichterstattung und Umwelterklärung nach der EG-Öko-Audit-Verordnung. Berlin: Springer.
- Wysocki, K. von (1981): Sozialbilanzen: Inhalt und Formen gesellschaftsbezogener Berichterstattung. Stuttgart: Fischer.
- Deutsches Institut für Normung e.V. (1997): Leitfaden Umweltberichte für die Öffentlichkeit. Deutsche Norm DIN 33922. Berlin: DIN.

Organisations and Internet addresses

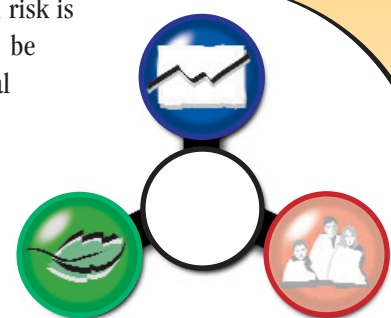
- German Environmental Management Association (B.A.U.M.): www.baumev.de
- EnviroWindows: www.ewindows.eu.org/Industry/Reporting
- future e.V.: www.future-ev.de, see under Projects
- Global Reporting Initiative (GRI), Guidelines and Supplements (download): www.globalreporting.org
- Institute for Market – Environment – Society (imug): www.imug.de
- Institute for Ecological Economy Research (IÖW), Guidelines and Supplements (download): www.ioew.de & www.nachhaltigkeitsberichte.net
- International Institute for Sustainable Development (IISD): www.iisd.org/measure
- SustainAbility: www.sustainability.com
- German Association of Engineers (VDI): www.vdi.de
- World Business Council for Sustainable Development (WBCSD), Guidelines and Supplements (download): www.wbcsd.org



Risk analysis is a systematic method for forward-looking risk identification and assessment (risk evaluation) of potential future dangers or risks. There are basically two types of risk analysis: process risk analysis and product risk analysis. The purpose of the former is to prevent incidents in the course of processes, i.e. events resulting in harmful effects on people, property or the environment. The aim of product risk analysis is to prevent product-induced dangers to employees, consumers and the environment. The result of a risk analysis is a risk inventory (also known as risk catalogue, cf. Figure 1). This contains a condensed version of the findings made during the risk analysis (e.g. information on the individual risks, evaluation of the risks, assessment of risk policy measures, suggestions for improving the status quo, and a priority ranking of the measures). As a rule risk analysis is part of the risk management process, which in turn can be broken down into the risk analysis itself, the investigation of alternative options, the design of risk policy and its implementation and control.

In various cases companies are required by law to perform and/or submit a risk analysis, e.g. before launching products such as pharmaceuticals, hazardous substances etc., bringing processes into service, or in the data protection and IT fields. Under Basel II (“New Basel Capital Accord”) the operational risk is explicitly included in the calculation of the banks’ necessary capital backing. This can be expected to lead to increased differentiation of credit terms and hence to corporate capital costs. With effect from 2005 the provisions of Basel II are to be transposed into national law in 100 countries, in order to increase the security of the global financial system.

Instrument



Risk Areas		Risk description and assessment of potential maximum loss (before risk management measures)				Risk management measures implemented (effectiveness of measures)				Risk description and assessment of potential maximum loss (after risk management measures)				Suggestions/Remarks										
General extreme risks	Legal requirements Technology Acts of God Political circumstances	Threat to existence	5	4	3	2	1	No impact on corp. objectives	Very low	5	4	3	2	1	Very high	Threat to existence	5	4	3	2	1	No impact on corp. objectives	Priority	Suggestions
Performance risks	Procurement Production Sales Research & Development Fire protection IT Quality management	Threat to existence						No impact on corp. objectives	Very low						Very high	Threat to existence						No impact on corp. objectives		
Financial risks	Customer credit standing Liquidity Market prices	Threat to existence						No impact on corp. obj.	Very low						Very high	Threat to existence						No impact on corp. obj.		
Corporate Governance risks	Organisation Management style Communication Corp. culture Personnel risks	Threat to existence						No impact on corp. objectives	Very low						Very high	Threat to existence						No impact on corp. objectives		
Social goals	Envir. protection Occup. safety	...						...	...						...	...						...
Other goals	...	...						...	...						...	...						...

© Copyright 1999 RisCon (www.RisCon.de)

Figure 1: Example of a risk inventory as a basis for risk policy decisions in a company (Source: www.risknet.de, 21.01.02)

A risk analysis is usually performed using the following procedure:

1. Define objectives and delimit system
2. Draw up basic figures (e.g. on basis of safety data sheets)
3. Identify risks (describe cause-and-effect relationships)
4. Evaluate risks (assess probability of occurrence and scale of damage)
5. Present the risk profile (e.g. in a risk matrix, cf. Figure 2)
6. List of measures (draw up measures designed to reduce risks)
7. Analyse the risks that remain after implementation of the measures

Risk identification should be undertaken on a process-oriented basis and be subdivided into different risk areas (company management, purchasing, production, infrastructure, marketing, quality management, fire protection, occupational safety, IT, transport etc.). The scale of the damage and the probability of its occurrence can be rated in both quantitative and qualitative terms (categories “small to catastrophic” and “improbable to frequent”). The risk profile of a company can be represented in a risk matrix (risk map, cf. Figure 2). The risk matrix shows what priority should be attached to tackling the various risks. First priority is given to risks in the intolerable risks zone (catastrophic results). Within a given scale of damage, priority is given to risks with a higher probability.

To make it possible to undertake a comprehensive analysis and assessment of (environmentally relevant) risks, it is necessary to hold interdepartmental/interdisciplinary workshops with specialists from the various areas, such as engineering (process technology, mechanical engineering), chemistry, biology and geology.

Instruments that can be used to support risk analysis may include ➔ Early Identification, ➔ Scenario Analysis, ➔ ABC Analysis or error tree analysis. Once the risks have been analysed, a monitoring system (e.g. computer-based) should be set up to coordinate, monitor and control the planned and implemented risks (e.g. adherence to deadlines, definition of alert thresholds (who reports to whom) and competencies).

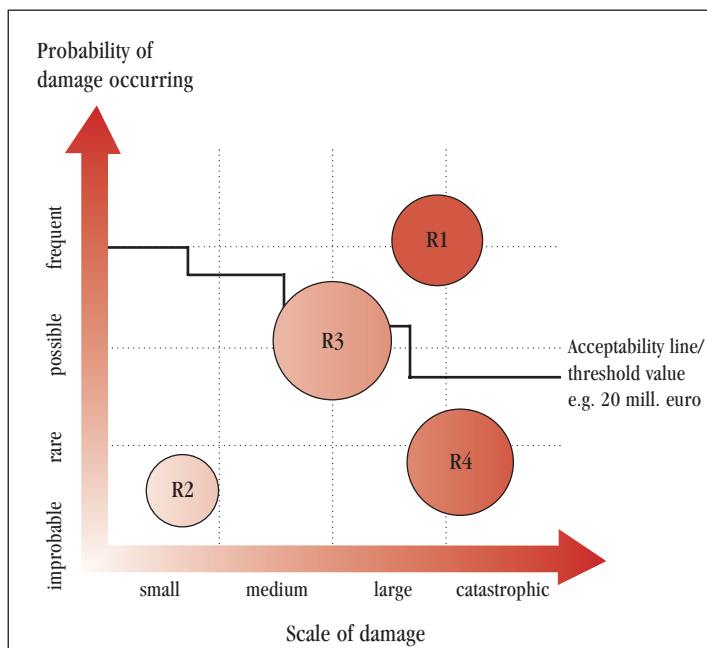


Figure 2: Example of a risk matrix with various identified and evaluated risks (R1 to R4)
(Source: www.risknet.de, 21.01.02)

Strengths and potential for meeting sustainability challenges

Ecological challenge

Scientifically and ecologically oriented risk analysis serves to determine and assess the (environmental) soundness of processes and products in particular. It forms the methodological basis for the integration of (environmental) safety in processes or products and in their development. By taking account of risks at an early stage it is possible to reduce or even avoid a potential environmental burden in advance and thereby achieve a substantial increase in the effectiveness of business enterprises.

Social challenge

Since the assessment of risks may be subject to very considerable variations owing to differences in subjective risk perception, all persons potentially affected (not only experts, but also employees, residents, customers etc.) with their individual concerns and anxieties should as far as possible be included in a risk analysis. The search for an acceptable risk is usually not a problem of technical and scientific optimisation, but one of social acceptance. To optimise social effectiveness it is therefore necessary for the company to take account of risk perception and acceptability. The benefit-risk dialogue (➔ Dialogue Instruments) is a useful instrument in this respect. If the results of dialogue forums are included in the risk analysis, this may help to increase social effectiveness.

Economic challenge to environmental and social management

Risk analysis makes it possible to identify risks in advance and assess their significance (primarily: probability of occurrence and expected scale of damage). This helps to save costs and usually to avoid/reduce environmental or social impact added, which may result in an increase in eco-efficiency or social efficiency.

Limitations and weaknesses

Risk analysis is an instrument that usually has to work with incomplete information (both for risk identification and risk assessment). This and the lack of a generally recognised system of indicators make it difficult to measure a risk and especially to compare it with other risks. Moreover, a risk that has to be considered (= potentially negative impact) is not a hard fact and cannot be precisely defined, since its perception and many protection objectives are subjective and risk awareness depends on knowledge about a potential danger. Risk assessment is generally subject to the difficulty of weighing up priorities in the system of constraints between what is desirable, what is technically feasible and what is acceptable from an economic and ecological point of view.

The call for a consensus-based approach or for involvement of all parties potentially affected by possible damage and their protection objectives in a risk analysis can involve a good deal of work, explanation and coordination (i.e. reaching a consensus). However, it lays the foundations for broadly based social acceptance of the results of a risk analysis.

Further information*Literature*

- Dörner, D., Horvath, P. & Kagermann, H. (Eds.) (2000): *Praxis des Risikomanagements*. Stuttgart: Schäffer-Poeschel.
- Efker, M. (2001): *Ratgeber zur Ermittlung gefährdungsbezogener Arbeitsschutzmaßnahmen im Betrieb: Handbuch für Arbeitsschutzfachleute*. Bremerhaven: Wirtschaftsverlag NW, Verlag für Neue Wissenschaft.
- Fent, K. (1998): *Ökotoxikologie: Umweltchemie-Toxikologie-Ökologie*. Stuttgart: Thieme.
- Hungerbühler, K., Ranke, J. & Mettler, T. (1999): *Chemische Produkte und Prozesse*. Heidelberg: Springer.
- German Federal Environmental Agency (UBA) (Ed.) (2001): *Nachhaltigkeit und Vorsorge bei der Risikobewertung und beim Risikomanagement von Chemikalien*. Berlin: UBA.

Organisations and Internet addresses

- Risk Assessment & Policy Association: www.fplc.edu/risk/Rapa.htm
- RiskNet: www.risknet.de
- Society for Risk Analysis (SRA): www.sra.org



Scenario Technique, Scenario Management, Multiple Scenario Analysis

Scenario analysis is an instrument in which several clearly differing views of the future (scenarios) are produced. Scenarios give pointers to potential opportunities and/or risks from which it is possible to deduce consequences for measures and strategies in the present (e.g. for company management, technology management, product or location development). Thus scenarios support decision finding in strategic management.

A scenario can describe either a possible future situation (static scenario) or the development which leads to this situation. When drawing up a scenario it is not necessary to know the probability of its occurrence. The method involves drawing pictures of the future which spread out as time goes on (5, 10, 15, 20 or more years) to form a funnel-like structure widening from the present to the future as a result of their differences in design (cf. Figure 1). Scenarios make for better mental appreciation of different situations and encourage thinking in alternatives. They may not resolve the uncertainties of the future, but they give them structure. Within a team or company the creation of scenarios can make a contribution to agreeing on common objectives.

A scenario analysis involves several phases or steps. The five most important phases are outlined below (cf. Figure 2):

- 1) Problem analysis: Deciding on project objectives and organisation and defining and making an inventory of the present state of the object in view (companies, products, industries, technologies etc.)
- 2) Context analysis: Open description of the company context to be investigated, stating its spheres of influence and determining the relevant influence factors; identification of key factors by analysing and grouping the influence factors
- 3) Future projection (“Look into the future”): Elaborating, naming and giving reasons for several alternative and plausible alternatives for the development of the key factors (views of the future: trend scenario, extreme scenarios etc.; cf. Figure 1)
- 4) Scenario creation: Selecting and describing a manageable number of logical and consistent scenarios by bundling or grouping the future projections (possibly with the aid of ➔ Cross-Impact Analysis)
- 5) Scenario transfer: Transferring the scenarios to the decision processes of company management; i.e. examining the impacts of the scenarios described on the object in view, and subsequently drawing up statements and setting priorities for strategic decisions and/or for strategy development.

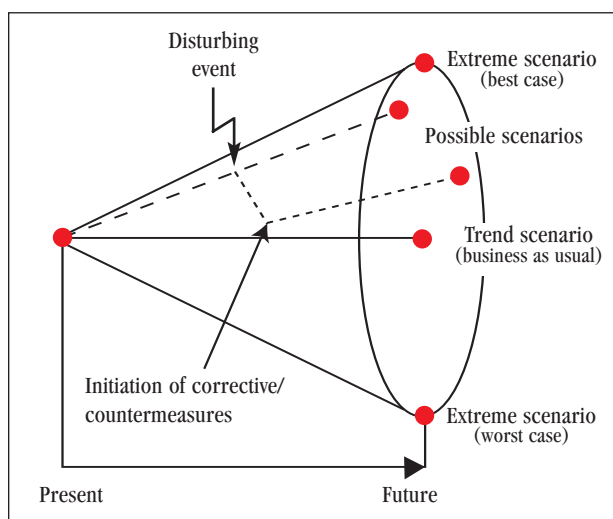
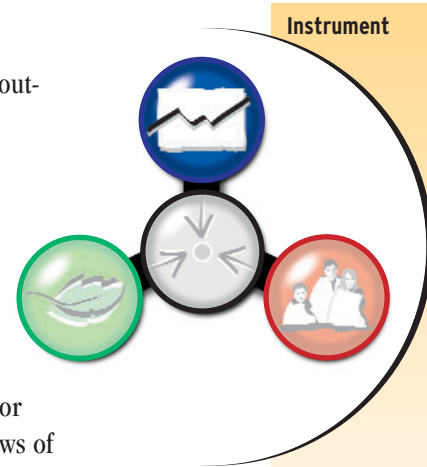


Figure 1: Scenario funnel (after Reibnitz 1991)

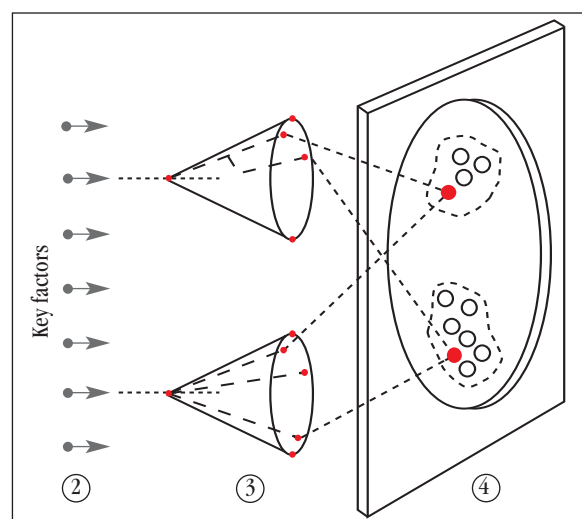


Figure 2: Basic procedure (phases 2 to 4) for scenario creation (after Gausemeier & Fink 1999, 86)

Performing a scenario analysis is a task for a group which should include employees from all management levels. This is a prerequisite for successful inclusion of their results. Scenario analysis must not be seen as a one-off process. It must be integrated in a company's planning and decision process and must develop into a planning instrument that provides lasting support. Linking the scenario analysis with early warning systems (→ Early Identification) is important and increases its value to the company.

Strengths and potential for meeting sustainability challenges

Thanks to its very broad and virtually unlimited spectrum of application, scenario analysis can be used to *meet all four challenges*, but in particular the economic challenge. It promotes an understanding of the business contexts, makes for more sensitive perception of changes, leads to better handling of uncertainties, and supports future-oriented action. The process of scenario creation results in an overall improvement in the creativity and flexibility of planning and a general raising of awareness of problems.

Economic challenge to environmental and social management

The identification of future opportunities and risks by means of scenario analysis allows the course for corporate activities to be set at an early stage. It allows a company to prepare for trend changes or new scientific findings even before they have emerged or become established. The associated pioneering role frequently results in competitive advantages and in improved efficiency in the ecological and social fields.

Limitations and weaknesses

A scenario analysis is a process involving a good deal of work, time, personnel and expenditure. It has to be planned on a long-term basis and calls for (prior) methodological and technical knowledge. It may be very difficult to decide on a strategy as a basis for scenarios, since company or its decision makers have three options:

- Choosing a robust strategy, i.e. one that is bound to be successful, by deliberately accepting compromises
- Taking the most probable strategy as a basis
- Making targeted use of resources to bring about a desirable scenario

Which option is the most suitable depends both generally on the company and specifically on the project objectives. There is no general method of making the choice easier.

Further information

Literature

Gausemeier, J. & Fink, A. (1999): Führung im Wandel. Ein ganzheitliches Modell zur zukunftsorientierten Unternehmensgestaltung. Vienna: Hanser.

Mißler-Behr, M. (1993): Methoden der Szenarioanalyse. Wiesbaden: DUV.

Reibnitz, U. von (1991): Szenario-Technik: Instrumente für die unternehmerische und persönliche Erfolgsplanung. Wiesbaden: Gabler.

Organisations and Internet addresses

Economic Sociology and Urban Sociology, Department of Sociology, Johannes Kepler University, Linz:
www.awista.uni-linz.ac.at/loid/esof99s/prognoseforschung.html

Chair of Economic and Social Didactics, University of Bielefeld: www.wiwi.uni-bielefeld.de/%7Eweinbren/szenario.htm

Scenario Management International (ScMI): www.szenario.com

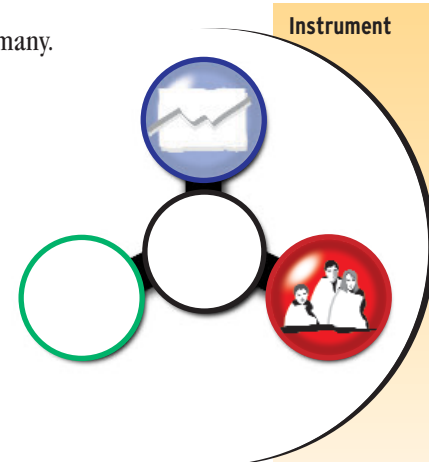
Corporate Social Accounting

Social accounting is a term used to describe accounting systems (➔ Accounting) which provide information about the social benefits and social costs of business activities. As a rule, however, social accounting does not present a “balance sheet” (of inventory items) in the strict sense. Occasionally social reports (➔ Reporting) or ➔ Life Cycle Assessment are also known as social accounts. By preparing social accounts the company can document its social performance and responsibility. The evaluation can, for example, draw attention to the contributions that ➔ Employee Volunteering or special schemes for working hours make to solving social problems. To date there is no standard structure for social accounts. Basically they may be *input or output oriented*. The figure below shows an input-oriented basic model for social accounting. With the trend in the ➔ Reporting field from straight environmental reports to sustainability reports, increasing attention is being given to documenting social activities. This represents a first step towards preparing social accounts. A special case of social accounting that is confined to the contribution of various groups to the value of the company is Stakeholder Value analysis (➔ Stakeholder Value).

Preparation and publication of social performance evaluations is not very common in Germany.

Expenditure <i>saved</i> as a result of failure to take social measures		Expenditure <i>incurred</i> as a result of failure to take social measures	
Area	EUR	Area	EUR
Employees	...	Employees	...
Residents		Residents	
Suppliers		Suppliers	
Products		Products	
...		...	

Figure: Basic model of input-oriented social performance evaluation (after Linowes 1974, quoted in Schredelseker 1993)



Strengths and potential for meeting sustainability challenges

Social challenge

Social accounting documents the contributions made by a company to the existence of significant social problems on the one hand, and to their solution on the other. By preparing social accounts the company is forced to get to grips with its activities in the social sector. The result is that management is made aware of new circumstances and is offered suggestions for improving social effectiveness. Moreover, social accounts are usually published. If it exhibits weaknesses to the outside world, it has to justify them to the public. It will therefore seek to eliminate such weaknesses directly or at least to take countermeasures. This also leads to an improvement in social effectiveness.

Economic challenge to environmental and social management

As a result of social deficits a company can be expected to suffer a fall in profits. This fall is often hard to quantify, since parameters like employee motivation are difficult to measure and compare. If social parameters are compiled systematically, however, it is possible to systematically analyse the economically relevant aspects and identify high expenditure. This gives the company the opportunity to increase its social efficiency.

Limitations and weaknesses

A crucial limitation of social accounts lies in the fact that many social aspects are hard to measure adequately. Furthermore, the combination of monetary and nonmonetary parameters often makes a certain complexity unavoidable. The variety of units is an obstacle to clarity and communication. This can also make it difficult for the target groups to understand. To date there is no standardised model for preparing social accounts.

Further information

Literature

Heymann, H. (1981): Die Sozialbilanz als Instrument der Unternehmensführung: Das gesellschaftsbezogene Rechnungswesen der Unternehmung in der sozialen Marktwirtschaft. Frankfurt/M.: Fischer.

Kracke, U. (1982): Sozialbilanzen und sozialverantwortliche betriebliche Sozialpolitik. Berlin: Duncker & Humblot.

Pfnür, A. (1995): Informationsinstrumente und -systeme im betrieblichen Umweltschutz. Heidelberg: Physica.

Schredelseker, K. (1993): Sozialbilanz. In: Chmielewicz, K. & Schweitzer, M. (Ed.): Handwörterbuch des Rechnungswesens. Stuttgart: Poeschel, 1833-1842.

Wysocki, K. (1981): Sozialbilanzen: Inhalt und Form gesellschaftsbezogener Berichterstattung. Stuttgart: Fischer.

Organisations and Internet addresses

BASF AG: www.basf.de

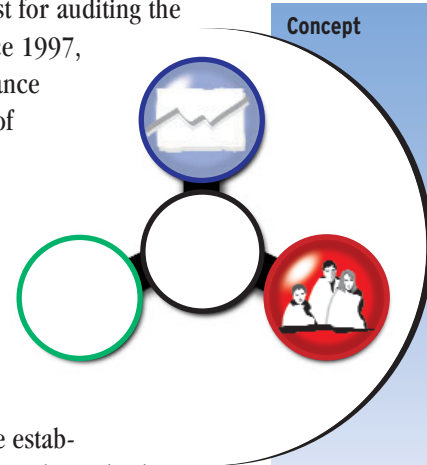
Karfurke Personnel and Business Consulting: www.unternehmerinfo.de

Social Accountability 8000 (SA 8000), AccountAbility 1000 (AA 1000)

Management systems coordinate and systematise business activities with the aid of defined and documented steering and control mechanisms. The aim is to improve the company's workflows and organisation and hence its corporate (social) performance (→ Accounting, → Reporting), and to support compliance with legal requirements. To this end responsible persons are appointed, the organisational structure is adapted, procedures are drawn up for defining behaviour patterns, approaches and methods, and objectives and measures are formulated. The framework for the company's activities is provided by its corporate policy in the form of → Guidelines or corporate principles. Regular → Audits and system checks are performed to ensure the continued operation of the system. Following the external → Audit, which is conducted by an independent expert, the management system can be certified.

Depending on their emphasis, a distinction is made between social and → Environmental Management Systems. A social management system makes it possible to include social aspects in the management of the company. Social standards such as Social Accountability 8000 or AccountAbility AA 1000 serve as a checklist for auditing the social management of a company. The SA 8000 standard, which has been in existence since 1997, is used to examine social aspects in the company and the supply chain and to verify compliance with defined minimum social standards. Based on international human rights conventions of the International Labor Organization (ILO) and the United Nations, it covers the following eight areas of activities:

- Child labour
- Freedom of association and collective bargaining
- Discrimination
- Disciplinary procedures
- Working hours
- Remuneration
- Occupational safety and health



On the lines of the environmental management standard ISO 14001ff., SA 8000 requires the establishment of a social management system that defines procedures for compliance with the social standards in the company and for documentation and communication. Compliance with this standard is checked by independent external verifiers in the social audit (→ Audit) and in regular follow-up audits. The certificate, which is valid for three years, can be used for advertising to consumers or other companies.

Strengths and potential for meeting sustainability challenges

Social challenge

Social management system can close the gap between → Environmental Management Systems and quality management systems. Systematic and thorough recording, planning and control of social aspects is still not very widespread, however. Social management systems support adherence to social standards in the company and a process of continuous improvement in corporate social aspects. If the suppliers are also required to meet the certification requirements, it is possible to combat socially undesirable situations at prior production stages in other countries, for example. This reduces the potential risk of damage to one's own company image. Auditing (→ Audit) and certification can increase the company's social credibility and safeguard its legitimation. Social or sustainability reports (→ Reporting) can enhance communication of the company's social responsibility to consumers, investors and other companies.

Economic challenge to environmental and social management

Social management systems primarily pursue the aim of permitting better identification and control of the social impacts of the company. At the same time they can also help to increase social efficiency by achieving economic benefits resulting from reductions in harmful impacts inside and outside the company.

Integration challenge

It would be useful if the various management systems could be combined as regards both structure and content. This would permit equal inclusion and control of ecological, social and economic aspects. In practice, however, such comprehensive integration is a rare occurrence.

Limitations and weaknesses

There are weaknesses in the inadequate integration of the various management systems. In addition, social management systems are not yet very widespread. The design of social management systems runs into problems where minimum social standards are not compatible with the legal situation in the countries concerned: for example, suppliers from other countries where constitutional factors preclude freedom of association or the existence of necessary political structures conflict with the requirement of freedom of association and collective bargaining for employees. Other points of criticism relate to the arbitrary selection of individual production facilities and the rigid uniform design and application of global social standards. Universal norms such as SA 8000 do not take account of cultural values and specific circumstances in the individual countries.

Further information

Literature

Lohrie, A. (2001): Standard für soziale Verantwortung. Erfahrungen mit dem SA 8000 als Teil des Managements der gesellschaftlichen Beziehungen. In: Ökologisches Wirtschaften, 1/2001, 13-14.

Social Accountability International (1997): Soziale Bewertungsregeln 8000 (Social Accountability 8000). Internet: www.cepaa.org/publications.htm

Organisations and Internet addresses

Global Reporting Initiative (GRI): www.globalreporting.org

Institute for Social and Ethical AccountAbility: www.accountability.org.uk

SGS Consumer Product Services and International Certification Services: www.sgsgroup.com

Social Accountability International (SAI): www.cepaa.org

Social and Ethical Reporting Clearinghouse (SERC): cei.sund.ac.uk/ethsocial/index.htm

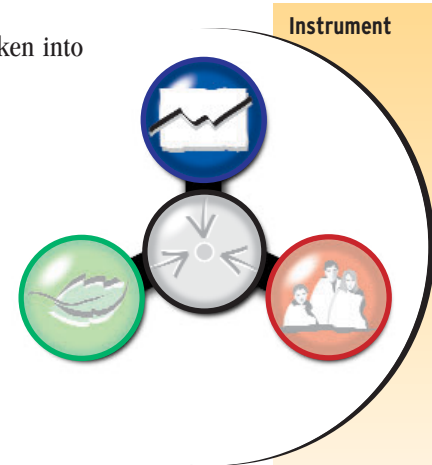
Eco-Sponsorship, Social Sponsorship

Eco-sponsorship or social sponsorship means the provision of cash or noncash resources or services by companies for ecological or social projects or organisations. For the recipients this results in better achievement of the targeted ecological and/or social welfare objectives. It also has impacts on the ecology-oriented or socially oriented corporate culture and communication. In sponsorship, unlike donations, the sponsor receives in return the right to market the resources provided, e.g. to advertise using a specific logo.

Eco-sponsorship may take the form of support for existing nature conservation organisations or for company-initiated projects, such as commissioning environment-related research projects or organising nature conservation competitions. Much the same applies to social sponsorship. Especially projects initiated by companies themselves result in enhanced credibility in the eyes of the target groups. This can be reinforced by involving the company's own employees (→ Employee Volunteering).

The following items can be identified as central features of sponsorship that should be taken into account when developing a sponsorship philosophy:

- Information about the targeted objectives
- Definition of the target groups
- Promotion areas and forms of sponsorship
- Reasons for and statement of the connection between the company and the relevant environmental problem
- Information about company's own ecological and/or social behaviour
- Relationship to corporate image
- Information about time scale
- Clear distinction from donations



Strengths and potential for meeting sustainability challenges

Ecological challenge

As a rule the resources made available under eco-sponsorship arrangements permit targeted pursuit and better achievement of ecological objectives. Companies that engage in eco-sponsorship activities address the public with their commitment to specific ecological objectives. Credible communication of these activities calls for an internal discussion of the ecological issues and the type of sponsorship. If a company engages in eco-sponsorship it must, to remain credible, pay special attention to ecological effectiveness in its own production as well. Thus eco-sponsorship may indirectly bring about an improvement in ecological effectiveness within the company.

Social challenge

Sponsorship is also widespread in the social sector. In the same way as eco-sponsorship, social sponsorship can also be expected to make a contribution to improving social effectiveness, both through the resources provided and through increased internal awareness.

Economic challenge to environmental and social management

The difference between sponsorship and donations is above all that the sponsor receives something in return. This often takes the form of a licence to use a logo or some other kind of marketing assistance. Such marketing activities are designed to result in increased sales and additional value added. In this way sponsorship can, depending on its orientation, contribute to increasing the value of the company.

Integration challenge

Sponsorship can support both aspects of the integration challenge. On the one hand it is an instrument that is already being used successfully by many companies for various fields. This makes it easier to integrate the instruments of environmental and social sponsorship in conventional management. On the other hand sponsorship is not limited to specific topics, which means that a wide variety of fields can be included in sponsorship activities. In many cases a company sponsors parallel projects in the environmental and social sectors, and this as a whole can be regarded as sponsorship of sustainable development.

Limitations and weaknesses

Sponsorship in the context of sustainable development frequently involves cooperation between organisations with very different ways of thinking and acting. This can result in misunderstandings and conflicts that endanger the success of sponsorship activities.

Sponsorship may lead to unexpected reactions by the public (e.g. accusations of attempts to “buy” a positive image). It is not always possible to communicate a sponsorship project in the desired way. For this reason careful planning of how the sponsorship activities are to be presented to the public is essential if annoyance and loss of credibility are to be avoided. As a result of its sponsorship the company is also subject to increased public scrutiny with regard to sustainable development issues.

Sponsorship does not arouse positive associations in all areas. Sometimes it is associated with “efforts to expand the sphere of influence” and “asserting specific interests”. Precautions must be taken to avoid such associations by means of suitable communication at an early stage.

Further information

Literature

Bruhn, M. (1993): Chancen und Risiken des Öko-Sponsoring. Schloß Reichartshausen.

Gillies, C. (1991): Business sponsorship. Oxford: Butterworth-Heinemann.

Niedersächsische Naturschutzakademie (Ed.) (1994): Ökosponsoring - Werbestrategie oder Selbstverpflichtung? Mitteilungen aus der NNA, No. 4.

Organisations and Internet addresses

Daimler Chrysler AG: www.daimlerchrysler.de

Henkel KGaA: www.henkel.de

Academy for the Protection of Nature and Environment (NUA) of North Rhine-Westphalia: www.nua.nrw.de

ÖkoBörse: www.oeko-boerse.de

Sponsoring & Consulting: www.sozial-sponsoring.de

IEG, Inc. (sponsorship forum): www.sponsorship.com

Return on Stakeholder (RoSt), Stakeholder Value Added

Stakeholder value analysis is based on the stakeholder approach of standard-setting and strategic management of companies, which is used to analyse relations between stakeholders (interest groups) and companies. Stakeholder value analysis involves systematic determination of the stakeholder contribution to the value of the company. It is thus efficiency oriented, much like the determination of optimum input of capital. The goal of the shareholder value approach (➔ Environmental Shareholder Value) – that of increasing and maintaining the value of the company in the phases value generation, maintenance and realisation – is mentally applied to the relationship between company and stakeholders.

Measuring the contribution to company value due to the stakeholder relations (stakeholder value) is done in four steps (cf. Figure). In the first two steps, on the same lines as return on capital, the “return on stakeholder” (RoSt) is calculated for the company in question and the reference company (e.g. market average). The RoSt represents the stakeholder’s relative contribution to the value of the company (value generation or destruction). In a third step the RoSt of the reference company is subtracted from the RoSt of the company in view, yielding the “value spread”. This describes whether the stakeholder’s contribution to the value of the company was made by means of a relatively efficient use of resources. In the final step this is multiplied by the company’s stakeholder costs to obtain the “stakeholder value added”, i.e. the stakeholder’s absolute contribution to the value of the company.

Instrument

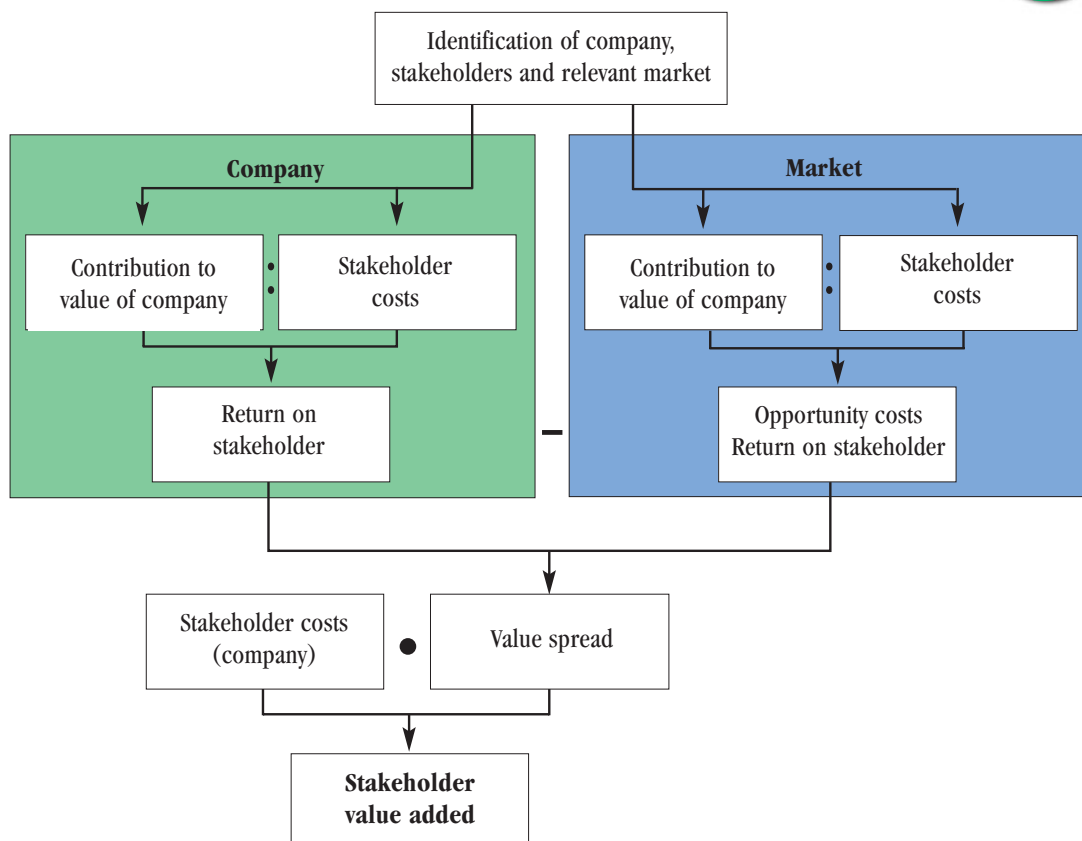
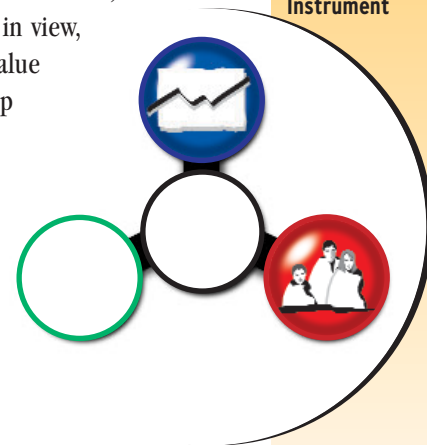


Figure: Calculation of return on stakeholder (RoSt) and of stakeholder value added (after Figge & Schaltegger 2000)

Strengths and potential for meeting sustainability challenges

Social challenge

Every output requires an input of resources such as capital resources, trust, information and know-how. These are made available to the company by certain resource providers whose demands are satisfied by the company through its outputs. Thus the purpose of business enterprises lies not solely in production, in selling goods and services or in making a profit, but also, as “quasi-public institutions”, in satisfying the needs of various interest groups. Stakeholder value makes it possible to register these exchange relationships in quantitative form and examine their social effectiveness, and may be regarded as a supplement to the shareholder value approach.

Economic challenge to environmental and social management

Stakeholder value analysis permits measurement of stakeholder contributions to the value of the company. Stakeholders such as personnel or customers are acquiring increasing importance, e.g. as a result of the strong trend to dematerialisation. Traditional accounting and conventional business appraisal, by contrast, concentrate entirely on one stakeholder, the investor. Stakeholder value analysis fills this gap.

The calculation of stakeholder value makes it possible to distinguish between cost-intensive and unprofitable stakeholder relationships. Instead of absolute stakeholder costs, the return on stakeholder (RoSt) is used to obtain a ratio for the costs and benefits of the exchange relationships between the company and the stakeholders. Stakeholder value is a first systematic, efficiency-oriented determination of the stakeholder contribution to the value of the company.

Limitations and weaknesses

Weaknesses exist in the calculation and interpretation of the “return on stakeholder” (RoSt). There is a risk, for example, that incorrect assumptions may result in relations with stakeholders that make no contribution to the value of the company being neglected or even totally discontinued (miscalculation). Furthermore, stakeholder value analysis in its present form is “only” applicable to stakeholders whose costs or expenditure items can be seen from internal or external accounts.

Further information

Literature

Figge, F. & Schaltegger, S. (2000): What is “Stakeholder Value”? Developing a catchphrase into a benchmarking tool. Lueneburg: Center for Sustainability Management (CSM) and Bank Pictet & Cie in cooperation with UNEP.

Organisations and Internet addresses

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/csm

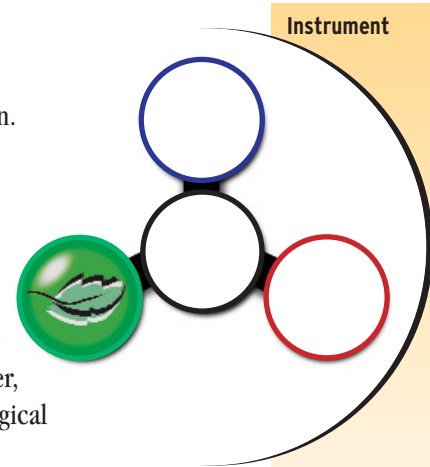
Substance Stream Analysis, Material Flow Accounting

Substance flow is a term used to describe the route taken by substances from their extraction/production through all stages of manufacture to disposal. Substance flow analysis documents and analyses the path of a substance from raw material to sink (waste management, landfill). Hence internal substance flow analysis looks at the progress of a substance through the processes within the company. Substance flow analysis is an important basis for substance flow management. Where the item in view is not a single substance (such as CO₂, TOC), but a material (such as oil, waste, wastewater), it is usual to speak of *material flow accounting*. Material and substance flow accounts may be regarded as approaches of physical ➔ Accounting. The basis for a substance flow analysis is a flow chart.

The aims of substance flow management are to:

- Reduce or avoid problematic substances (e.g. toxic substances)
- Reduce raw material and energy input
- Reduce or avoid emissions
- Reduce quantity of waste generated
- Reduce or avoid noise problems

Before every substance flow analysis it is necessary to define the purpose of the investigation. Substance flow analysis can be performed using different methods and in different degrees of intensity. Its precision should as far as possible be keyed to its purpose. The item in view (substance or chemical element) should also be stated clearly, since definition problems can easily arise in the case of chemical processes, for example. An internal substance flow analysis is performed using plant-specific ➔ Life Cycle Assessments, ➔ Product Line Analyses and other methods. Frequently the plant is broken down into subsectors. The finer this structure, the greater is the information value of the analysis. A finer structure, however, also increases the amount of work involved in the analysis. A variety of methods (technological or economic) can be used to identify the substance flows.



Strengths and potential for meeting sustainability challenges

Ecological challenge

Substance flow analyses primarily serve to obtain information about the entire path of a specific substance in the production of goods and services. Paramount aims here are ecological aspects such as reducing waste quantities, increasing substance utilisation levels etc. Substance flow analysis can also be used to compare different production workflows in order to find the one with the best ecological effectiveness.

Economic challenge to environmental and social management

Substance and material flow analyses provide a necessary (physical) basis for ➔ (Environmental) Cost Accounting, and there especially for material flow cost accounting, which helps to reveal potential cost savings.

Limitations and weaknesses

In many cases substance flow analysis involves a relatively large amount of work, both for registering and for describing the substance streams. If no data are available on input-output quantities for the substance in question, it may be necessary to perform extensive measurements. This also applies to the further steps in substance flow management. The quantitative data from substance flow analysis do not say anything about the impacts of the substance streams. The analysis must therefore be followed by an evaluation of the substance flows, i.e. an assessment of their ecological, economic and social impacts with regard to sustainability aspects.

Further information

Literature

Brickwedde, F. (Ed.) (1999): Stoffstrommanagement – Herausforderung für eine nachhaltige Entwicklung. Osnabrück: Steinbacher.

Friege, H., Engelhardt C. & Henseling K.-O. (Eds.) (1998): Das Management von Stoffströmen. Berlin: Springer.

Möller, A. (2000): Grundlagen stoffstrombasierter Betrieblicher Umweltinformationssysteme. Bochum: Projekt Verlag.

Organisations and Internet addresses

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/csm

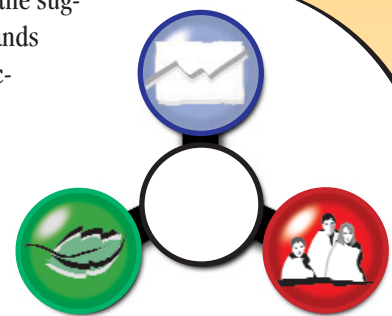
Institute for Applied Ecology, Freiburg: www.oeko.de

Institute for Environmental Informatics (IFU): www.ifu.com

Company Suggestion Scheme, Employee Suggestion System

Company suggestion schemes are systems for promoting, appraising, recognising, implementing and rewarding improvements suggested by employees outside their normal sphere of activities. Suggestion schemes serve to improve the efficiency and cost-effectiveness of company workflows and products and to motivate and encourage employees and their creativity. They make use of the existing on-site potential for innovation without having to conduct lengthy investigations. In Germany suggestion schemes are less widespread than in other countries, e.g. Japan. It must however be remembered that there are very considerable variations in the design of suggestion schemes, and it is difficult to compare different systems – even within the same country. The suggestion scheme is set up either by virtue of a decision by company management or under a works agreement. A prerequisite for success is the existence of clear rules on the appraisal of and the granting of awards for employees' suggestions for improvements, as otherwise there is no incentive for the employees. The Suggestions Officer occupies a central position in the suggestion scheme system. He or she informs the employees about the suggestion scheme, receives the employees' suggestions and forwards them to the various appraisers, who submit opinions about the suggestions. These opinions are studied by the suggestion scheme commission, which accepts or rejects the suggestions and decides the amount of any reward. The rest of the procedure is then in the hands of the Suggestions Officer, who documents acceptance of the suggestion and gives instructions for payment. Suggestion schemes can basically be used in establishments of all sizes and in all industries.

Instrument



Strengths and potential for meeting sustainability challenges

Ecological challenge

Suggestion schemes seek to improve and increase the efficiency of company workflows. Thus suggested improvements with an environmental content often result in absolute reductions in harmful environmental impacts and an increase in ecological effectiveness. In recent years environmental aspects have in many cases been explicitly integrated in the suggestion scheme, which has given them a higher standing. However, the official integration of environmental aspects does not automatically result in large numbers of suggestions in this field. Nevertheless, there has been a marked increase in environmental protection suggestions under suggestion schemes in recent years.

Social challenge

A suggestion scheme unites two social aspects. On the one hand the existence of a suggestion scheme can promote the identification of employees with their work. If suggestions for special developments are expressly requested, employees are more willing to think closely about the problems associated with their workplace. This can improve motivation and working climate.

On the other hand, social effectiveness can also be increased by the results of the suggestion scheme. If the suggestion scheme also accepts suggestions in the social field (e.g. reducing workplace noise levels, taking action against mobbing), these may bring about direct improvements in social effectiveness.

Economic challenge to environmental and social management

Suggestion schemes are traditionally an instrument for increasing economic efficiency. The implementation of suggestions relating to environmental or social aspects may help to increase eco-efficiency or social efficiency if they reduce the environmental impact added and/or increase the economic value added.

112 Suggestion Scheme

Integration challenge

Suggestion schemes can combine both aspects of the integration challenge: not only the simultaneous fulfilment of the ecological, social and economic challenges, but also their integration in conventional management. Firstly, it is an established instrument that is used in many organisations in a wide variety of forms and for a wide variety of fields. In a suggestions scheme it is possible to design the incentives (⊕ Incentive System) so that suggestions from all areas of sustainable development are expressly encouraged and, if appropriate, rewarded. Secondly, in view of its roots, its simple structure and the central coordination of the suggestions, a suggestion scheme is highly suitable for integrating sustainability aspects in conventional management.

Limitations and weaknesses

A suggestion scheme is not an integral component of routine decisions by the management, but facilitates changes suggested in a “bottom-up” procedure on an exceptional basis. The creation of a formal system for the suggestion scheme requires considerable human and financial resources. A certain size of establishment is therefore necessary to guarantee the establishment and operation of the system. Also the system is normally only suitable for small-scale improvements, not for major restructuring projects. Moreover, in many cases the suggestion scheme runs the risk of inhibiting creativity through too much bureaucracy.

Particularly since they are not very widespread at present, employee suggestion schemes are not yet in a position to make significant contributions to environmental protection. There is however evidence of an upward trend.

Further information

Literature

- Diensberg, C. (1997): Betriebliche Weiterbildung, Vorschlagswesen und Umweltschutz. Frankfurt: Peter Lang.
Martin, C. & Bassford, R. (1996): Employee Suggestion Systems: Boosting Productivity and Profits. Crisp Pubns.
Thom, N. (1993): Betriebliches Vorschlagswesen – Ein Instrument der Betriebsführung. Frankfurt: Peter Lang.

Organisations and Internet addresses

Center for Suggestion System Development: www.suggestionsystem.com
FAG Kugelfischer AG: www.fag.de
Cologne Institute for Business Research (IW): www.iwkoeln.de

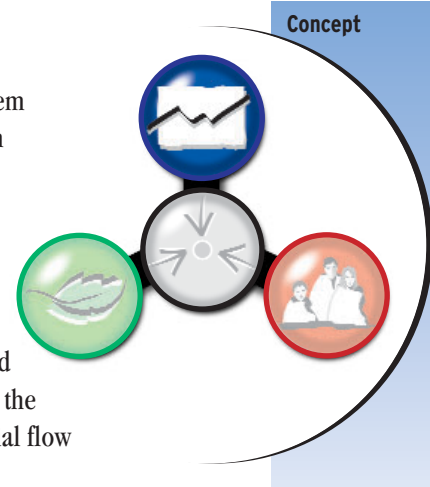
SCM, Logistics Chain Management, Supra-Company Business Process Optimisation, Green Supply Chain Management

The Supply Chain Management (SCM) concept denotes a system of suppliers of goods or services from various stages who have reached agreement on continuous cooperation. The customers within the chain opt for either one (single sourcing) or two suppliers (dual sourcing). This clear structure simplifies the analysis of the workflows beyond the limits of the individual companies. The aim is to optimise the internal and external business processes. Frequently the customers are “Original Equipment Manufacturers” (OEM) who resell the products under their own name by agreement with the supplier (e.g. parts from component suppliers in the car industry). The main motives for supply chain management are as follows:

- Improving product and process quality
- Improving supply quality (reliability, delivery time)
- Streamlining the organisation
- Reducing negative environmental impacts
- Realising cost savings

SCM basically requires a particularly well functioning information and communication system within the supply chain. The supply chain is subdivided into business processes that form units which are as small as possible, but self-contained and analysable.

SCM forms the basis for the concept of *Green Supply Chain Management*, which looks at the supply chain for ecological aspects in particular, but also social aspects. Both concepts make use of various instruments, some of which are taken over, with appropriate modifications, from established management practice, while others have been specially developed for this concept. For example the following are used to determine the “breaking strain” of the various links in the chain: ➔ Checklists, ➔ Substance Flow Analysis, process cost or material flow cost accounting (Supply Chain Costing, ➔ Cost Accounting) or ➔ Indicators.



Strengths and potential for meeting sustainability challenges

Ecological challenge

In many areas the ecological challenge for business enterprises is greater than only a few years ago. Responsibility for the company's products does not stop at the factory gate: the scope of the scrutiny has been extended to include upstream inputs, downstream production stages and, if appropriate, waste management. Against this background SCM offers a company the opportunity to also exert influence on its suppliers and customers within the supply chain of which it forms a part. Environmental protection measures are an important aspect here. By means of scheduling and planning at the supra-company level, for example, it is possible to minimise storage quantities and empty trips.

Social challenge

SCM can also make a contribution to social effectiveness. If the entire supply chain is organised, control of the social aspects at all points in the supply chain is made considerably easier, especially where long distances are involved. What an individual company is unable to do for lack of human and financial resources, is easier to achieve within SCM (e.g. effective control of minimum pay or avoidance of child labour).

Economic challenge to environmental and social management

SCM was originally designed as an instrument for increasing economic efficiency. Just-in-time delivery, avoidance of unnecessary storage quantities/times etc. are economic benefits offered by the concept in its conventional form. Here too, it may also include positive ecological and social impacts (e.g. reduction in transport capacities). By combining efficiency improvements in the economic field and increasing ecological or social effectiveness (cf. ecological and social challenge) the concept also brings about an increase in eco-efficiency and/or social efficiency.

Integration challenge

SCM is a flexible management instrument that is not confined to a particular specialised function. This concept therefore offers opportunities for integrating ecological, economic and social aspects. Simply because it has not yet been used for very long in the purely economic field, but seems likely to become much more important in the future, there is a possibility of developing it right from the start as *Sustainable Supply Chain Management*, taking in all the dimensions of sustainability. In the context of global competition, sustainable development can only be established effectively by means of systems above the level of the individual company.

Limitations and weaknesses

SCM calls for more or less far-reaching disclosure of company data that have hitherto been treated as confidential. This gives rise to reservations on the part of many companies, particularly with regard to storage and distribution of the data using IT systems. Moreover, supply chain management may lead to situations of dependence for the companies taking part, which can have serious consequences if a customer or supplier drops out. As a result, safeguards for supply and delivery commitments are often necessary. Small and medium enterprises are frequently unable to establish and organise a supply chain on their own initiative. They therefore have to rely on being involved by large companies, which in turn may lead to situations of dependence.

Further information

Literature

Khoo, H., Bainbridge, I., Spedding, T. & Taplin, D. (no year): *Creating a Green Supply Chain*. Sheffield: Greenleaf.

Download: www.greenleaf-publishing.com/pdfs/gmi35kho.pdf

Mentzer, J. (2001): *Supply Chain Management*. Thousand Oaks, CT: Sage Publ.

Seuring, S. (2000): *Supply Chain Costing*. University of Oldenburg. Dissertation.

Thaler, K. (2001): *Supply Chain Management*. Cologne: Fortis.

Wildemann, H. (2000): *Supply Chain Management*. Munich: TCW Verlag.

Organisations and Internet addresses

Fraunhofer Center for Applied Research on Technologies for the Logistics Service Industries (ATL): www.supply-chain.de

Supply Chain Council: www.supply-chain.org

Supply chain knowledge base: www.supplychain.ittoolbox.com

Supply Chain Management Center: www.uni-oldenburg.de/scmc

Supply Chain Management Review: www.manufacturing.net

The Sustainability Balanced Scorecard (SBSC) is a concept of strategic sustainability management. It is an extension of the conventional Balanced Scorecard (BSC) to sustainability management, in that it integrates environmental and social aspects (= nonmarket environment; cf. Figure) in BSC. BSC serves to translate corporate strategies into operating parameters and to implement these. Thus with the aid of SBSC the environmental and social management of a company are geared to the successful implementation of the strategy, and *win-win-win potentials* between economic, ecological and social objectives are exploited. SBSC guarantees this by

- identifying the environmental and social aspects relevant for success,
- creating the causal link between the environmental and social aspects and the company's economic results,
- enabling management of all environmental and social aspects in line with their strategic relevance,
- developing appropriate ➔ Indicators and measures and thereby
- resulting in the integration of environmental and social management in conventional economic management.

The aim is to identify, systematise and measure the strategic central economic, ecological and social objectives. SBSC can be expected to profit from the great importance and topicality of conventional BSC.

The starting point for SBSC is the strategy of an operating unit. It is also necessary to determine the relevant environmental and social aspects of the company. A top-down process then investigates whether and to what extent these environmental and social aspects make a contribution to the successful implementation of the strategy. This is done by examining, for each perspective of the SBSC – *Finance, Customers, Internal Business Processes, Learning and Developing and Nonmarket Context* (cf. Figure) – whether environmental or social aspects are of central strategic importance. This identifies both the strategic relevance and the mode of action of environmental and social aspects. This is followed by the formulation of suitable ➔ Indicators, target parameters and measures. Data needed for this purpose include data from the ➔ Corporate Environmental Information System and the environmental accounting system (➔ Accounting). The result is a fully formulated scorecard which in 4-5 perspectives presents the 20-25 most important strategic parameters, keys them to the company's results by means of cause-and-effect chains, and makes them measurable through indicators. This approach offers the opportunity to also include qualitative factors such as environmental and social aspects in the implementation of strategies on a profit-oriented basis. By formulating the relevant objectives, indicators and measures, an SBSC forms the starting point for comprehensive ➔ Control.

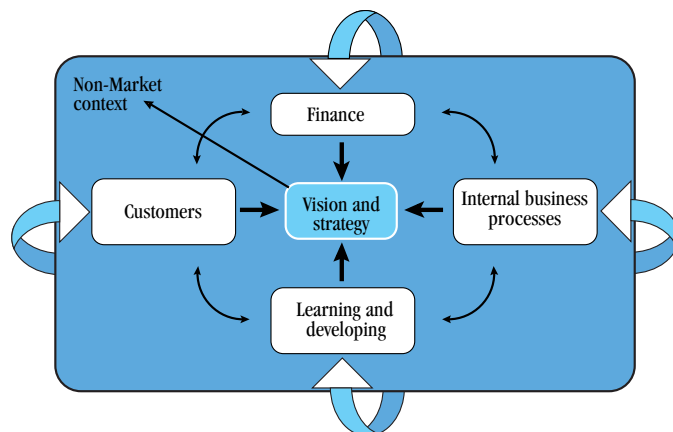


Figure: Sustainability Balanced Scorecard with the four conventional perspectives (Finance, Customers, Internal Business Processes and Learning and Developing) and the Non-Market perspective (Environmental and Social Aspects) (after Figge et al. 2001, 24).



Concept

Strengths and potential for meeting sustainability challenges

Ecological challenge

The SBSC determines the interactive relationships between the management of ecological effectiveness and the company's economic result. In this way all environmental impacts are managed in accordance with their strategic relevance. Thus the increase in ecological effectiveness in the strategically relevant areas is rooted in the company's overall management system.

Social challenge

Through its various perspectives, SBSC provides an opportunity to explicitly include “soft”, nonmonetary aspects (e.g. from the nonmarket context) such as social aspects in the implementation of corporate strategies. Thus as with the ecological challenge, the SBSC can make a contribution to increasing social effectiveness.

Economic challenge to environmental and social management

In the past, the growing importance of ecological and social aspects for companies has mainly been addressed by creating specific → Environmental Management Systems and → Social Management Systems. The majority of such management systems, however, operate in parallel with the company’s traditional core management tasks. The SBSC keys environmental and social management to the successful implementation of the strategy and thus ensures that effective environmental and social management also makes a contribution to the company’s economic success. In this way the SBSC makes the economic benefits of environmental and social management visible to the company and leads to an improvement in eco-efficiency and social efficiency.

Integration challenge

The SBSC takes a value-oriented view of sustainability management. In other words, the main focus is on the simultaneous achievement of economic, ecological and social objectives. In order to identify and exploit such *win-win-win potentials*, it investigates the causal relationships between ecological and social objectives on the one hand and economic objectives on the other. In this way the SBSC makes it possible for companies to integrate environmental and social aspects in their core management tasks and to design their environmental and social management (→ Environmental Management Systems and → Social Management Systems) so that it also contributes to achieving economic objectives. Consequently the integration of all three sustainability dimensions in successful implementation of corporate strategies is a central advantage of the SBSC. Another advantage of the SBSC is its openness. In other words, it can not only be used for a small minority of niche companies with a heavy ecological and social orientation, but is also suitable for integrating environmental and social aspects in the management system in the great mass of conventional companies.

Limitations and weaknesses

The SBSC presupposes the existence of a strategy. It is expressly not an instrument for formulating (sustainability) strategies for companies. The focus is rather on integrating environmental and social aspects in the implementation of strategies. Because the SBSC looks at environmental and social aspects from a value-oriented point of view, this results in specific key areas of environmental and social management for each individual company. This is not always in accordance with the kind of general requirements for → Environmental Management Systems and → Social Management Systems that are demanded by standards.

Further information

Literature

Figge, F., Hahn, T., Schaltegger, S. & Wagner, M. (2002): “The Sustainability Balanced Scorecard – Linking Sustainability Management to Business Strategy”, *Business Strategy and the Environment*, 11 (5), 268-284.

Kaplan, R. & Norton, D. (1996): *The Balanced Scorecard. Translating Strategy into Action*. Cambridge: HBS Press.

Schaltegger, S. & Dyllick, T. (Eds.) (2002): *Nachhaltig managen mit der Balanced Scorecard. Konzepte und Fallstudien*. Wiesbaden: Gabler.

Organisations and Internet addresses

Balanced Scorecard Collaborative: www.bscol.com

Centre for Sustainability Management (CSM): www.uni-lueneburg.de/csm, www.sustainability-balanced-scorecard.com

The Balanced Scorecard Institute: www.balancedscorecard.org

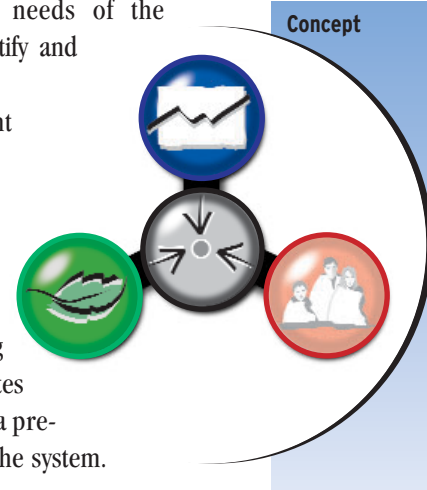
The Sigma Project: www.projectsigma.com

TQEM, Total Quality Management (TQM)

TQEM is a concept that integrates environmental aspects in the core strategies of a company and is based on the quality management approach of “Total Quality Management” (TQM). It is a combination of environmental management with TQM (cf. Figure) and has many aspects in common with (Eco-) Control. TQM is an approach which focuses on *quality as a maxim* and which proceeds on the assumption that better quality satisfies customers and increases the benefits for both the employees and society, and thereby guarantees long-term business success. TQEM is similarly a quality philosophy that encompasses the entire company and is based on the participation of all employees. The notion of quality is comprehensively defined and includes not only process, product and service quality, but also – explicitly – quality with regard to the interests of the employees and society.

Compared with TQM, TQEM has the additional objective of continuously reducing negative environmental impacts (especially waste) and hence *improving environmental quality*. The four basic elements of TQEM are:

- *Customer/stakeholder identification*: Quality is primarily defined by the needs of the (internal/external) customers/stakeholders. It is therefore very important to identify and describe the customers/stakeholders.
- *Continuous improvement*: The employees should be motivated to pursue a constant search for innovative alternatives to environmentally undesirable products and processes, and thereby constantly improve them.
- *Do the job right the first time*: Potential environmental problems should be identified and avoided before they occur. If problems nevertheless occur, they must be tackled rigorously.
- *System approach*: A holistic view and analysis of an organisation system (including employees and machinery/equipment) calls for cooperation in teams with delegates from all sectors involved. This kind of approach and cross-sectoral cooperation are a precondition for registering all relevant factors and for the subsequent functioning of the system.



The continuous monitoring and improvement of the environmental quality of products and processes, which must be easy to communicate and easy for all participants and interest groups to understand, is to be supported by

- registration of information (➔ Early Identification, ➔ Risk Analysis, ➔ Supply Chain Management, ➔ Corporate Environmental Information System etc.),
- preparation of this information (➔ Indicator, ➔ ABC Analysis, statistical representations such as histograms, cause-effect diagrams etc.),
- establishment of ➔ Quality Circles and a ➔ Suggestion Scheme, and
- rewards for innovative ideas (➔ Incentive systems).

The yardstick for measuring success in TQEM is the “eco-leader”, i.e. the most environmentally sound object compared (e.g. industry leader, product etc.; ➔ Benchmarking).

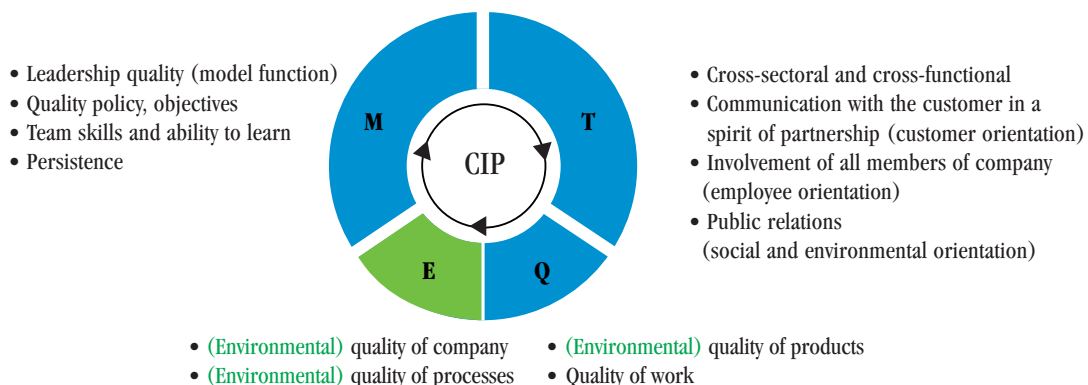


Figure: Total Quality Environmental Management model (CIP: Continuous Improvement Process)

Strengths and potential for meeting sustainability challenges

Ecological challenge

By explicitly taking account of environmental aspects and involving employees in relation to environmental impacts, TQEM ensures a broadly based process of awareness raising for all concerned. This is the basis for eco-effective action. Moreover, the targeted continuous improvement process, coupled with ➔ Incentive Systems, ➔ Quality Circles, ➔ Suggestion Scheme etc., promises eco-effective process and product design (e.g. ➔ Eco-Design) in the long term.

Social challenge

In addition to ecological aspects of business activities, TQEM also takes into account the needs of employees (employee orientation) and other stakeholders (e.g. customers, customer orientation). This, combined with systematic communication appropriate to the target groups, forms the basis for effective satisfaction of social concerns and hence improvements in social effectiveness.

Economic challenge to environmental and social management

The process promoted by TQEM of raising employee awareness of environmental problems and their causes can reduce costs, especially in the procurement and waste management fields (e.g. raw materials, energy), but also in reporting (➔ Reporting) to public authorities, crisis management bodies etc. The reduction in environmental burdens and costs is reflected in increased eco-efficiency. On similar lines to eco-efficiency, TQEM offers great potential for increasing social efficiency as well.

Integration challenge

Simply because of the integration of quality management and environmental management that already exists in TQEM, this concept is in principle a logical choice for meeting the integration challenge. In the ideal case it takes into account not only environmental and quality aspects and the associated economic expectations, but also the needs of a wide variety of stakeholders (social aspects). In the implementation of the concept, however, there is in practice a risk that a large number of individual aspects may be pursued without ensuring sufficient integration of the three sustainability dimensions.

Limitations and weaknesses

In practice it is often impossible to satisfy the claim to couple quality management with environmental management (and also the social management that is implicitly integrated in TQEM). It is frequently found that a large number of activities designed to improve quality and environmental soundness are pursued, but with little or no systematic coordination.

Further information

Literature

Bhat, V. (1998): Total Quality Environmental Management. An ISO 14000 Approach. Westport, CT: Quorum.

Deming, E. (2000): Out of the Crisis. Cambridge, Mass.: MIT Press.

GEMI (Global Environmental Management Initiative) (1993): Total Quality Environmental Management. The Primer. Washington D.C.: GEMI.

Pfeifer, T. (1996): Qualitätsmanagement: Strategien, Methoden, Techniken. Munich: Hanser.

Schaltegger, S. (1994): Zeitgemässe Instrumente des betrieblichen Umweltmanagements. In: Die Unternehmung, No. 2, 117-131.

Organisations and Internet addresses

Business and Sustainable Development, International Institute for Sustainable Development (IISD): www.bsdglob.com

Global Environmental Management Initiative (GEMI): www.gemi.org/TQE_101.pdf

Helsdale Quality Management: www.helsdale.demon.co.uk/tqem.htm

Massachusetts Institute of Technology (MIT), The Center for Advanced Educational Services (CAES): caes.mit.edu/deming

- A**
- ABC analysis 5, 8, 12, 19, 20, 21, 79, 96, 117
- accident 9, 19, 20, 39, 40, 52, 67, 68, 86, 91
- accident potential 20
- AccountAbility 1000 103
- accounting V, VI, X, XII, 3, 4, 5, 7, 9, 12, 14, 23, 24, 26, 29, 30, 33, 34, 35, 36, 51, 54, 55, 59, 69, 70, 71, 73, 74, 75, 79, 81, 82, 87, 91, 92, 93, 101, 103, 108, 109, 113, 115
- accounting, conventional 14, 23, 92
- accounting, environmental 14, 23, 24, 30, 34, 36, 51, 54, 71, 74, 75, 115
- accounting, social 5, 12, 23, 26, 69, 81, 82, 87, 91, 101
- accounting, sustainability 23, 24
- advantage ratio, ecological X, 73
- advantages, absolute 73
- advantages, ecological 23
- advantages, relative 73
- advisory function 33
- analysis of causes 33
- analysis, inventory 79
- assessment, life cycle XI, 3, 5, 7, 12, 23, 27, 28, 33, 35, 47, 48, 49, 50, 51, 59, 75, 79, 80, 81, 83, 85, 86, 87, 101, 109
- audit 4, X, 5, 8, 12, 25, 26, 31, 32, 50, 59, 61, 62, 64, 75, 80, 91, 93, 103
- audit, eco- 4, 25
- audit, environmental 25, 26, 61, 80
- audit, social 25, 26, 103
- audit, sustainability 25, 26
- audit, system 25, 61
- B**
- balanced scorecard V, X, XI, 3, 5, 10, 12, 14, 24, 34, 81, 115, 116
- Basel II 95
- benchmark 27, 28
- benchmarking 5, 12, 19, 27, 28, 35, 69, 71, 79, 108, 117
- benchmarking process 27
- benchmarking, competition-oriented 27
- benchmarking, eco- 27, 28
- benchmarking, functional 27, 28
- benchmarking, internal 27, 28
- benchmarking, social 28
- benefit-risk dialogue 39, 40, 41, 97
- benefits, ecological 73, 81
- brand policy 81
- Brundtland Commission V
- budgeting 3, 5, 12, 14, 23, 24, 29, 30, 35, 73
- budgeting, eco- 29
- budgeting, progressive 29
- budgeting, retrograde 29
- business control 14, 34
- business field 37, 44
- business process 27, 38, 62, 113, 115
- business process optimisation, supra-company 113
- business success I, 13, 117
- C**
- certificate 55, 56, 103
- certification XI, 25, 62, 75, 77, 78, 103, 104
- challenge, ecological V, XII, 6, 7, 10, 12, 13, 14
- challenge, economic VI, XII, 1, 6, 9, 12, 14, 15
- challenge, integration VI, IX, XII, 3, 6, 10, 12, 14
- challenge, social V, XII, 6, 8, 12, 14
- checklist 5, 8, 12, 31, 32, 49, 79, 103, 113
- checklist, eco- 31, 32
- checklist, social 32
- communication 3, 4, 14, 27, 33, 34, 39, 40, 41, 52, 61, 65, 67, 69, 75, 76, 79, 81, 91, 92, 95, 101, 103, 105, 106, 113, 117, 118
- communication aid 69
- communication instrument 4, 81
- communication process 79, 91
- communication technologies 14
- community advisory panel X, 5, 12, 39, 41
- company inventory 79
- comparison of target and actual figures 25
- compensating effects 38
- competitive advantages 1, 13, 28, 40, 44, 62, 100
- competitive strength 14, 27
- concept II, V, VI, IX, XII, 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15
- conflict situation 39
- context analysis 99
- control V, 4, 5, 10, 12, 14, 25, 29, 33, 34, 43, 59, 67, 69, 79, 81, 91, 92, 115, 117
- control function 34, 91, 92
- control instrument 25, 29, 92
- control of employees 68
- control, eco- 33, 34, 52
- control, environmental 33
- control, integrated 33, 34
- control, personnel 33, 34
- control, sustainability 33, 34
- cooperation 39, 40, 49, 65, 106, 113, 117
- cooperation principle 65
- corporate communication 41, 91, 92
- corporate culture 105
- corporate identity 65
- corporate performance 27, 91
- corporate planning 43
- corporate policy 61, 65, 103
- corporate principle 61, 65, 103,
- corporate sector VI, 2, 3, 4, 27, 29, 31, 37, 38, 55, 56
- corporate social accounting 101
- corporate strategy 13, 44
- corporate volunteering 57
- cost accounting VI, 3, 5, 7, 9, 12, 14, 23, 29, 30, 35, 36, 73, 74, 109, 113
- cost accounting, ecologically oriented 35
- cost accounting, environmental 23, 35, 74
- costs, direct 35
- costs, indirect 35
- credibility 40, 66, 75, 77, 81, 82, 83, 91, 92, 103, 105, 106
- crisis management 43, 118
- cross-impact analysis X, 5, 12, 37, 44, 99
- crowding-out effect 68
- D**
- data management 33
- dematerialisation 49, 81, 108
- design 25, 27, 29, 49, 50, 81, 87, 91, 95, 99, 104, 111, 112, 118
- design for environment X, 5, 12, 49
- Design, Eco 5, 12
- design, eco- 49, 50, 81, 118
- design, environmentally sound 49
- design, green 49
- design, sustainable X, 49, 50
- development, sustainable I, II, III, V, VI, IX, XI, XII, 1, 2, 3, 4, 6, 7, 9, 10, 13, 14, 23, 24, 26, 40, 48, 52, 62, 65, 66, 68, 69, 70, 71, 74, 82, 91, 93, 106, 112, 114, 118
- dialogue instrument V, 5, 8, 12, 14, 39, 40, 41, 57, 89, 97

- dialogue platform 40, 41
 direction of influence 37
 discussion forum 40
 documentation function 92
- E**
- early identification 5, 12, 37, 43, 44, 45, 96, 100, 117
 early identification system 43
 early information 43, 44, 45
 early information system 43
 early reconnaissance, strategic 43, 44, 45
 early warning 43, 45, 100
 early warning system 100
 eco-audit 25
 eco-benchmarking 27, 28
 eco-budgeting 29
 eco-checklist 31, 32
 eco-compass 33, 47, 48, 49, 51
 eco-control 33, 34, 52
 EcoDesign 49, 50
 eco-design 49, 50, 81, 118
 eco-efficiency VI, IX, 1, 3, 6, 9, 10, 11, 12, 21, 23, 26, 29, 30, 34, 35, 40, 48, 50, 51, 52, 55, 60, 63, 65, 68, 69, 74, 77, 82, 91, 92, 97, 111, 113, 116, 118
 eco-efficiency analysis VI 9, 21, 23, 35, 51, 52
 eco-efficiency indicator 69
 eco-efficiency matrix 51, 52
 eco-efficiency portfolio 51, 52
 eco-efficiency report 91, 92
 eco-label 75, 76, 78
 ecological advantage ratio X, 73
 ecological challenge V, XII, 6, 7, 10, 12, 13, 14
 ecological effectiveness I, V, IX, 6, 7, 10, 12, 20, 26, 29, 31, 33, 35, 38, 40, 45, 51, 55, 57, 59, 63, 65, 67, 69, 73, 76, 80, 82, 86, 89, 91, 105, 109, 111, 115
 ecological investment appraisal 73
 ecological payback period X, 73
 ecologically investment appraisal 73
 Eco-Management and Audit Scheme X, 61
 eco-marketing 81, 82, 83
 economic challenge VI, XII, 1, 6, 9, 12, 14, 15
 economic growth III, 13
 eco quality 89
 eco quality circle 89
 eco-rating 14, 53, 54
 eco report 91
 eco-sponsorship 105
 effectiveness I, V, VI, IX, 3, 6, 7, 8, 10, 12, 14, 20, 21, 26, 29, 30, 31, 32, 33, 35, 38, 40, 45, 50, 51, 55, 56, 57, 59, 63, 65, 67, 69, 73, 76, 77, 78, 80, 82, 86, 89, 91, 95, 96, 97, 101, 105, 108, 109, 111, 113, 115, 116, 118
 effectiveness management 10, 77
 effectiveness, ecological I, V, IX, 6, 7, 10, 12, 20, 26, 29, 31, 33, 35, 38, 40, 45, 51, 55, 57, 59, 63, 65, 67, 69, 73, 76, 80, 82, 86, 89, 91, 105, 109, 111, 115
 effectiveness, economic VI, 3, 6, 77
 effectiveness, social V, VI, IX., 6, 8, 10, 12, 21, 30, 33, 38, 40, 57, 67, 76, 77, 82, 89, 97, 101, 105, 108, 111, 113, 116, 118
 efficiency assessment 21
 efficiency benefits 56
 efficiency improvement 113
 efficiency management 10, 77
 efficiency, eco- VI, IX, 1, 3, 6, 9, 10, 11, 12, 21, 23, 26, 29, 30, 34, 35, 40, 48, 51, 52, 55, 60, 63, 65, 68, 69, 74, 77, 82, 91, 92, 97, 111, 113, 116, 118
 efficiency, social VI, IX, 6, 9, 10, 11, 12, 21, 24, 26, 28, 34, 38, 40, 65, 68, 77, 82, 97, 101, 103, 111, 113, 116, 118
 EMAS I, III, X, 25, 27, 61, 62, 91, 92
 emission avoidance 49, 109
 emission certificates 55
 emission quantity 55
 emission quotas 55
 emission source 56
 emission trading 5, 12, 55, 56
 emission, total 55
 employee suggestion system 111, 112
 employee volunteering 5, 12, 14, 57, 101, 105
 end-of-pipe technology 59
 energy consumption 13, 50, 69, 77
 environmental accounting 14, 23, 24, 30, 34, 36, 51, 54, 71, 74, 75, 115
 environmental audit 25, 26, 61, 80
 environmental circle 89
 environmental condition indicator 70
 environmental control 33
 environmental cost accounting 23, 35, 74
 environmental costs 20, 30, 35
 environmental costs, internalised 20
 environmental guideline 32, 65
 environmental impacts 7, 20, 23, 29, 31, 33, 35, 47, 49, 51, 52, 56, 59, 61, 62, 69, 70, 73, 74, 79, 80, 86, 89, 91, 92, 111, 113, 115, 117, 118
 environmental indicator 23, 27, 44, 69, 70, 71
 environmental information management 48
 environmental management accounting X, 24, 30, 35, 36, 71, 74
 environmental management indicator 70
 environmental management information system X, 55, 59, 60, 70
 environmental management system I, III, V, X, 5, 12, 25, 26, 27, 31, 61, 62, 70, 91, 92, 103, 116
 environmental management, value-based 62
 environmental performance evaluation 79
 environmental performance indicator 69, 71
 environmental policy 39, 61
 environmental pollution indicator 51
 environmental rating 53
 environmental report 23, 27, 91, 92, 101
 environmental shareholder value 5, 9, 12, 14, 63, 64, 107
 environmental statement 27, 61, 62, 91, 92
 environmental strategy 91
 environmental symbol 75, 76, 78
 error tree analysis 96
 evaluation 23, 26, 32, 47, 48, 51, 53, 54, 61, 67, 79, 83, 85, 86, 87, 92, 93, 95, 101, 109
 evaluation instrument 85
 exchange of information 40
 exhaustion of resources 20
 extreme scenario 99
- F**
- fair label 75
 financial accounting 92

- flow chart 59, 79, 109
forecasting instrument 37
free cash flow 63
future projection 99
future workshop 89
- G**
Global Reporting Initiative XI, 3, 24, 41, 62, 65, 66, 70, 71, 91, 93
globalisation I, III, 1, 14
grandfathering 55
green supply chain management 113
guideline 5, 8, 12, 25, 32, 35, 49, 61, 65, 66, 91, 93, 103,
32, 65
guideline, environmental 8, 65
guideline, social 8, 65
guideline, sustainability 65
- H**
horizontal view 85
- I**
identification of weaknesses 31, 79, 85
image 7, 13, 41, 44, 62, 65, 75, 82, 91, 103,
105, 106
imbalances of information 25
impact added VI, 2, 9, 23, 35, 51, 69, 92, 97, 111
impact added, ecological 9
impact added, social VI, 2, 9, 97
impact analysis X, 5, 12, 37, 44, 99
improvement process, continuous X, 27, 117, 118
improvements 111
incentive system 5, 12, 14, 65, 67, 68, 112, 117, 118
incentive systems, material 67, 68
incentive systems, non-material 67
indicator 5, 9, 12, 23, 26, 27, 28, 33, 35, 43, 44,
51, 52, 59, 69, 70, 71, 75, 85, 91, 92,
97, 113, 115, 117
indicator system 69, 70, 71
indicator, eco-efficiency 69
indicator, environmental 23, 27, 44, 69, 70, 71
indicator, environmental condition 70
indicator, environmental management 70
indicator, environmental performance 69, 71
indicator, environmental pollution 51
indicator, social 23, 26, 28, 52, 69, 70, 71
indicator, sustainability 69, 70
industrial ecology 3
information instrument 28, 29
information management 23, 48
information supply function 33
information system X, XI, 5, 12, 14, 32, 33, 35, 43, 44, 55,
59, 60, 70, 79, 115, 117
information system, environmental management X, 55, 59, 60, 70
innovation III, XI, 13, 27, 28, 44, 47, 48, 60, 68,
83, 111
innovation potential 13
innovation, eco-instrument 48
instrument 3, I, II, III, V, VI, IX, XI, XII, 1, 2, 3, 4,
5, 7, 8, 9, 10, 11, 12, 13, 14, 15
integration V, VI, IX, XII, 1, 2, 3, 6, 10, 12, 13, 14,
15
integration challenge VI, IX, XII, 3, 6, 10, 12, 14
interest group V, 7, 23, 25, 39, 40, 41, 91, 92, 107,
108, 117
inventory analysis 79
inventory, company 79
inventory, process 79
inventory, product 79
- investment appraisal 3, 5, 12, 23, 29, 52, 73, 74
investment appraisal, ecological 73
ISO 14001ff. III, 25, 61, 103
- L**
label X, 5, 8, 12, 49, 70, 75, 76, 77, 78, 81,
82
label, eco- 75, 76, 78
label, process 78
label, social 76
label, sustainability 78
legal compliance audit 25, 26
legitimation V, 8, 40, 76, 92, 103
life cycle I, XI, 3, 5, 7, 12, 23, 27, 28, 33, 35,
47, 48, 49, 50, 51, 59, 75, 79, 80, 81,
83, 85, 86, 87, 101, 109
life cycle analysis 48
life cycle assessment XI, 3, 5, 7, 12, 23, 27, 28, 33, 35, 47,
48, 49, 50, 51, 59, 75, 79, 80, 81, 83,
85, 86, 87, 101, 109
logistics chain management 113
Lorenz distribution 19
- M**
management advisory function 33
management process 1, 3, 33, 80, 95
management, operational 1, 79
management, strategic I, 99, 107
market research 81
market segmentation 81
marketing V, 4, 5, 7, 12, 38, 75, 76, 77, 78, 81,
82, 83, 96, 105
marketing mix 81
marketing, eco- 81, 82, 83
marketing, environmental 81
marketing, operational 81
marketing, social 75, 81, 82
marketing, strategic 81
mass marketing, ecological 82
material flow accounting 5, 7, 12, 14, 23, 35, 73, 109
material flow cost accounting 5, 12, 23, 35, 73, 109, 113
material management 49
media monitoring 44
monitoring system 43, 96
motivation 7, 13, 24, 38, 57, 62, 65, 67, 68, 89,
91, 101, 111
multiple scenario analysis 99
- N**
neighbourhood forum 39
network matrix 37
networks III, 5, 12, 39, 40, 41, 57
- O**
observation field 37, 38
observation horizon 43
obtaining information 3, 28, 40, 53, 81
"Open Space" method 89
opportunities 2, 7, 13, 14, 27, 31, 32, 35, 37, 38, 43,
44, 67, 77, 82, 99, 100, 114
opportunity costs 107
- P**
Pareto analysis 19
pay system 67
payback period, ecological X, 73
performance audit 25, 26
performance comparison 27
performance documentation 91
performance standards 27
performance, ecological 51, 53, 69, 83

- performance, economic V, 51, 53, 69, 70, 92
 performance, social 26, 28, 53, 54, 69, 70, 93, 101, 103
 s.o.
 personnel control X, 3, 33, 57
 personnel management 91
 planning function 29, 100
 planning instrument 81
 price policy V, IX, 3, 4, 5
 principal users 99
 problem analysis 59
 process chain 79
 process inventory 78
 process label 113
 process quality 95
 process risk analysis 47
 process variant 49, 50, 81, 118
 product design 49, 50, 81, 85
 product development 79
 product inventory 80
 product life cycle XI, 5, 12, 52, 81, 82, 83, 85, 86, 87, 109
 product line XI, 5, 12, 81, 82, 85
 product line analysis 85, 86
 product line matrix 49, 50, 85
 product planning 76, 89
 product quality 95
 product risk analysis 85
 product variant 3, 9, 14, 26, 73, 74
 profitability
- Q**
- quality circle XI, 5, 12, 89, 90, 117, 118
 quality circle, eco-89
 quality management X, XII, 28, 62, 95, 96, 103, 117, 118
 quality management system 103
- R**
- radar, strategic 43, 44
 rating 5, 8, 12, 14, 20, 53, 54, 75
 rating, eco-14, 53, 54
 rating, environmental 53
 rating, social 53
 rating, sustainability 53
 raw materials consumption 86
 recycling principle 65
 report, eco 91
 report, eco-efficiency 91, 92
 report, environmental 23, 27, 91, 92, 101
 report, reporting 5, 8, 10, 12, 14, 23, 26, 27, 28, 54, 61, 62, 65, 69, 75, 91, 92, 93, 101, 103, 118
 report, social 26, 91, 92, 101
 report, sustainability 91, 92, 101, 103
 resource savings 31
 responsibility principle 65
 return on investment XI
 return on stakeholder XI, 107, 108
 risk/accident potential 20
 risk analysis XII, 5, 8, 12, 44, 95, 96, 97, 117
 risk analysis, process 95
 risk analysis, product 95
 risk assessment 97
 Risk catalogue 95
 risk identification 95, 96, 97
 Risk inventory 95
 risk management 95
 risk map 96
 risk matrix 96
 risk perception 96, 97
 risk profile 96
- S**
- scenario analysis 5, 12, 37, 44, 96, 99, 100
 scenario creation 99, 100
 scenario funnel 99
 scenario management XI, 99, 100
 scenario technique 99
 scenario transfer 99
 score 38, 47
 self-control 25
 sensitivity analysis 73
 service quality 117
 shareholder value VI, 3, 5, 9, 12, 14, 63, 64, 107, 108
 shareholder value, environmental 5, 9, 12, 14, 63, 64, 107
 signal diagnosis 43
 signal exploration 43
 social acceptance V, 8, 19, 20, 40, 63, 76, 91, 97,
 Social Accountability 8000 103, 104
 social accounting 5, 12, 23, 26, 69, 81, 82, 87, 91, 101
 social audit 25, 26, 103
 social challenge V, XII, 6, 8, 12, 14
 social checklist 32
 social effectiveness V, VI, IX., 6, 8, 10, 12, 21, 30, 33, 38,
 40, 57, 67, 76, 77, 82, 89, 97, 101
 ,105, 108, 111, 113, 116, 118
 social efficiency VI, IX, 6, 9, 10, 11, 12, 21, 24, 26, 28,
 34, 38, 40, 65, 68, 77, 82, 97, 101,
 103, 111, 113, 116, 118
 8, 65
 social guideline 23, 26, 28, 52, 69, 70, 71
 social indicator 76
 social label 5, 8, 12, 15, 26, 31, 61, 103, 104, 116
 social management system 75, 81, 82
 social marketing 53
 social rating 26, 91, 92, 101
 social report 105, 106
 social sponsorship 8, 26, 31, 76, 82, 103, 104
 Social Standard SA 8000 26
 sponsorship 105
 sponsorship, eco-105
 sponsorship, social 105, 106
 stakeholder XI, 5, 7, 8, 9, 12, 14, 23, 24, 25, 26,
 39, 40, 41, 53, 61, 62, 63, 85, 92, 93,
 101, 107, 108, 117, 118
 stakeholder value 5, 9, 12, 14, 23, 24, 54, 63, 101, 107,
 108
 stakeholder value added 107
 stakeholder value analysis 5, 9, 12, 14, 23, 24, 53, 63, 101, 107,
 108
 static scenario 99
 steering concept 33
 steering function 79, 92
 strategic radar 43, 44
 strength of influence 37
 substance flow analysis 5, 7, 12, 23, 35, 59, 73, 79, 109, 113
 substance flow management 109
 success factor 34
 suggested improvements 111
 suggestion scheme X, 5, 12, 67, 89, 111, 112, 117, 118
 supply chain XI, 5, 8, 12, 14, 59, 103, 113, 114, 117
 supply chain management XI, 5, 8, 12, 14, 59, 113, 114, 117
 supply chain management, green 113
 supply chain management,
 sustainable 114
 sustainability accounting 23, 24
 sustainability audit 25, 26
 sustainability balanced scorecard V, XI, 5, 10, 12, 14, 81, 115, 116
 sustainability challenge VI, IX, 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12,
 13, 14, 15
 sustainability control 33, 34
 sustainability cube 52
 sustainability indicator 69, 70

sustainability label	78
sustainability management	I, II, V, VI, IX, X, 1, 2, 3, 4, 5, 10, 11, 13, 14, 15, 17, 30, 59, 62, 66, 115, 116
sustainability management signal	IX, 15
sustainability policy	65
sustainability rating	53
sustainability report	65, 91, 92, 101, 103
sustainable design	X, 49, 50
sustainable development	I, II, II, V, VI, IX, XI, XII, 1, 2, 3, 4, 6, 7, 9, 10, 13, 14, 23, 24, 26, 40, 48, 52, 62, 65, 66, 68, 69, 70, 71, 74, 82, 91, 93, 106, 112, 114, 118
sustainable development management framework	XI, 62
sustainable supply chain management	114
SWOT analysis	44
system audit	25, 61
system check	61, 103
T	
target costing	29
target setting process	27
targets	2, 25, 27, 69
technology management	99
total emission	55
total quality environmental management	XII, 89, 117, 118
total quality management	XII, 117
trading platform	55
transparency	14, 75, 83, 91, 92
trend scenario	99
U	
useful life	73
V	
validation statement	91
value added	VI, 9, 51, 68, 70, 105, 107, 111
value driver	63
value of the company	63, 101, 105, 107, 108
value spread	107
value-based environmental management	62
vertical view	85
vision	V, VI, 2, 6, 13, 65
volunteering	5, 12, 14, 57, 58, 101, 105
W	
weak signal	44, 45
win-win potential	115, 116
win-win-win potential	115, 116
working context	57
World Business Council for Sustainable Development	XII, 48, 52, 70, 71, 91, 93
X	
XYZ rating	20