EMA - Links

Government,Management & Stakeholders (UN-Workbook 2)

For the Expert Working Group on Improving Government's Role in Environmental Management Accounting (EMA) of the United Nations Division of Sustainable Development (UNDSD)

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This research has been funded by the German Federal Ministry of Education and Research under the project number 01RU0039.

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ISBN 978-3-935630-07-8

ACKNOWLEDGEMENTS

The authors would like to thank the following persons for their valuable contribution and helpful comments: Alex Grablowitz (German Ministry of Education and Research, BMBF), Monika Rudeloff (DLR), Tarcisio Alvarez-Rivero (UNDSD), Ralph Chipman (UNDSD), Christine Jasch (IÖW Wien), Deborah Savage (Tellus Institute), Richard Osborn (ICLEI), Howard Pearce (Environment UK), Martin Bennett (EMAN), Katsuhiko Kokubu (Kobe University), Marinus Stulp (FO-Industry), David Pinch (Environment Australia) and all the members of the UNDSD working group on EMA promotion for their contributions in Vienna and Bonn.

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AARF	Australian Accounting Research Foundation
ACCA	Association of Chartered Certified Accountants
AICPA	The American Institute of Certified Public Accountants
ASRB	Australian Accounting Standards Review Board
BIC	Bank Information Center
BMU	Deutsches Bundesumweltministerium (German Ministry of Environment)
BMUJF	Österreichisches Bundesministerium für Umwelt, Jugend und Familie (Austrian Ministry for Environment, Youth, and Family)
BS	British Standard
CEFIC	European Chemical Industry Council
CERES	Coalition of Environmentally Responsible Economies
CICA	The Canadian Institute of Chartered Accountants
CPA Australia	Certified Practising Accountant in Australia
CRI	Chemical Release Inventory (UK)
DETR	Department of the Environment, Transport and the Regions (UK)
DOE	Washington State Department of Ecology
ECOMAC	Eco-Management Accounting (EU research project)
EITF	Emerging Issue Task Force of FASB
EMA	environmental management accounting
EMS	environmental management system
EPER	European Pollutant Emission Register
FAS	Financial Accounting Standard (of the FASB)
FASB	Financial Accounting Standards Board (USA)
FEE	Fédération des Experts Comptables Européens
FEEM	European Pollutant Emission Register
FIN	Financial Accounting Standards Board Interpretations
GASB	Government Accounting Standards Board
GDP	gross domestic product
GEMI	Global Environmental Management Initiative
GNP	gross national product
HRM	human resources management
HSM	health and safety management
IASC	International Accounting Standards Committee
ICAA	Institute of Chartered Accountants in Australia
ICAEW	The Institute of Chartered Accountants in England/ Wales
IOSCO	International Organization of Securities Commissions
IPPC	Integrated Pollution Prevention and Control (EU)
ISAR	Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting of the United Nations
ISO	International Organization for Standardization
IUCN	World Conservation Union
JEA	Japan Environment Agency
MEMA	Monetary Environmental Management Accounting
NGO	non-governmental organization
NIMBY	Not In My Back Yard
NPI	National Pollutant Inventory (Australia)
NWF	National Wildlife Federation
OECD	Organisation for Economic Co-operation and Development
PCSD	President's Council on Sustainable Development (USA)
PEMA	physical environmental management accounting
PER	Polluting Emissions Register (UK)

PI	Pollution Inventory (UK)
PR	public relations
PRTR	Pollutant Release and Transfer Register
QMS	quality management system
R&D	research & development
SEEA	System of Environmental and Economic Accounting
SNA	System of National Accounts
SOER	State of Environment Report
SRU	Der Rat von Sachverständigen für Umweltfragen (German Council for Environment)
TQEM	total quality environmental management
TQM	total quality management
TRI	Toxic Release Inventory (USA)
TURA	Toxic Use Reduction Act (Massachusetts)
UBA	Umweltbundesamt (German Federal Environment Agency
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDSD	United Nations Division of Sustainable Development
US EPA	Environmental Protection Agency (USA)
US SEC	Security and Exchange Commission (USA)
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (Dutch Ministry for Housing, Planning and Environmental Management)
WWF	World Wide Fund for Nature

1 INTRODUCTION

In most corporations conventional management accounting is the central information tool for management. Accounting serves as a means to classify, collect, analyze and communicate information between decision makers – it "links" decision makers. The decision quality created in this process depends on the quality of information provided by the accounting system. Conventional accounting systems do not fully reflect environmental costs and benefits of enterprises. This fact applies equally as well to external costs and benefits, that are not attributed to a corporation, as to internal environmental costs and benefits of corporations (Bennett & James 1998, Schaltegger & Burritt 2000, UNDSD 2000). Of further concern is the fact that external corporate costs are being internalized more frequently, sometimes many years after the events that produced these costs (e.g. US Superfund Activities).

Consequently, there is a need for the widespread establishment of corporate Environmental Management Accounting (EMA) in order to integrate environmental costs and benefits into business decision making in a routine way (UNDSD 2000, v and 11f.).

Although management accounting in most countries is an internal matter for corporate management the potential economic and environmental benefits to the public of widespread use of EMA by corporations has motivated international organizations and governments to think about ways to promote EMA application in business on a broad scale (UNDSD 2000, 28 and 33). According to the UNDSD (2000, 15) the major *reasons for government initiatives to promote EMA* are to:

- achieve pollution reduction at minimal cost to government and with minimal political resistance;
- increase the effectiveness of new environmental regulations; and
- encourage management to take into account prospective new regulations designed to internalize environmental costs that are now external.

The Expert Working Group of the United Nations Division of Sustainable Development (UNDSD) on Improving Government's Role in Environmental Management Accounting (EMA) has therefore initiated the development of three workbooks on EMA.

The Three Workbooks of the UNDSD EMA-Initiative

To help achieve the purpose of the UN initiative three workbooks will be compiled, examining:

a) the characterization and description of EMA as a management tool (Workbook 1: "Principles and Procedures of EMA Metrics");
b) the analysis and identification of the different potential links between government activities and EMA (Workbook 2: "EMA and the Linkages between different Levels of Decision Making"); and
c) the evaluation of different policy options by which governments could promote EMA use in enterprises (Workbook 3: "Governments' Guidelines on how to promote EMA")

Workbook 1 highlights the characteristics of EMA by explaining the fundamental idea behind, and the major elements of, EMA, Workbook 3 adopts the viewpoint of government agencies by addressing the different policy instruments that could be applied and how they should be designed to achieve a more widespread use of EMA in corporations.

At present there are not many government incentives, guidelines, programs and regulations in place that directly address EMA. This leads to the question of whether the information exchange between governments, business, consultants, and academia should be intensified to identify and discuss the most promising ways for improving corporate environmental and economic potential. *Workbook 2, therefore, investigates direct and indirect linkages between governments and companies to promote EMA* (UNDSD 2000, 15). Whereas the other two workbooks concentrate on examining the contents of EMA and the related policy instruments, the purpose of Workbook 2 is to identify and analyze the structural framework through which government activities and corporate EMA can best be linked (see Figure 1).

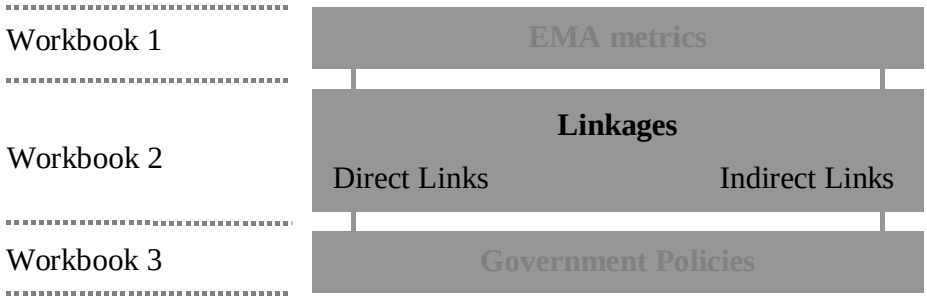

Figure 1. Workbook 2 investigates Linkages

The budgetary constraints which government environmental programs and initiatives have to face depends to a considerable extent on the path on which these programs are launched. Therefore, the purpose of this workbook "EMA – Links: Government, Management & Stakeholders" is to *analyze the paths* by which government at local, national, or international levels can best promote the application of Environmental Management Accounting (EMA) in corporations. This workbook addresses linkages rather than policies or metrics.

For government policy decision makers it is highly desirable to *know how to identify the most suitable links for their policy making*. Therefore, the analysis of EMA-links in this workbook is organized in a way that government policy makers can use it as a decision making tool. It will

offer step by step guidance on how to assess the suitability and attractiveness of different links, and how to identify the most important stakeholder groups to cooperate with.

As illustrated in Figure 1 the *structural analysis adopted for this purpose will cover direct links* between different levels of government and corporate EMA *as well as indirect links via intermediate stakeholders and elements* (such as accounting and management systems). These two tracks, direct and indirect links, form the basis of analysis. In order to identify those paths, EMA will be considered in the context of different accounting systems at national and corporate levels as well as in the context of different corporate management systems, such as financial, environmental or quality management systems. Through an analysis of the interests, goals and information needs of relevant stakeholders, this approach draws attention to underlying structural links. In doing so, it enables decision makers to reveal the most promising paths by which governments could promote EMA use by corporations.

In short, the main contribution of this workbook consists of two aspects: first, it will develop a decision making tool which allows government policy makers to identify the most suitable links and the most important stakeholders for the effective and efficient promotion of corporate EMA use; second, the workbook will reveal those paths, leverage points, and stakeholders that, in generic terms, appear to have the most potential for government promotion of EMA use by applying the structural analysis developed for this decision making tool. These results can serve as a reference for government decision makers' own specific application of the decision making tool.

Overall, this Workbook delivers the means for linking the content-orientated issues raised in the other two workbooks commissioned by the UNDSD working group.

This workbook is organized in the following way: Chapter 2 discusses how linkages between government and EMA users can be analyzed. First, the general framework of investigation and the two focal point of the linkages (section 2.1), namely EMA with its users on one hand and government agencies on the other hand, are examined. Second, the core of the approach to investigate linkages – the *two track analysis* – is shown (section 2.2). Third, the process and analytical steps of linkages is discussed in depth (section 2.3):

The following chapters then illustrate the application of this analytical approach. The results of the analysis may serve as a point of orientation or a benchmark for government agencies to find the most suitable linkages for their promotion activities.

In Chapter 3 the two focal points for all EMA and government links are analyzed as the first analytical step. Chapter 4 provides an in-depth examination of direct links, while indirect links are examined and conclusions drawn in Chapter 5.

2 CONCEPTUAL FRAMEWORK BEHIND THE DECISION MAKING TOOL

Government programs and initiatives aim to influence a target group's behavior towards EMA in a desirable way. It may be a surprise that, in the literature, little attention has been paid to the question of the regulatory effectiveness of such programs. One exception proposes a strategic regulatory planning approach and elaborates upon the development of a schematic model of analysis as a guide for policymakers consisting of seven major steps (Cohen & Kamieniecki 1991).[1] While mainly dealing with the rational choice of policy instruments (see Workbook 3), the authors of this study also highlight the fact that the effectiveness of government programs and initiatives depends, to a considerable extent, on the actors and links involved (see Cohen & Kamieniecki 1991, 13 and 28; Burritt & Welch 1997, 537-537; and Burritt 2001). Therefore, they recommend a broad and in-depth analysis of each party involved in, or addressed by, any government program (Cohen & Kamieniecki 1991, 37). Identification and analysis of all the relevant parties and stakeholders, *prior to deciding upon policy instruments,* is considered crucial for effective government programs.

Workbook 2 adopts this viewpoint. This chapter outlines how linkages between policy makers and EMA users can be investigated according to their suitability for promotional activities by governments. The analytical approach introduced in the following section is based on available evidence of the importance of analyzing stakeholders within the policy decision making process.

2.1 General Framework: Direct and Indirect Links

Governments can influence corporations to apply EMA either directly or indirectly. This fact is reflected in the distinction between direct and indirect links as different paths through which government programs can be launched. Direct and indirect links are bounded by two focal points (see the elements shaded in dark grey in Figure 2). These focal points consist of two types of actors:

- government agencies; and
- the users of corporate EMA systems.

[1] The seven major steps of the schematic model for strategic regulatory planning proposed by Cohen & Kamieniecki (1991, 31) are: problem recognition, identification of parties, historical analysis, situational analysis, strategic regulation formulation, ex ante review, and ex post review.

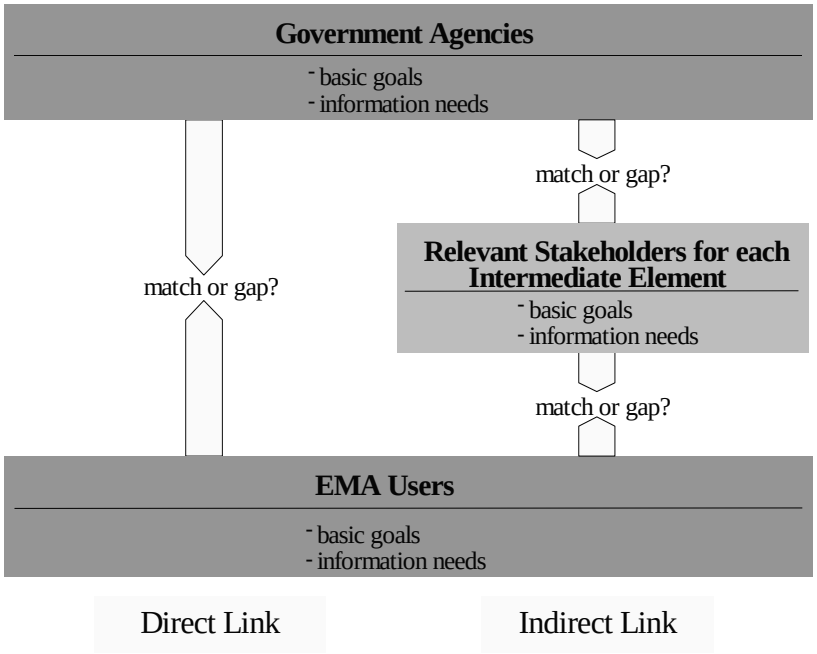

Figure 2. Direct and indirect links, showing the integration between stakeholders

As illustrated in Figure 2, direct links are characterized through a bi-focal interrelationship between government agencies and corporate EMA users.

Indirect links are characterized by additional intermediate stakeholders who are involved with separate intermediate elements that mediate the relationship between the two focal points – corporate EMA and government (see the element shaded light grey on the right hand side of Figure 2). As depicted in Figure 2, the match between the basic goals and information needs of specific stakeholders involved with intermediate elements provides the key ingredient for the assessment of direct and indirect links.

Consideration of other stakeholders, that is apart from management as the main user of EMA and government agencies as promoters of EMA, is necessary because different accounting or management systems, acting as intermediate elements in indirect links, are designed to provide specific information to different groups of stakeholders in order to service their interests. Different stakeholders have different interests and information requirements relating to the same accounting or management systems. In other words, various indirect links exist between different stakeholders and EMA. Furthermore, indirect links between a government agency and EMA may also be initiated or maintained by intermediate stakeholders (e.g. an industry association or a non-government organization (NGO)), therefore, stakeholder interests, other than those of government and managers, also need to be taken into account (Neely & Adams 2000; Schaltegger & Burritt 2000; Azzone & Bertele 1994).

2.1.1 EMA as the Target System at one Focal Point of Links

In this section, before introducing the framework for the decision making tool, Environmental Management Accounting (EMA), as the underlying system of one of the two focal points of all the direct and indirect links under examination, is introduced and defined for the purposes of this workbook. In order to provide a detailed understanding of EMA links, different EMA tools, used in different contexts and by different corporate decision makers, are identified and classified (see Figure 3). To gain a better understanding of direct and indirect links it is important to note that EMA links are in fact links between people, i.e. government

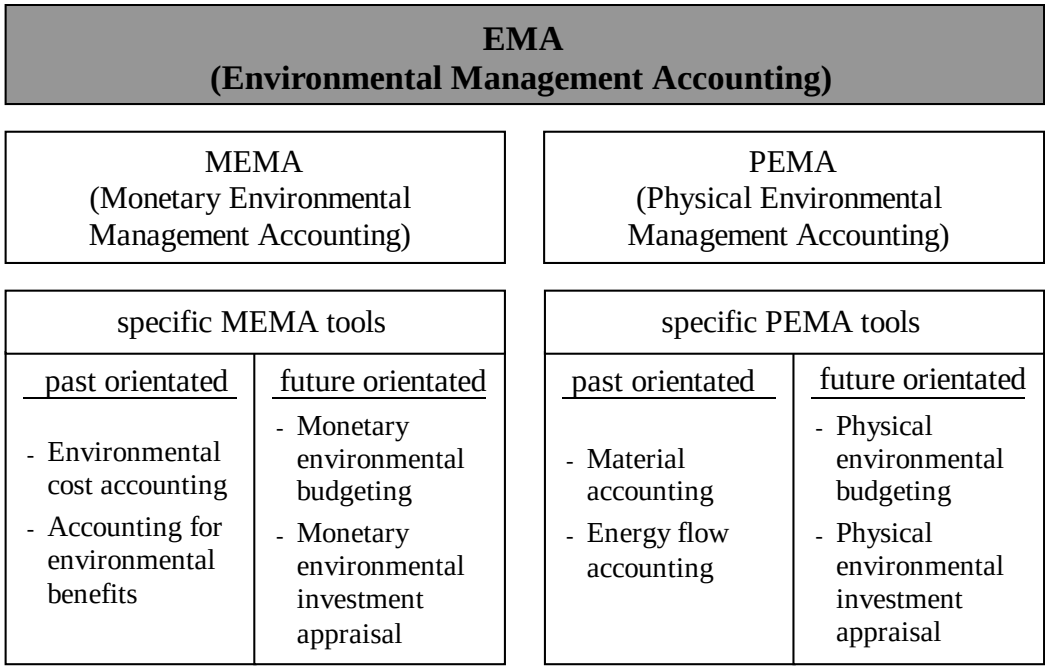

Figure 3. EMA tools

agency members and corporate decision makers who use different EMA tools. The linkages under investigation can, therefore, be related to government decision makers on the one hand, and corporate decision makers on the other. Linkages to EMA are, in other words, links to various corporate decision makers using different EMA tools, as illustrated by the white columns at the bottom of Figure 3. Any link between government and EMA will therefore need to address one or several EMA tools.

In contrast to the classification in some of the accounting literature, where EMA only includes internal *monetary* environmental accounting, the use of the term EMA is considered in this workbook to include internal monetary *and* material accounting as suggested by the UNDSD expert group. To reflect the importance of the need for separate identification and integration of these two aspects – monetary and physical – EMA is considered to be a generic term that includes both Monetary Environmental Management Accounting (MEMA) and Physical Environmental Management Accounting (PEMA).

Monetary Environmental Management Accounting (MEMA), as part of environmentally differentiated conventional accounting, incorporates environmentally-induced monetary impacts on the corporation. It provides the central accounting source of information for most internal management decisions and addresses the tracking, tracing, and allocation of environmentally-induced costs and benefits (Schaltegger & Burritt 2000, 4.1.2). MEMA supports strategic and operational planning, provides the main basis for decisions about how to achieve desired goals or targets, and acts as a control device (Schaltegger & Burritt 2000, 6.1).

Physical Environmental Management Accounting (PEMA) also serves as an information system for internal management decisions. However, in contrast with MEMA its focus is on the physical impacts of the corporation on the natural environment, expressed in terms of physical units, such as kilograms. PEMA tools are designed to classify, collect and record environmental impact information in physical units for internal use by management (Schaltegger & Burritt 2000, 4.1.3). PEMA, as an internal approach to physical environmental accounting, serves as:

- an analytical tool designed to detect ecological strengths and weaknesses;
- a decision-support technique concerned with highlighting relative environmental quality;
- a measurement tool that is an integral part of other environmental measures such as eco-efficiency;
- a tool for direct and indirect control of environmental consequences;
- an accountability tool providing a neutral and transparent base for internal and, indirectly, external communication; and
- a tool with a close and complementary fit to the set of tools being developed to help promote ecologically sustainable development.

A useful distinction can be made between past and future orientated accounting when considering MEMA and PEMA tools (see Figure 3). In the following sections, generic Environmental Management Accounting (EMA) tools, which are classified in Figure 3 according to their financial or physical nature and their time horizon, will be considered as possible core aspects of direct and indirect links to government activities. Workbook 1 provides details of the characteristics of these EMA tools.

2.1.2 Government as an Initiating Party at the Other Focal Point of Links

As indicated above, the main objective of this workbook is to investigate linkages between government agencies and corporate EMA users. Systematic examination of these linkages will provide a basis to enhance the effective promotion of EMA through government. Government agency perspectives and roles are, therefore, of special interest in this context. Various government agencies at local, national/regional and supranational levels represent the second focal point of all direct and indirect links under consideration.

In addition to the consideration of the different EMA tools and their users throughout corporate management, an in-depth assessment of EMA linkages requires examination of the

interests and goals, as well as the information needs, of government agencies. Both of these aspects are included in the overall discussion and analysis of the potential paths by which government can promote the introduction or establishment of corporate EMA. This can occur either directly, or indirectly, through other stakeholder groups. The emphasis on stakeholders provides the basis to establish direct and indirect linkages for government – EMA inter-relationships.

2.2 Analytical Approach: the Two-Track Analysis

According to the general framework illustrated in Section 2.1 (see Figures 1 and 2), governments can either encourage the application of EMA directly, or they can encourage it indirectly, by influencing stakeholders of intermediate elements (such as other accounting or management systems). It has also been argued that the structural links behind these two tracks are strongly characterized by the groups of stakeholders involved. Therefore, the match or gap between the basic goals and information needs of these stakeholders represents the core analytical factor behind direct and indirect links.

With this in mind, section 2.2 explains the analytical approach used to examine these linkages. Based on the characteristics of the analytical elements (i.e. corporate EMA users, government agencies, and all the intermediate elements such as accounting and management systems) (identified below in Section 2.2.1), a *"two-track analysis"* investigating the direct and the indirect linkages is conducted (see Section 2.2.2). This two-track analysis reveals, in detail, the potential held by different direct and indirect links for the promotion of corporate EMA. Finally, in section 2.2.3, criteria used to assess the suitability of direct and indirect links between government and EMA are outlined.

2.2.1 Characterization of the Different Systems Examined

First, in order to describe a linkage, characteristics of the elements being linked have to be identified. Hence, the first part of the structural analysis consists in identification and description of each different element, including EMA and its users, based on the following characteristics:

- *identification of specific stakeholders* with an interest in the particular element under examination;
- description of the basic *interests and goals* of the element being examined; and
- deduction of the *type of information* needed or desired.

Element being examined		
Relevant Stakeholders	Basic Goals	Type of Information Desired
...	...	...

Table 1. Categories used to describe and characterize every linked element

Table 1 provides a template that can be used for the characterization of every element being analyzed by the linkage decision making tool. Its use within the individual steps of the analytical tool will be explained in Section 2.3.

2.2.2 Two-Track Analysis: Identification of the Common Characteristics, Differences and Gaps between the different Elements and EMA

The second and major part of the analysis consists of the investigation of possible direct and indirect links in order to establish their suitability as a path along which government may promote the use of EMA. Building on the results of the examination of preliminary characteristics identified for each element, as described in Section 2.2.1, the different elements are compared by examining their relationship with EMA. Potential linkages are assessed using information about the characteristics of common elements, differences between these characteristics, and gaps identified between desired goals and information needs of the elements. Through this analysis the *crucial* links and critical paths by which government could successfully promote EMA are identified.

The basis for comparison is modified depending on whether a direct or indirect link is being examined (i.e. depending on which of the "two tracks" is being examined). For direct links, the interrelationship between government and the corporation can be analyzed in a single step, whereas indirect links can only be analyzed by considering the interaction with intermediate elements. Figure 4 highlights the framework adopted for the two-track analysis. The description of each focal point and indirect element serves to identify the important characteristics for the two-track analysis. The sequence of the different steps required to conduct this analysis are outlined in the following section (section 2.3) and is shown through the generic application in the subsequent chapters.

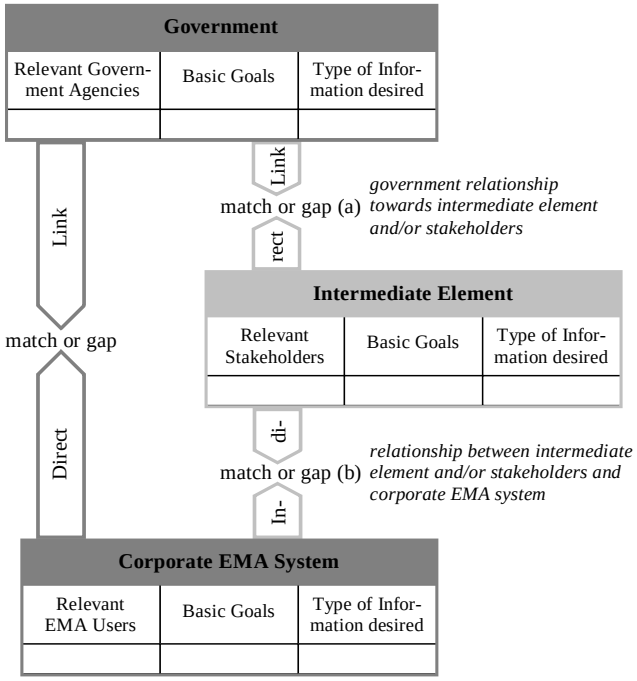

Figure 4. Two-Track Analysis of the links between governments and EMA

a) Track 1: Direct Links

For the direct track, government agencies and users of the corporate EMA system, represent the two focal points. These focal points can be characterized by the specific sets of government and management levels being considered, their basic goals, and their information requirements. Emphasis is placed upon an examination of commonalities and differences between government agencies and corporate EMA users (see the dark grey arrow in Figure 4 as well as the left hand side in Figure 2). According to the classification of EMA tools, shown in Figure 3, the direct links can be related to each of the different MEMA and PEMA tools.

b) Track 2: Indirect Links

Indirect links include an intermediate element between government and EMA, such as other accounting systems or management systems. Section 5.1 and 5.2 examines the question of the choice of potentially relevant intermediate elements for analysis of their potential for indirect promotion of EMA.

Investigation of indirect links requires a two-step approach (see the areas shaded in light grey in Figure 4), rather than the single step used for direct links:

- In the first step, the relationship between different government agencies and each intermediate element is analyzed (see the partial link (a) in Figure 4). In a similar way to the analysis of a direct link, the relationship between the relevant government agencies and intermediate element stakeholder groups are compared in order to clarify the first step in the indirect link. The aim of this first step is to find out the relationships between government and intermediate elements that could serve for the promotion of corporate EMA.

- In the second step, the relationship between each intermediate element and EMA is examined (see partial link (b) in Figure 4). Again, analysis is undertaken of whether the stakeholders involved (those related to each intermediate element and company management) appear suitable as a promising promotion path between each intermediate element and corporate EMA. Together with the results of the first step in the analysis of indirect links, the most promising indirect paths are identified, for government promotion of EMA. Different EMA tools (see Figure 3) are related to the elements analyzed in these two steps.

Part of the examination of direct and indirect links involves the highlighting of the different characteristics of intermediate elements. This is of particular relevance to the overall process of identifying the most important stakeholders that shape indirect links between government and EMA.

2.2.3 Criteria for an Analytical Assessment

The central aim of the method proposed in this workbook is to reveal the suitability of direct and indirect links for the promotion of corporate EMA use. In order to *assess the suitability* of the different links being investigated, three criteria are used. From a stakeholder-orientated point of view, a link reveals a high suitability for exerting influence if there is:

- a high match between the interests and goals of the stakeholders involved;
- a high match between information needs of the stakeholders involved; and
- a broad range of different stakeholder groups at each focal point and intermediate element, providing a broad structural anchorage of the link.

When analyzing *indirect links*, the *method proximity* of the intermediate elements with EMA has to be taken into account as an additional criterion when assessing the suitability of the different links.

These analytical assessment criteria not only serve to assess the suitability of the possible direct and indirect linkages between government and corporate EMA, but also allow detailed identification of those critical stakeholders on which the suitability of identified links is founded. Thus, following the in-depth analysis of the different direct and indirect links and detection of the most suitable links for promoting EMA by the application of this tool, an overall synthesis will be provided of these links and the main stakeholders involved.

a) Match of Interests and Goals

The question of how well the identified interests and goals of the identified stakeholders match represents the first important criterion for the assessment of potential links between government agencies and corporate EMA users. Thus, in line with the *two-track analysis* introduced above, the match between interests and goals of government agencies and management departments are to be examined for direct links. For indirect links two matches will be required, with the first match being between goals and interests of government agencies and the stakeholders involved with the intermediate element, and with the second match being between corporate managers and stakeholders involved in the intermediate element. The main question in this context is to find out whether there are any stakeholder relationships within the links examined which show a close match between the major interests and goals of stakeholders, or whether, on the contrary, a loose match exist because of diverging interests.

b) Match of Information Needs

Analogous with the analysis of the match between interests and goals, an analysis of the information needs of different stakeholders will be undertaken. The relationships with different stakeholder groups involved will be discussed both for direct and for indirect links. According to the analytical approach introduced in Section 2.4.2 and Figure 4 this investigation will be conducted along two tracks. On the first track, the information needs of government agencies and corporate managers are directly compared with each other,

whereas the discussion on the second track focuses on the partial links between government agencies, or management departments, and the different stakeholders involved with an intermediate element. The core question is whether information needs of stakeholders match or whether there are gaps and differences.

c) Anchorage of Links

The criterion of anchorage refers to the breadth of the match between interests and goals or information needs, i.e. it answers the question of how many stakeholders within government agencies, corporations, or – for indirect links – linked with intermediate elements, show a high degree of matching. A second way of judging the anchorage of a link is the background of the stakeholders making up a link, that is, whether they are all concerned with one issue or whether concern is over a diverse range of issues. In the case of indirect link, the anchorage will be examined along the two partial links (a) and (b) introduced above. This supplementary aspect of direct and indirect links will provide valuable insight into the stability of a potential link between government and corporate EMA, and the range of critical stakeholders behind the different links.

d) Method Proximity

Indirect links are characterized by a range of different accounting and management systems which serve as intermediate elements between the two focal point government and corporate EMA. In this indirect constellation, the suitability of a link cannot solely be judged upon the structural relations between the different stakeholder groups involved. Rather, prior to investigating the match of interests and goals, and information needs of the different stakeholders, as well as the anchorage of the links, the *method proximity* of each intermediate element with EMA has to be addressed from a technical point of view. This step of analysis serves to reveal how close the methods and tools associated with any intermediate element are to the different EMA tools, and to which extent intermediate elements deal with information generated by EMA systems. The results of this first assessment of each intermediate element provide first indications of the suitability of the different intermediate elements to serve as promising paths for government's promotion of corporate EMA. The in-depth analysis of the structural suitability along the three criteria introduced above will then be based on this technical suitability.

e) Additional Criteria

Two additional criteria help with the structural analysis of links between government agencies and corporate EMA users. These are outlined next.

Operative and Inoperative Links: One issue is the question whether government policies for a link are already in place or do not appear to have been followed up so far (operative vs.

inoperative links). To answer this question attention will be directed to the actual and potential paths for government to promote the implementation and use of corporate EMA. In Workbook 3 specific government policies that have been adopted, and potential new policies, are identified and analyzed in depth. In this workbook, identification of the operative links between EMA and government indicates the implementation paths that have been most popular to date. Based on findings from the analysis, this overview of operative and inoperative links will facilitate the discussion in Workbook 3 of whether the operative links are effective and efficient and whether it might be promising to formulate policies using other, at present, inoperative links.

Use of EMA Information for Government Bodies at different Levels: A further issue, is the potential use of EMA information for government at different administrative levels. The question asked is 'how useful is EMA information for government purposes at local, national/ regional, and supranational levels'. This additional analytical aspect highlights the internal benefits government can gain by establishing EMA information exchanges. Whether EMA information is useful to government mainly depends on how EMA information is generated, rather than on the way (direct or indirect) it is transmitted between a company department and a government agency. Potential use of EMA information flows by different levels of government will be discussed as part of the analysis of direct links in Chapter 4.

2.3 Process and Steps of Analysis of Linkages: How to Analyze Linkages

This section describes the process and steps of analysis proposed to investigate which linkages between government agencies and EMA users may be most interesting for the promotion of EMA. The approach enables policy decision makers (government) to decide, in a logical way, about the most suitable links for the promotion of corporate EMA use. Based on the general introductory comments made in the previous sections, the different sequential steps of the decision making tool will be outlined. In addition, comprehensive master lists will be provided to illustrate the range of possible decision options. Furthermore, a set of criteria for assessing the suitability of the potential direct and indirect links is introduced and discussed.

Once the political decision has been taken to promote a more widespread use of EMA in the corporate sector, it is crucial for policy decision makers to adopt a systematic and rational scheme which they can follow in order to design and implement highly effective programs. An overall regulatory planning scheme (as proposed e.g. by Cohen & Kamieniecki 1991) will support decision making not only through a rational choice of links but also by covering the whole process of policy making, including additional stages, such as problem recognition, historical analysis, policy device choices, and review processes. The focus of this workbook, however, lies with the identification, assessment, and choice of suitable links. The question of how to choose the best policy instruments will be considered in workbook 3.

Figure 5 summarizes the sequential steps for making a decision about EMA-links. These individual steps will be explained in detail in the following subsections. In Chapters 3 to 5 the

tool is applied in a generic way, thereby providing specific policy decision makers with a comprehensive reference point against which they can test their own specific results.

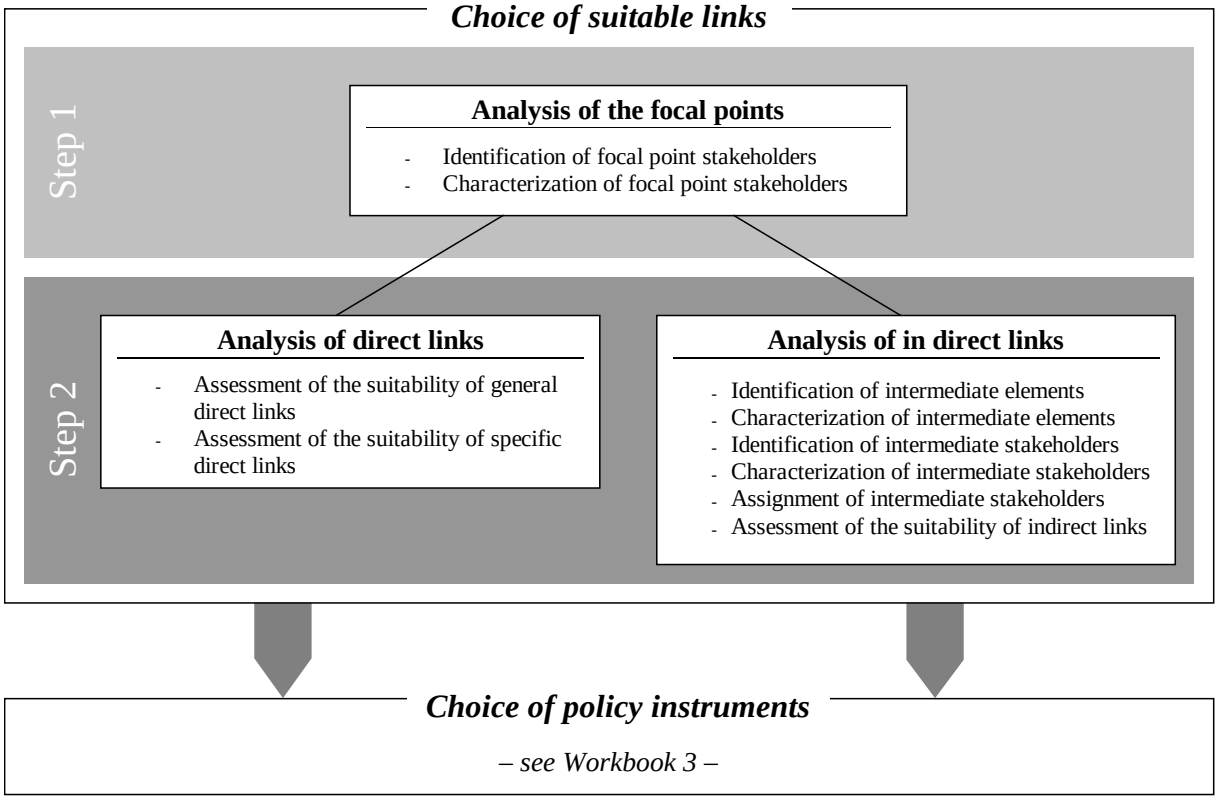

Figure 5. Schematic approach to chose the adequate EMA-links.

This schematic model will enable policy decision makers to be in an informed position for making a decision about the most suitable links to use for launching programs and initiatives to promote corporate EMA use.

2.3.1 Analysis of the Focal Points

As introduced above in Section 2.1, all links are characterized by two focal points, government agencies and corporate EMA users. Depending on whether any intermediate element is placed between these two focal points, reference is made to direct or indirect links. It should be noted that the characteristics of the two focal points are common for both direct and indirect links. As argued above, links are, related to the different actors involved. Therefore, the first step of the decision making tool for EMA-links consists of the identification of the focal point stakeholders.

Identification of Focal Point Stakeholders

a) Government Agencies

Governments form one focal point of all direct and indirect links. The first task is to identify those government agencies that are potentially involved in the promotion of corporate EMA use. It is up to policy decision makers in their specific decision contexts to decide which government agencies they want to consider. In order to provide as broad a basis as possible, the following master list identifies those government agencies that could be considered by policy decision makers as belonging to the potentially relevant and interesting set of agencies to be involved in promoting corporate EMA.[2]

- Environmental agencies (including all kinds of agencies which are primarily responsible for environmental issues, such as natural resource agencies, waste agencies, water agencies, environmental protection agencies, costal protection agencies, maritime agencies, and (space use) planning agencies);
- Commerce agencies (including all agencies who primarily deal with economic issues, such as commerce, industry, trade, etc.);
- Tax agencies (comprising all agencies that are concerned with public budgets);
- Education agencies (concerned with research and educational issues)
- …

Those different agencies can be located at different administrative levels, i.e. at local, regional, national, or supranational levels. It is important to note that this list is intended to be neither exclusive, nor complete, so that each policy maker can add or remove different agencies according to the specific conditions of the decision context. However, in general, it is advantageous to consider involving a wide range of government agencies and not to exclude any agencies without close examination or sound reasons.

b) Corporate EMA Users

Stakeholder groups related to the other focal point, corporate management, show even greater variety. The corporate management groups that are most likely to be concerned with obtaining EMA information, and which are most susceptible to government influence, depend on the specific organizational structure of the corporation, as well as on the industry that the organization belongs to. Hence, a general master list of potentially relevant corporate management departments is provided. From this list, policy decision makers can identify the relevant management groups according to their own specific policy decision context. It is left to policy makers to provide the rationale for their choice of the management groups they decide to emphasize.[3]

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[2] Depending on the political and administrative system of the region or level under consideration, agencies can include legislative as well as regulatory or oversight bodies.

[3] For the application of decision making in generic terms for the remainder of this workbook, stakeholders in the value chain, introduced by Porter (1985), will be used as the basis for choosing the relevant management departments. However, policy decision makers can also base their own choice on other classifications.

- Top Management
- Accounting and Finance Department
- Environmental Department
- Health and Safety Department
- Quality Department
- Human Resources Department
- Legal Department
- R&D and Design Department
- Corporate Marketing and Public Relations Department
- Information Management/Control
- Data Warehouse Management
- Production Management
- Purchasing Department
- Logistics
- Marketing and Sales Department
- Disposal and Recycling
- …

Once again, this master list can be adjusted according to the specific decision context in which the most suitable links need to be detected.

Characterization of Focal Point Stakeholders

The next step requires identification of the characteristics of all stakeholder groups identified for both focal points (i.e. government agencies and management departments). As mentioned above, the interests and goals, and information needs, of all stakeholders that are to be analyzed as EMA promoting links, are examined. These criteria are applied to all government agencies as well as to all management departments that are considered relevant by government policy decision makers, based on the master lists. It is recommended that stakeholder information be compiled in tables in the format suggested above (see Table 1). When completing these tables for government agencies and management the following questions need to be asked: What interests does each government agency or management department have - in general and in relation to EMA? What goals does each group pursue? What kind of information is required by each of the stakeholder groups under examination? The resulting two tables display characteristics of the different government agencies and management departments. These then serve as the basis for assessing the suitability of direct and indirect links.

2.3.2 Analysis of Direct Links

Once the focal point stakeholders and their characteristics have been identified all of the pre-conditions for the analysis of direct links are fulfilled. However, it is important to note, that the sequential order of the analysis of direct and indirect links does not imply any hierarchical order (see also Figure 5 where the two boxes for the analysis of direct and indirect links are shown in parallel at the same level). It is strongly recommended that no kind of potential link,

direct or indirect, be excluded prior to its detailed examination. Furthermore, direct and indirect links need to be considered in combination whenever this appears suitable.

In order to reveal the suitability of direct links, a direct comparison is made between the government agency and management focal point stakeholders. As suggested above, in section 2.2.3, this is undertaken through use of the following criteria:

- match of interests and goals;
- match of information needs; and
- anchorage of the links.

No formal rules exist to establish the *match of interests and goals*. Instead, assessment of the match of interests and goals requires the development of a rational argument about the complementarity of the interests and goals of the relevant government agencies and management departments. By comparing the interests and goals of the different government agencies with those of the chosen corporate management departments, the degree of matching can be judged using an ordinal scale calibrated as either no/low match – rather low match – moderate match – rather high match – high match. This can easily be visualized in a bar chart by adjusting the length of bars that indicate the extent of matching (for examples see Chapter 4).

Judgment about the relative *match of information needs* is conducted in a similar way to the match of interests and goals previously described. Through a logical discussion of the information needs of the stakeholder groups associated with both focal points, the match of information needs between the two focal points can be located on an ordinal scale calibrated in the same way as that for interests and goals. Even if it is expected that a high match of information needs coincides with a high match of interests and goals, this criterion should be methodically applied.

The aim is to arrive at a combined judgment about the degree of matching between the interests and goals and information needs of stakeholders between the two focal points, i.e. to integrate the judgments about different government agencies and corporate management departments. In contrast, the *anchorage* criterion refers to the variety and number of stakeholder groups that reveal the number of matches of interests, goals and information needs between both focal points. Anchorage is measured using a five point ordinal scale ranging from narrow to broad. In order to situate the anchorage for a specific link on the five point ordinal scale between low anchorage and high anchorage, two questions need to be asked: How many government agencies and management departments are engaged by the link? And how great is the variety amongst these stakeholder groups for each focal point?

In order to make an estimate of overall suitability, judgments for the three separate criteria outlined above have to be taken together. Once again, there is no formal rule for aggregating the three single judgments into a single overall suitability assessment of a direct link. Instead, the overall judgment depends on the reasoning behind this aggregation. However, judgment of the overall suitability should reflect the main tendencies found for the three separate criteria. In addition, for consistency reasons,

it is sensible to compare the overall suitability assessments obtained for the various direct links examined.

Assessment of Suitability of General Direct Links

In the case of direct EMA-links, a distinction can be made between general direct links and specific direct links. The general direct link refers to the relationship between government agencies and corporate EMA users with respect to EMA in general. In contrast with this, specific direct EMA-links examine the relationship between the same focal points in relation to the different specific EMA-tools identified in Figure 3 above.

In order to assess the overall suitability of the general direct EMA-link the following questions are asked: In relation to the two focal points, how well do the interests and goals, and information needs, match *in respect of EMA in general*? How well are the basic interests and goals of the different groups met by EMA in general? Which interests and information needs do the different groups have in relation to EMA in general? The anchorage criterion, which refers to the number and variety of stakeholders, completes the suitability assessments of the general direct EMA-link.

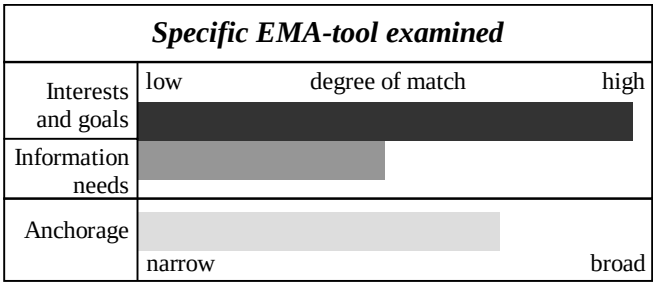

Figure 6: Template for visualizing the findings for specific direct links

Assessment of Suitability of Specific Direct Links

For the suitability assessment of specific direct EMA-links the same approach is used. The only difference with specific direct links is that the matches of interests and goals, and information needs, refer to the different specific MEMA and PEMA tools identified above (see Figure 3). Hence, the questions to ask are: How well are the basic interests and goals of the different groups met by the specific MEMA or PEMA tool under consideration? Which interests and information needs do the different groups have in relation to the specific MEMA or PEMA tool considered? Together with the *anchorage* of each specific direct link between government agencies and corporate management departments for every specific EMA-tool an assessment of the *overall suitability* of every specific direct EMA-link can be derived. To visualize the results and to facilitate the cross checking of the results for the different links being examined, it is useful to present the findings through bar charts, the length of different bars being based on the representations proposed in Figure 6. The length of the two upper bars indicate the degree of match between interests and goals, and information needs, of government agencies and corporate EMA users. The length of the third bar represents the breadth of the anchorage found for the specific direct link under examination.

2.3.3 Analysis of Indirect Links

Indirect links form the second track of the two-track analysis applied to the structural examination of EMA-links. Indirect links are characterized by an intermediate element and associated intermediate stakeholders which are placed between the two focal points and which mediate the influence towards EMA use governments bring to bear on companies.

Identification of Intermediate Elements

Identification of the intermediate elements, that could be used by governments in order to influence corporate EMA through indirect means, forms the first step in the analysis of indirect links. Intermediate elements have to be distinguished from EMA-applications such as design for environment, eco-efficiency, cleaner production, and pollution prevention.[4] Different groups of intermediate elements can be identified and analyzed. This tool does not prescribe intermediate elements that might be common to all circumstances. Instead, it provides master lists with possible interesting options for policy makers to consider. The following groups could be considered as possible relevant intermediate elements:

- Corporate accounting systems other than EMA, such as:
  - Conventional management accounting,
  - Financial accounting and reporting,
  - External physical environmental accounting and reporting,
  - Stock accounting,
  - Production planning systems,
  - Regulatory accounting ,
  - Tax accounting ,
  - …
- Corporate management systems, such as
  - Financial management systems,
  - Management control systems,
  - Environmental, health and safety management systems,
  - Quality management systems,
  - Human resource management systems,
  - Information management systems,
  - …
- National accounting systems
  - National economic accounting,
  - National environmental accounting,
  - National (economic and environmental) statistics,
  - …
- Other systems
  - …

[4] Such EMA applications are examined in workbook 3.

It is up to the government policy makers, in their specific decision contexts, to decide about the intermediate elements that appear most appropriate for further examination. From a practical perspective, it can also make sense to combine or group some of the intermediate elements as a basis for further analysis.

Characterization of Intermediate Elements

Once the intermediate elements are chosen for further analysis of their suitability for establishing promising EMA-links, their characteristics have to be identified. In order to gain a better understanding of each intermediate element, the purpose of each intermediate element, the kind of information it is concerned about and the application context for each intermediate element should be briefly outlined. The most important task for this step is to establish the method proximity of each intermediate element to EMA from a technical perspective. Here decision makers should ask: How close are the methods and tools associated with any intermediate element to the various EMA tools? What is the extent to which intermediate elements consider information generated by EMA systems? The method proximity criterion provides a first indication of the suitability of each intermediate element being examined. It is advisable to place the method proximity of each intermediate element on an ordinal scale that has a range of possibilities from low, low-medium, medium, medium-high to high?

Identification of Intermediate Stakeholders

As previously stated earlier in this workbook, the actors and decision makers behind each intermediate linking element play a crucial role in the assessment of the suitability of any links. Therefore, for each indirect link, the relevant stakeholders have to be identified. Because stakeholders can be interested in different intermediate elements, to keep the tool as simple and useful as possible, identification of intermediate stakeholders is considered to be independent of the intermediate elements.[5] As with the other steps identified earlier, this tool offers an extensive master list, which includes most of the potentially interesting intermediate stakeholders. Clearly, this list can be adjusted depending on the specific circumstances of the decision. Stakeholder groups that are likely to be involved in indirect links include the following:

- Shareholders and financial analysts
- Creditors (banks) / insurance companies
- Industry associations
- Standardization organizations
- Professional accounting associations
- Neighbor communities
- Suppliers and purchasers
- (Environmental) NGOs
- International Organizations
- Employees (other than management)
- Tax agents

[5] In a later step these intermediate stakeholders will be assigned to the different intermediate elements (see Section 2.3.3.5).

- Professional accounting companies
- Consultants
- Researchers and academia
- General public
- Indigenous communities
- Media
- …

In particular, consideration should be given to those stakeholder groups that have an interest in the application or promotion of EMA, in general, or of specific EMA tools. Another reason for taking stakeholders groups other than government agencies and corporate management departments into account is that the impetus for promotion or use of EMA by corporations can originate from several different sources. Apart from government agencies, other groups of stakeholders noted in the master list may also issue guidelines and implement their requirements in relation to corporate EMA.

Characterization of Intermediate Stakeholders

In the same way that focal point stakeholders were identified earlier on, in the next step for assessing indirect links intermediate stakeholders have to be identified. The same criteria as those detailed above are used for this purpose. This is necessary because in the suitability assessment of indirect links matches between the focal point stakeholders and the intermediate stakeholders have to be derived through a comparison using the two partial links, (a) and (b), identified in Figure 4. The format provided in Table 1 is used to highlight characteristics of the intermediate stakeholders. For every intermediate stakeholder group the following questions are asked: Which basic interests and goals are pursued in general, and in relation to EMA? In addition, what are the corresponding information needs of the intermediate stakeholders? As a result of this step the user of the decision making tool should have developed a complete list of all stakeholder groups, considered relevant to indirect links, using the format of Table 1. It is important to take considerable care when compiling this list of intermediate stakeholders and their characteristics because it serves as the substantive basis for assessing the suitability of indirect links.

Assignment of Intermediate Stakeholders

Before it is possible to analyze the suitability of the different indirect links, the previously identified stakeholders have to be assigned to the intermediate elements chosen for the suitability assessment. As can be seen in Figure 2, every intermediate element considered constitutes an indirect link, which will be analyzed for its overall suitability for government exercise of influence on corporate EMA use. The suitability assessment of indirect links consists of a comparison between the interests and goals, and information needs of government agencies, intermediate stakeholders, and corporate management departments across the two partial links. Such a comparison, however, requires a preliminary assignment of the relevant intermediate stakeholders to each intermediate element under consideration. All the stakeholder groups that are related to or interested in an intermediate element should be

assigned to it. Each stakeholder group can be assigned to different intermediate elements. The step assigning intermediate stakeholders to intermediate elements is important as it facilitates the analysis of indirect links. One possible way of further clarifying this assignment process is to extract separate tables from the comprehensive table of intermediate stakeholder characteristics (see the previous section) that pinpoint the relevant stakeholders for each intermediate element.

Assessment of Suitability of Indirect Links

In principle the assessment of suitability of indirect links follows the same logic as the analysis conducted for direct links (see Section 2.3.2). The fundamental difference, however, is that the analysis of the match of interests and goals, and information needs, as well as of the anchorage, is conducted in relation to *two partial links*. This is because indirect links consist of one partial link between government agencies and the intermediate element, with its associated stakeholders (partial link (a)), and a second partial link between this intermediate element, with its associated stakeholders, and corporate EMA users (partial link (b)). In addition, the criterion of *method proximity* (Section 2.2.3) between each intermediate element and EMA needs to be assessed. Method proximity contributes to the overall assessment of the suitability of each indirect link. In general, when conducting the suitability assessment of direct and indirect links, there are no formal rules to establish the extent of matches, or broadness of anchorage, or aggregation for overall suitability. As stated above, judgment of the different criteria and overall suitability is based mainly on sound reasoning for each assessment and relies on reflective crosschecking between the different judgments. The main prerequisite for a favorable assessment of the overall suitability of an indirect link is that both partial links show rather high matches and a broad anchorage.

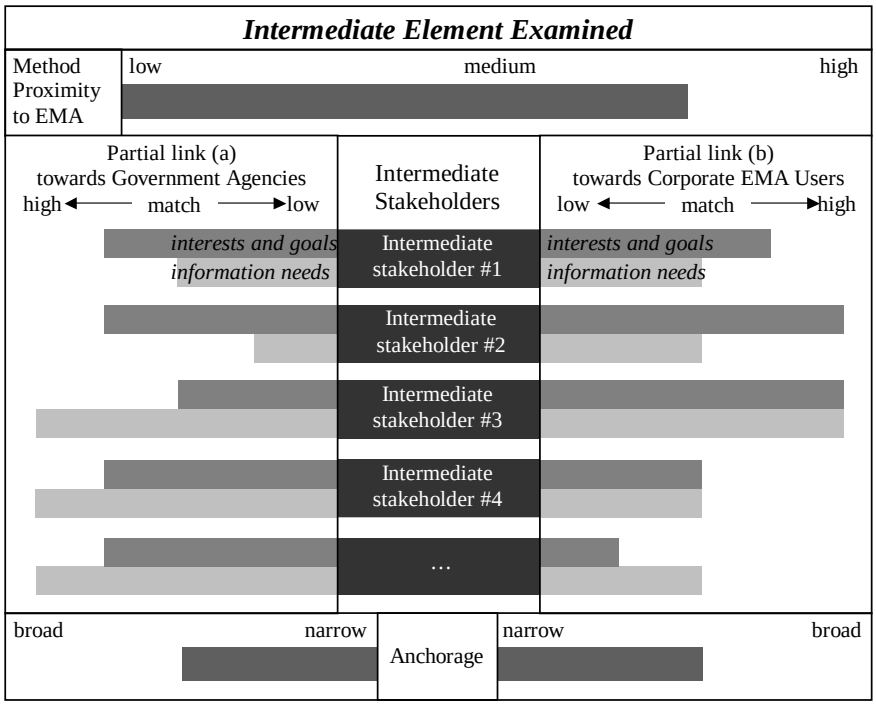

Figure 7. Format for visualizing the findings for indirect links.

The assessment of the suitability of each indirect link consists for each intermediate stakeholder of a discussion of the match of interests and goals and the match of information needs with government agencies and corporate management. It is recommended that the reasoning for each match should be written down as a basis to classify the degree of match on a five-step ordinal scale between low and high. In order to

clarify the analytical results it is recommended that the findings for each criterion are represented in a bar chart by the length of different bars as shown in Figure 7. The first bar stands for the method proximity between the intermediate element and EMA. Bars indicating the extent of matches between interests and goals, and information needs, as well as the broadness of anchorage are separated according to partial link (a) and (b). Viewing the findings in this form for each indirect link helps to improve the clarity of the analysis and to facilitate necessary crosschecking between the results of the different indirect links.

To investigate the overall suitability of an indirect link, the method proximity should be assessed first. Second, intermediate stakeholders associated with the link who show high matches between interests and goals, and between their information needs, have to be identified. Third, anchorage of the indirect link has to be assessed. The overall suitability of the link increases with a larger number and a broader range of different intermediate stakeholders and focal point stakeholders with high matches. Taken together, the assessment of matches, anchorage and method proximity provide the basis to judge the overall suitability.

It has to be stressed that, apart from the criteria discussed, there are no formal rules for this assessment procedure. Judgment depends very much on sound reasoning and crosschecking of any consistencies between the different indirect links being examined. By following this process the most suitable intermediate stakeholders for each indirect link will also be identified.

In what follows, the analytical tool outlined in the previous sections is applied at a generic level. Therefore, the remainder of this workbook is organized according to the three main analytical steps identified above. Chapter 3 deals with analysis of the focal points, Chapter 4 provides the analysis of direct links, and Chapter 5 presents the analysis of indirect links. This generic analysis serves two main purposes: first, it clarifies and illustrates the previous description of the analytical tool that has been developed; and second, the results of this generic analysis provide a valuable reference for each application of the tool in a more specific decision making context. In addition, in order to provide practical support for the findings, the *operative status* of the various links will be addressed. The operative status states whether the examined link is currently being used. A final criterion, *use of EMA information to governments,* serves to further identify the benefits governments can draw from promoting corporate EMA use.

3 ANALYSIS OF THE FOCAL POINTS

3.1 Identification of the Focal Point Stakeholders

3.1.1 Government Agencies

Government agencies pursue a wide range of different interests and goals according to the different departments and levels of administration being considered. For the generic analysis conducted in the following chapters, three main types of government agencies will be considered: environmental agencies, commerce agencies, and tax agencies.[6] These government agencies are thought to represent those most involved with corporate EMA. In addition, they are the agencies that can gain the most benefit from expanded application of EMA throughout industry. The term environmental agencies is used to include all government agencies concerned with environmental issues, such as environmental protection agencies, natural resource agencies, maritime agencies, water agencies, waste agencies, and costal protection agencies. Commerce agencies consist of all government agencies that deal with commerce, trade and industry issues.

3.1.2 Corporate EMA Users

For the purposes of this workbook (see Section 2.1), EMA is defined as an information tool for internal corporate decision making. EMA can furthermore be classified into MEMA and PEMA expressed either in financial terms, to measure environmentally-induced costs, or in terms of physical units, for measuring a company's impact on the environment. In general, internal information management is a basic prerequisite for meeting the information needs of external stakeholders and, therefore, internal and external stakeholders both require the

Figure 8. Value chain and internal corporate EMA users (based on Porter 1985, p. 37)

same *type* of information. However, management requires a greater amount and *degree of detail* (Schaltegger & Burritt 2000, Chapter 2.3). Stakeholders that use EMA consist of the

[6] Because of differences in specific competencies of government bodies operating at different levels and in different countries, a more precise distinction between different administrative departments will not be made.

members of different corporate management departments.[7] Each has an internal focus with information generally being regarded as confidential - for management use only. Conventional management accounting systems are designed in such a way as to make management internally accountable for their activities, and, at the same time, facilitate external accountability. The primary general aim of EMA is to inform and support decision making by, and accountability of, those managers who influence, or who are influenced by, environmental factors.

Bennett & James (1998, 34) see these managers as primarily being located in the accounting and finance department, the environmental department and in production management. Their structure is valuable for analysis in this workbook because it corresponds with corporate decision centers. In order to extend this to a more general theoretical basis for analysis of the scope of internal corporate stakeholders, the well established value chain approach of Porter (see Figure 8 above) will be used.

This approach ensures that consideration is given to all essential departments and related activities through which an enterprise creates a valuable product or service for its buyers. Consequently, top management, managers of marketing and public relations (PR), legal affairs, research, development and design, quality, and health and safety support departments, purchasing, logistics, and disposal and corporate recycling managers, will also be considered as internal users of EMA information.

3.2 Characterization of the two Focal Points

3.2.1 Government Agencies

Basic goals of and information desired by different government agencies are described in Table 2. In order to provide a comprehensive characterization of government agencies (as a focal point for direct and indirect links) the following table includes government goals related to direct promotion of EMA and also objectives and information needs that will only be met by including intermediate elements, such as reporting activities or specific approaches to management.[8]

[7] The UN expert group agreed at its meeting in Vienna in May 2000 to make no explicit distinction between private and public businesses as potential users of EMA, but to refer to corporate management in general instead. In theory, local administrative bodies can also be considered as EMA users because they are concerned about the management of local environmental situations and local government environmental performance through the use of EMA information.

[8] For example, as soon as it is assumed that the information needs of government bodies are to be met through use of corporate EMA the presence of some form of reporting system is implied, in order to establish an exchange of information between governments and corporations. In analytical terms, for the purposes of this workbook, this situation is addressed through an indirect element.

Government Agencies		
Relevant Government Agency	Basic Goals	Type of Information desired
Environmental Agencies	- Improvement of environmental situation - Pollution reduction at minimal cost to government and with minimal political resistance (UNDSD 2000, 15)	Physical measures of the environmental situation and the main pollution sources.
	- Improved enforcement of and compliance with regulations - Increasing effectiveness and efficiency of (new) environmental regulations and economic incentives (UNDSD 2000, 15; SRU 1996)	Financial and physical measures. Compliance information. Detailed information about: - industry's environmental performance - the environmental effects of policies in force - the economic burden of regulatory compliance for industry
	- Reliable database for environmental planning and setting of environmental quality goals (see e.g. SRU 1998)	Physical measures, related to environmental conditions in the particular area being administered
	- Integrating economic, social and environmental dimensions into policy design according to the government's role in promoting sustainable development via Agenda 21 (UNCED 1992, Chapter 8.3).	Financial information related to environmental impacts. Physical measures referring to economic activities. Integrated knowledge
	- Promotion of integrated pollution prevention - Integrating environmental aspects into mainstream business decision processes (Bennett & James 1998, 33) - Improving eco-efficiency of industry (Schaltegger & Sturm 1990, 274)	Financial measures of the economic feasibility of pollution prevention efforts. Physical measures of the effectiveness of pollution prevention measures. Business knowledge of decision making processes and structures.
	- Internalization of external environmental effects.	Financial and physical measures of external effects.
	- Creation of an appropriate structure to provide for transparency and accountability of businesses, and to encourage corporations to act in the public interest.	Financial and physical measures of corporate (environmental) performance.
	- ...	
Commerce Agencies	- PROMOTION OF ECONOMIC GROWTH AND EMPLOYMENT	Financial information on the economic situation. Physical measures e.g. about the availability of natural resources.
	- Transparency of economic transactions - Accountability of companies	Financial measures of corporate performance.
	- Competitiveness of local and national economies through the relevant markets (avoidance of monopolies)	Financial measures of market conditions.
	- Economically viable approaches to environmental protection	Financial measures of the economic feasibility of environmental protection activities. Physical information on the effectiveness of environmental protection measures.
	- ...	
Tax Agencies	- Securing income for public budgets	Financial measures.
	- Equitable and just taxation systems	Financial measures.
	- Steering or influencing taxpayer behavior in a desired direction (e.g. "green" taxes)	Financial measures. Physical measures before charges for emissions can be calculated in the case of eco-taxes.
	- ...	

Table 2. Characterization of Government Agencies

Without claiming to be complete, Table 2 provides an overview of the main goals and information needs of those government agencies that are responsible for environmental and/or economic matters relating to companies.[9] The Table demonstrates that commerce and tax agencies are mainly concerned about information expressed in financial (or monetary) terms whereas, environmental agencies mainly emphasize information expressed in physical units.

A close inspection of Table 2 shows that each of the different government agencies considered has an interest in EMA. However, rather than being part of the core goals of these agencies, EMA serves as a means to achieving their core goals.

The major goal of *environmental agencies,* which may be supported by corporate EMA, is to achieve the highest reduction in pollution by companies and others. This should be achieved through corporate compliance with government policies and regulations at lowest cost to government and with the minimal political resistance, as well as through the realization of economically beneficial environmental protection and pollution prevention measures. The main goal of *commerce agencies* is supported by corporate EMA if it enables industry to meet the environmental protection requirements at the lowest cost, in order to ensure sustained growth and employment for a given level of environmental protection. EMA is also of use to *tax agencies* in achieving their major goal of ensuring that income is available to contribute towards public budgets.

Finally, *government* has a *general interest* in corporate EMA because of the basic notion that it seeks to encourage sustainable development by integrating economic, environmental and social considerations within its policies, programs and decision making activities (UN 1992, Chapter 8.3).

3.2.2 Corporate EMA Users

Table 3 shows the major characteristics of the basic goals and information needs of corporate EMA users as internal company stakeholders involved in a set of different corporate management areas. Without claiming completeness, internal management groups, their major goals and information needs, as shown in Table 3, offer a wide variety of leverage points that will eventually be linked with different government agencies and their interests and information needs.

[9] To prevent Table 2 from becoming overly complicated a further distinction, between aspects of local, national and supranational administrative levels, will only be undertaken during the analysis of specific direct links in Section 3.2.

Corporate EMA System		
Relevant EMA users	Basic Goals	Type of Information desired
Top Management	- Long term profitability and survival of company - Securing legal compliance with minimal cost to the corporation - Realization of all economically beneficial environmental protection measures - Securing the provision of resources from the critical stakeholders (Schaltegger 1999) - ...	Highly aggregated financial and strategic (qualitative and quantitative) information on the business environment and the company's performance.
Accounting and Finance Department	- Identifying and realizing cost saving potential - Transparency about cost-relevant (environment-related) corporate activities - Transparency about the impact of (environment-related) activities on the income statement and/or balance sheet - Reduction of environmentally-induced risks (Bennett & James 1998, 34ff.) - Compliance with accounting regulations - Maximization of shareholder value - ...	Financial measures about corporate activities, e.g. cost-, income- and balance sheet related issues, risk assessments, investment decisions, mergers and acquisitions etc. Financial information on the value and economic performance of the enterprise.
Environmental Department	- Identifying environmental improvement opportunities - Prioritizing environmental actions and measures - Environmental differentiation in product pricing, mix and development decisions - Transparency about environmentally relevant corporate activities - Meeting the claims and information demands of critical environmental stakeholders, to ensure resource provision and access - Justifying environmental management division and environmental protection measures - ... (Bennett & James 1998, 34f.; UNDSD 2000, 46)	Physical measures on material and energy flows and stocks and related processes and products, and their impacts upon the environment. Financial measures about the economic impact of environmental initiatives (such as pay-back periods, return on capital/investment, etc.). Qualitative measures on stakeholder claims.
Health and Safety Department	- Safeguarding the safety, health and welfare of employees at work from environmental accidents and disasters	Physical measures of health and safety. Financial measures of worker compensation.
Quality Department	- Meeting the (environmental) product requirements of customers at the minimum cost for a given level of product quality	Information on cost of quality. Physical measures of technical product requirements.
Human Resources Department	- Job related (including environmental) concerns of employees - Remuneration, including rewards for good environmental performance - Physical jobs allocated and job conditions monitored	Information on financial rewards. Physical information on turnover, satisfaction, morale.
Legal Department	- Ensuring (environmental) legal compliance by the company's operations	Physical measures. Qualitative compliance information.
R&D and Design Department	- Development and design of marketable products and services - Reducing (environmental) risks of investments - Development of improved production processes	Strategic information about market demands. Financial information about costs of new products and services. Information on technical feasibility and environmental impacts of newly designed products and services.
Corporate Marketing and PR Department	- Meeting external information demands of critical stakeholders - Meeting claims and information demands of shareholders, other economic stakeholders (including those interested in environmental reports) - Developing a green image of the company and its products - ...	Information about stakeholder claims. Physical and financial information on the company's environmental impacts and efforts for pollution reduction and prevention.

Production Management	- Task control over operations - Optimizing energy and material consumption - Reduction of environmentally-induced risks - ...	Information on material and energy flows and process records.
Purchasing Department	- Efficient procurement of the inputs for corporate operations - Establishing and securing favorable relationships with suppliers - ...	Information on quality and environmental properties of the goods purchased. Financial information on prices.
Logistics	- Efficient organization of, collection, storage, and physical distribution of goods and products - ...	Physical measures e.g. on distribution means and storage facilities and related environmental impacts.
Marketing and Sales Department	- Increasing sales and attracting and satisfying buyers. - Provision of means by which buyers can purchase the product - Inducing customers to buy the enterprise's products through the tools of the marketing-mix (especially pricing, distribution, and communication) - ...	Information on operational market conditions (e.g. pricing, competitor activities, etc.) Information on customer demands.
Disposal and Recycling	- Efficient disposal and recycling of wasted or used material - Minimization of wastes to be treated, especially hazardous wastes - ...	Physical measures of the properties of disposable and recyclable goods. Technical information on treatment and recycling options.

Table 3. Internal Stakeholders, goals and information needs related to EMA Systems.

Table 3 does not show different EMA methods that managers could use in different management departments.[10] Specific direct links, as discussed in Section 3.2.2, do however refer to specific EMA tools in the context of particular decisions (see Figure 3 and Section 2.1). The in-depth analysis of direct government-EMA links, in Section 3.2, will place specific EMA tools, that are available to different government agencies, in the context of the basic goals and information needs of management, as shown in Table 3. Thus, EMA represents a set of specific EMA tools that can be related to different basic goals and information needs of corporate management. Each link with EMA in general, and with specific EMA tools, will be characterrized according to how well the basic goals and information needs of government agencies and internal company stakeholders match.

[10] This workbook will not discuss specific EMA methods in detail. The in-depth discussion and analysis of different EMA-tools is the subject of Workbook 1.

4 ANALYSIS OF DIRECT LINKS

Analysis of direct links compares the structural match between the "government" and "EMA" *focal points*. The following examination of direct links between the two focal points, represents the *first track* of the two-track analysis introduced above (see Section 2.2.2).

When analyzing direct links, it should be mentioned that, contrary to the regulated foundations of conventional financial accounting, *conventional management accounting is a voluntary activity and is not undertaken to satisfy the requirements of external stakeholders*, including government bodies (Schaltegger & Burritt 2000, Chapter 6.1). In consequence, for internal purposes managers are not forced to account for environmental impacts in a specific way.[11] This is also the case for government agencies: direct government influence on EMA is restricted by the internal, voluntary nature of EMA. This illustrates the *fact that the possibility of direct mutual interaction between government bodies and internal corporate management accounting activities in general is restricted.* Spanning and then discussing *all* imaginable links between the numerous goals and information needs of the government and internal corporate stakeholders identified above, including discussion of all the different EMA tools, would greatly exceed the scope of this workbook. Therefore, the links are analyzed according to the assessment criteria introduced above, i.e. the match between interests and information needs of *the most important* management departments and government agencies. In addition, the structural anchorage of the links within the two focal points is analyzed. Finally, for each operative link, examples of government programs are given.

Direct links between government and EMA provide the structural basis for direct promotion of environmental considerations in the application of conventional management accounting and modern EMA methods by government. This direct influence can either refer to EMA in general or to the specific EMA tools listed in Figure 3. Thus, the structural analysis in this chapter distinguishes between general direct links and specific direct links. Section 4.1 will address *general* direct links between government and EMA. Subsequently, Section 4.2 extensively analyzes the direct links that address the structural match between government and management in relation to *specific* MEMA and PEMA tools.

4.1 Assessment of Suitability of General Direct Links

This section examines those direct links that do not specifically address any EMA tools, but, instead, refer to the use of EMA in general. These links are therefore called general direct links.

Match of interests and goals: The use of general direct links is motivated by the assumption that the fundamental barrier to a more widespread use and implementation of EMA in industry is a lack of information and knowledge about EMA tools and the benefits

[11] However, this does not lead to the conclusion that external stakeholders have no influence on internal company matters in general and EMA use in particular. Schaltegger & Burritt (2000, 4.2 and 6.2.6) illustrate different ways stakeholders can exert their influence and the results of this process. Influence of non-government stakeholders will also be addressed when indirect links are analyzed in Chapter 4.

they can generate (UNDSD 2000, 46). Knowledge about, and acceptance of, EMA is a necessary condition for EMA to be useful to the government agencies and internal corporate EMA users shown in Tables 2 and 3. Therefore, prior to the examination of any specific matches between focal point stakeholder interests and information needs, the fundamental interests of internal government and company stakeholders in EMA will be discussed. The *fundamental interests of government in EMA* have been identified as:

- reduction of pollution through compliance with regulation at lowest cost to government and with minimal political resistance, and through the realization of economically beneficial environmental protection and pollution prevention measures, as well as the integration of environmental considerations into mainstream business decision processes (environmental agencies);

- compliance with environmental protection requirements at the lowest cost to the corporation, in order to ensure sustained growth and employment for a given level of environmental protection (commerce agencies); and
- the contribution towards public budgets (tax agencies).

The *fundamental interests of corporate managers in EMA* in general (i.e. independent of the specific EMA tools) are mainly located within the activities and responsibilities of environmental protection managers and accountants. These interests consist mainly of:

- the identification of environmental improvement opportunities through increased transparency about environmentally relevant corporate activities. Environmental management divisions seek a justification for their own benefit and for environmental protection measures that lead to the realization of environmental protection measures that are economically beneficial for the corporation; and

- the identification and realization of potential cost savings, the improvement of transparency about environmentally-induced cost impacts of corporate activities and their implications for the income statement and/or balance sheet, as well as the reduction of environmentally-induced risks.

The achievement of these objectives, as well as the other EMA-related goals of government agencies *and* corporate management departments, depends fundamentally on their knowledge about EMA. As soon as governments succeed in communicating the potential benefits of implementing corporate EMA (see Tables 2 and 3 for the potential benefits for each internal stakeholder group), knowledgeable managers accustomed to the general benefits of EMA may begin to develop a growing interest in how to profit from EMA. At this fundamental level a rather close match in EMA-related interests can be found – providing the foundation for, and justifying, further efforts to promote corporate use of EMA.

Match of information needs: The same comment applies to the EMA-related information needs of different government agencies and corporate management departments. As shown in Tables 2 and 3, the internal stakeholder groups identified can benefit, to a greater or lesser extent, from information generated by corporate EMA systems. The fundamental need for

EMA information is motivated by the growing importance of environmental matters within regulatory regimes, in markets, through stakeholder claims, and as cost drivers. The findings for the match of information needs obey the same logic to that used for deriving the findings about the main goals and interests. Any needs for EMA-information can only be fulfilled if the stakeholders have a basic understanding of EMA and its tools.

Anchorage: Discussion of the match of EMA-related interests and information needs showed that the general direct link between government and EMA is based on ecological *and* economic interests of both focal points - government agencies and corporate management departments. Considering its importance for other, more specific, EMA-related interests and information needs, there is a rather broad anchorage for the general direct link.

Conclusion: At first sight, general direct links appear to be quite suitable for the promotion of corporate EMA. Among the main reasons are:

- the close match between the general interest in economically beneficial environmental protection measures in both government and management; and
- the fundamental significance of knowledge about EMA for the fulfillment of all EMA-related interests and information needs.

However, general direct links do not address specific EMA tools or related interests and information needs in a distinct manner. Decision makers usually operate under tight time constraints and are more interested in specific information relevant to their decisions than in general information. In consequence, although a general link provides a necessary basis for successful EMA promotion, it does not provide a sufficient basis.

Operative Status: Given the fundamental role played by general information about EMA systems it is not surprising to find that general direct links have been used as a basis for numerous government and administration programs to promote application of EMA in industry. The *general direct link towards EMA* is, therefore, classified as *operative*.

Administrative Level	Example of government initiative	Literature
Supranational	European ECOMAC project and EMAN network, sponsored by the European Commission UNDSD EMA project	UNDSD 2000, 50; ECOMAC 1996; EMAN 1999; Bartolomeo et al. 2000 UNDSD 2000
National	Manual on Environmental Management Accounting, released by the German Federal Environment Ministry and Federal Environmental Agency An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms Japan Environment Agency's guidelines on environmental cost accounting Austrian manual on environmental costs	BMU & UBA 1996; Schaltegger & Burritt 2000, 6.2.6 US EPA 1995 JEA 1999/2000; UNDSD 2000, 50ff. BMUJF 1997
Regional/Local	Introductory Guide to Environmental Accounting, published by Environment Canada's Environmental Protection Branch for the Quebec Region	UNDSD 2000, 56f.
...	...	...

Table 4. Examples of operative general direct links.

Table 4 provides some examples of government initiatives or programs, at different administrative levels, that use general direct links with corporate EMA.

The actual and potential use of EMA information for government will now be discussed in relation to specific EMA tools because the kind of EMA information varies substantially according to the EMA tool being considered.

4.2 Assessment of Suitability of Specific Direct Links

In contrast with the general direct EMA links discussed in the previous section, this section considers direct links that address *specific* EMA tools. The following specific MEMA and PEMA tools, identified in Chapter 2 (see lower white boxes in Figure 3), are examined in the context of the main goals and information needs of government agencies and corporate EMA users:

- Environmental Cost Accounting;
- Accounting for Environmental Benefits;
- Monetary Environmental Budgeting;
- Monetary Environmental Investment Appraisal;
- Material and Energy Flow Accounting;
- Physical Environmental Budgeting; and
- Physical Environmental Investment Appraisal.

As suggested in Section 2.2.3, for each of these specific direct links there will be an analysis of the match between the interests and information needs of different stakeholder groups and of each link's anchorage, as a way of assessing the suitability of each specific direct link. In addition, the usefulness of EMA information to different government agencies will be discussed in this context, because this usefulness may differ according to the different EMA tools used to generate the information. Analysis will be completed with an overview that examines whether links are operative. In the case of operative links some examples of government programs are provided.

4.2.1 Specific Direct Link with Environmental Cost Accounting

Environmental cost accounting as a MEMA tool orientated towards the past (see Figure 3) serves to enhance transparency about all costs that are influenced by, and that are directly or indirectly related to, environmental aspects of corporate activities (Schaltegger & Burritt 2000, 6.2.4).

In order to guide understanding of the following discussion Figure 9 summarizes the main results of the analysis for this specific direct link.

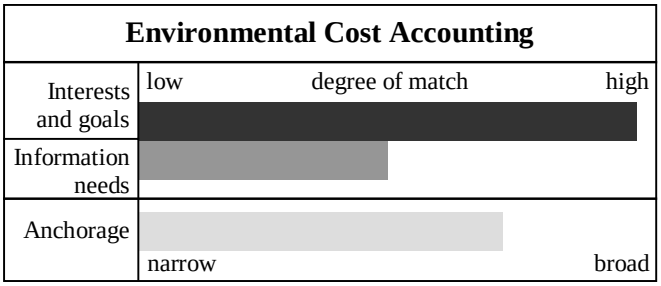

Figure 9. Findings for the specific direct link with environmental cost accounting

Match of interests and goals: On the *government side* of the link the purpose of environmental cost accounting is in line with the basic goal of promoting eco-efficiency and sustainability of industry through integrated pollution prevention. Environmental cost accounting also lends support to the goal of environmental agencies for integrating environmental considerations into mainstream corporate decision making (see Table 2). In addition, it is related to the aim of commerce agencies to achieve environmental protection at the lowest economic cost.

On the *corporate side*, accounting for environmental costs is a close fit with the interests of accounting and finance managers to identify and realize potential cost savings, and to enhance transparency about cost-induced environment-related corporate activities and their impacts on corporate economic performance. In this context, production managers, R&D and design department members and management concerned with logistics may all be interested in environment-related cost assessments. Furthermore, environmental cost accounting complements top management's basic goal of achieving long term profitability and corporate survival (see Table 3).

As a result, the specific link towards environmental cost accounting presents a rather *close match of interests* between the relevant government agencies and management departments.

Match of information needs: Specific MEMA cost information related to a single enterprise is by definition internal, confidential and somewhat detailed and thus in most cases not really of much interest to government agencies. Any match between government and internal company stakeholders only exists at the top management level because, as with commerce agencies, only highly aggregated figures about an enterprise's cost structure are of use. Thus the match in information needs between the relevant government agencies and corporate management departments is not as strong as the match in their interests.

Anchorage: Given the broad range of stakeholders involved within each focal point it is a remarkable fact that many economic stakeholders, who conventionally are not so much concerned with environmental issues, are involved with this link. This specific direct link, with its rather broad anchorage, seems to be well disposed towards promoting the use of corporate EMA by integrating, as it does, economic with ecological interests.

Use of information to government: The question arises as to how useful is the information generated by environmental cost accounting for decision making by different government groups. As mentioned above, corporate cost information specifically generated for the business is very detailed and varies substantially between corporations. Government bodies, such as environmental agencies, tend to seek highly aggregated information about environmentally-induced costs, or information averaged across industries or regions, in order to substantiate their arguments for environmental protection or pollution prevention measures.

Operative status: The high suitability revealed above is also reflected by the fact that this link is used by a range of government programs for promoting EMA (Table 5). The link is therefore operative.

Administrative Level	Example of government initiative	Literature
National	- US EPA Environmental Accounting Project - Japan Environment Agency's guidelines on environmental cost accounting	- US EPA 1994, 1995a-c; UNDSD 2000, 47ff.; Schaltegger & Burritt 2000, 6.2.6; - JEA 1999/2000; UNDSD 2000, 50ff.[12]
Regional/Local	- The Massachusetts Toxic Use Reduction Act (TURA) - The New Jersey Pollution Prevention Act	- Becker, Geiser & Keenan 1997 - Wise & Gray 1992
...	...	...

Table 5. Examples of guidelines establishing a direct link to environmental cost accounting

4.2.2 Specific Direct Link with Accounting for Environmental Benefits

Specific direct links to accounting for environmental benefits can be analyzed in a similar way to environmental cost accounting. Accounting for environmental benefits, being part of MEMA, provides a positive contrast with accounting for environmentally-induced costs. The two methods are very close. This closeness is reflected through a very high similarity in the stakeholder groups that are interested. Therefore, the *match between interests and information needs* of the relevant stakeholder groups, the *anchorage of the link,* and the potential use of information generated by this tool for government decision making, can be assessed in the same way as environmental cost accounting (see paragraph a)) (see also Figure 10).

[12] For additional information about the US EPA's Environmental Accounting Project, see http://www.epa.gov/opptintr/acctg. For additional information about the JEA guideline on environmental cost accounting , see http://www.eic.or.jp/.

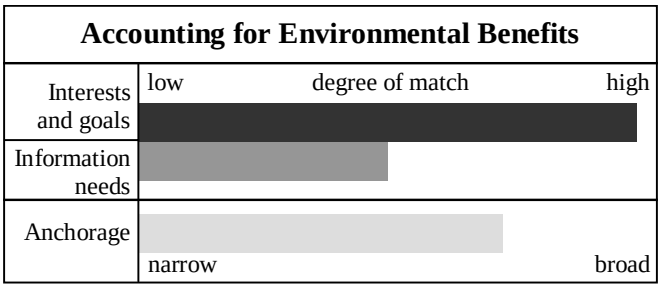

Figure 10. Findings for the specific direct link with accounting for environmental benefits

Nevertheless, and in somewhat of a contrast, apart from the US EPA Environmental Accounting Project, no government programs specifically addressing the MEMA tool accounting for environmental benefits could be found. Thus, in spite of being *operative*, this link is very rarely addressed by government policies. This is surprising because the same favorable structural conditions exist as for environmental cost accounting. Furthermore, this result is quite disappointing because the idea of accounting for the economic benefits of environmental protection has a positive connotation in relation to environmental protection and is fully in line with promotion of the goal of eco-efficiency.

4.2.3 Specific Direct Link with Monetary Environmental Budgeting

Monetary environmental budgeting as a MEMA tool refers to the short-term future costs of environmentally relevant corporate activities. It is devoted to budgeting for the expected environmental costs and benefits for the next period (Schaltegger & Burritt 2000, 6.3.3 and 6.3.5). Figure 11 summarizes the results of the structural analysis for the link with monetary environmental budgeting.

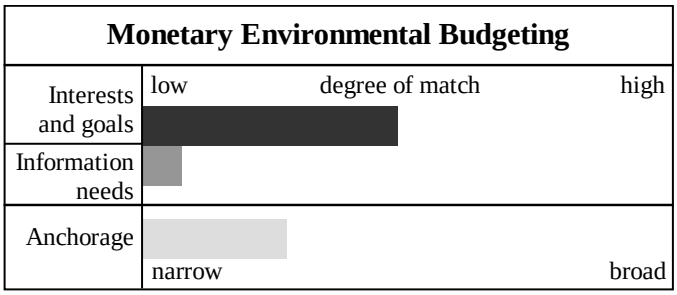

Figure 11. Findings for the specific direct link with monetary environmental budgeting

Match of interests and goals: On the government side the interests of *environmental agencies* in integrating environmental issues into mainstream business decision processes might be the most relevant, along with the more general expression of interest in EMA (see Section 3.2.1). *Commerce agencies* will welcome this economic approach towards environmental issues.

Operating management is the main internal corporate stakeholder concerned with budgeting because it is responsible for the short term allocation of monetary resources to operations. Depending on their current status within the enterprise, purchase, logistics, production, sales, and waste managers will have an interest in the transparent and explicit budgeting of environmental costs and revenues affecting their projects. Furthermore, monetary environmental budgeting is of interest to *environmental protection managers* as a means for increasing transparency of corporate environmental activities. This is analogous with the interests of *accountants and financial managers* who may like to see increased information on environmentally-induced cost-relevant activities.

Taken together, the *match of interests* between relevant government agencies, on the one hand, and relevant management departments, on the other, is *not overly close*, even though

no real divergences could be detected. This may be mainly due to the fact that budgetary control is a confidential company process, and is even more restricted than cost accounting because the information is future-orientated and is commercially sensitive. Hence, management has a fundamental interest in maintaining the confidentiality of their internal plans, which makes it quite difficult for government to influence monetary environmental budgeting.

Match of information needs: Monetary environmental budgeting's strict internal and commercial-in-confidence focus turns out to be the dominant factor in the assessment of the degree of *matching between information needs*. Short term future orientated information in monetary environmental budgets does not appear to be of great interest to government agencies – if, indeed, they were able get access – as this information quickly changes, often on a rolling basis, and it differs considerably from enterprise to enterprise. The main internal corporate actors having a high interest in monetary environmental budgeting are *managers in the operational part of the value chain* (see Figure 5). Taken together, the *gap between internal use of budgeting information and the information needs of government agencies is quite large. In conclusion, there appears to be no, or at best a very loose, match of information needs.*

Anchorage: The anchorage of this specific direct link, in particular on the government side, is rather narrow. Even though a broader range of stakeholders could be involved on the corporate side (the operations part of the value chain) the bi-focal anchorage for this link is quite narrow.

Use of information to government: Given the difficult access to, and short time life of, corporate budgeting information, the potential use of EMA information generated by monetary environmental budgeting appears to be quite restricted from the government perspective. However, environmental agencies might like to obtain evidence about how monetary environmental budgeting is actually conducted throughout industries in order to establish a valid information base for further activities, including gaining a better understanding of links with corporate planning for pollution prevention.

Operative status: The restricted influence of government agencies on corporate budgeting means that the specific direct link towards monetary environmental budgeting remains inoperative to date: that is to say, no government programs distinctly referring to this EMA tool could be found.

4.2.4 Specific Direct Link with Monetary Environmental Investment Appraisal

Monetary environmental investment appraisal is a long-term future-orientated MEMA tool and is used to calculate the net benefits and costs of less polluting investment alternatives in order to identify economically favorable environmental protection measures which otherwise would not have been realized by management (Schaltegger & Burritt 2000, 6.2.6 and 6.6.1). Monetary environmental investment appraisal is conceptually related to environmental cost accounting and accounting for benefits, the one difference being that its main focus is on cash flows rather than accrual based accounting costs and benefits.

The match for the link with monetary environmental investment appraisal is illustrated in Figure 12.

Match of interests and goals: The basic goals described above for environmental cost accounting are also valid for monetary environmental investment appraisal. In addition, it is especially significant that the purpose of monetary environmental investment appraisal appears to be widely complementary with the basic goal of *environmental agencies* to promote:

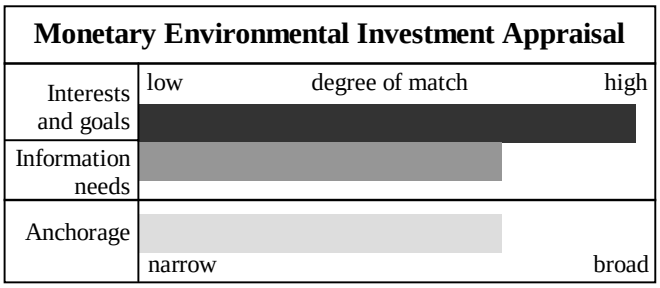

Figure 12. Findings for the specific direct link with monetary environmental investment appraisal

- environmental protection measures at minimal cost to government and with minimal political resistance;
- integrated pollution prevention measures;
- eo-efficiency of industry; and
- a movement towards sustainable development of industry.

Environmental agencies have a long term focus, similar to that of investment appraisal.In addition, *commerce agencies* here again also support an economic approach to environmental protection.

The fact that monetary environmental investment appraisal requires comprehensive information on environmental costs means that the basic goals of corporate managers, previously outlined above for cost accounting, are also valid. Monetary environmental investment appraisal helps managers to prioritize environmental actions and measures at all decision levels. Investment appraisal also meets the needs of R&D and design, production and financial and accounting managers to reduce environmentally-induced risks associated with investments and related future operations. Furthermore, because of its long-term, future orientation, this MEMA tool supports various management functions through consideration of environmental aspects of product pricing, research and development, legal compliance, marketing, quality, health and safety and corporate communications. As a result, monetary environmental investment appraisal integrates a great variety of interests of internal corporate stakeholders. These interests also match very well some of the most important goals of environmental agencies and commerce agencies. Thus, the specific direct link to monetary environmental investment appraisal reveals a high match of interests between a varied group of government and management stakeholders.

Match of information needs: Like other information generated by MEMA tools, investment information is strictly confidential and primarily corporate in its orientation. However, the *type*

of long term information generated by monetary environmental investment appraisal is of great interest to government agencies. For example, *environmental agencies* may look for information indicating how far businesses already integrate environmental aspects into their long term investment decisions, in order to help government with decisions relating to internalization of current and future externalities, site permits and product approvals. *Commerce agencies* are also interested in the amount of investment related to environmental opportunities and the potential effects on corporate competitiveness in this rapidly expanding market.

As mentioned above, when examining the interests of management in monetary environmental investment appraisal, a range of management levels and functions are involved. The exact information needs of corporate managers may differ, depending on the particular department interested in monetary environmental investment appraisal. Information about favorable investment opportunities is of concern to *management support functions* and other departments within the value chain. The kind of information typically of concern to managers relates to pay-back period, return on investment, and risk assessment. Even if the type of information desired by government and management does not completely match, there is a considerable overlap between the needs of management support functions within corporations and commerce agencies, and to a lesser extent between management support and environmental agencies. Given the match found for environmental cost accounting (see paragraph a) above), on which monetary environmental investment appraisal is based, the long term future orientation of investment appraisal information extends this match above the medium level.

Anchorage: As with environmental cost accounting, monetary environmental investment appraisal is mostly characterized by the integration of economic and environmental issues. This dual emphasis is also reflected in the *rather broad anchorage* this link has within both government and management.

Use of information to government: In spite of the differences in information needs of government and management concerning EMA detail, information generated by monetary environmental investment appraisal can be of use in government decision making. As already mentioned in the previous paragraph, there is a potential use for this kind of information by both environmental protection and commerce agencies, especially for long term orientated decisions, e.g. for planning or for compliance and approval issues. However, the confidential nature of this information will probably hinder any exchange.

Operative status: The good match between the goals of government and corporations and the possibility for some information exchange has led various governments to implement programs promoting the specific direct link with monetary environmental investment appraisal. The suitability of this link is, however, restricted because of problems caused by the different information needs of government and management.

Table 6 provides some examples to illustrate that this link is operative.

Administrative Level	Example of government initiative	Literature
National	- UK Environment Agency's Energy Efficiency Best Practice Programme	- UK Environment Agency 2000a
Regional/Local	- The Washington State Department of Ecology (DOE) legislation on pollution prevention - The Massachusetts Toxic Use Reduction Act (TURA) - The New Jersey Pollution Prevention Act	- DOE 1992a, 1993a; Stinson 1995; UNDSD 2000, 58; Schaltegger & Burritt 2000, 6.2.6 - Becker, Geiser & Keenan 1997 - Wise & Gray 1992
...	...	...

Table 6. Examples of specific direct links with monetary environmental investment appraisal

4.2.5 Specific Direct Link with Material and Energy Flow Accounting[13]

Material and energy flow accounting is a PEMA tool orientated towards the past. Its purpose is to reflect company flows of material and energy inputs and outputs affected by the corporation's operations. A record of material and energy flows helps with the tracking of these flows to the various stages of production, and to sites and products that caused them (Schaltegger & Burritt 2000, 11.1 and 11.3.3). It also provides an inventory.

Figure 13 provides a quick summary of the findings for this specific direct link.

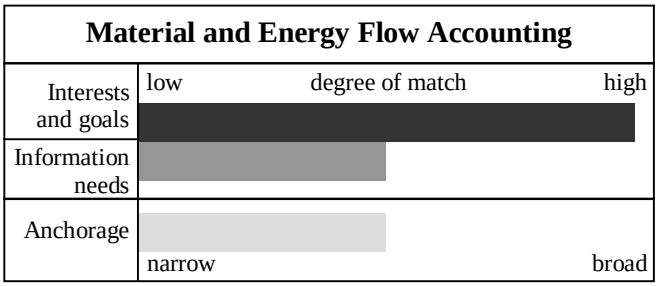

Figure 13. Findings for the specific direct link with material and energy flow accounting

Match of interests and goals: The basic goals of *environmental agencies* associated with material and energy flow accounting are: the improvement of the environmental situation in the administrated area; the promotion of integrated pollution prevention; and the integration of ecological issues into mainstream corporate decision processes. In this context, corporate material and energy flow accounting can be seen as providing a major impetus towards improved compliance with regulations and the provision of a better database for environmental planning and goal setting. *Tax agencies* have a similar interest in obtaining a better basis for the calculation of green taxes through material and energy flow accounting (see Table 2).

Material and energy flow accounting contributes towards a number of important *internal corporate stakeholder* goals. These include: the identification of opportunities for environmental improvement (through the environmental department); improving the basis for meeting environmental information demands of stakeholders; building up "green" credentials and image (environmental, marketing and public relations departments); and a better base for assessing the enterprise's current environmental compliance situation (through the legal department). In addition, these PEMA tools contribute to the interest of production managers

[13] Because these two PEMA tools are very similar (they only differ in the physical subject to be accounted for– matter or energy) they will be discussed together.

in optimizing energy and material consumption, the goal of the logistics department to secure safe storage and transportation of materials, and the aim of waste and recycling managers to reduce waste.

Taken together, the *match of interests between government and corporations is relatively close*, as both sides can obtain benefits from the information and, to an extent, are interested in the same information generated by the material and energy flow accounting PEMA tool.

Match of information needs: Looking at *information needs* from the government side, *environmental agencies* are the most obvious group interested in the information created by material and energy flow accounting. They will mainly look for compliance information, information about the ecological impact of economic activities and the ecological situation in the regulated area, as well as information on the effectiveness of environmental protection measures. *Managers of corporate departments* normally restrict their focus to the ecological impacts caused by their own departments and related compliance issues.

When considered together, there is an overlap in the information needs of the two focal points which, however, is restricted by problems and differences related to information access, confidentiality, and the degree of detail.

Anchorage: Anchorage of this specific direct link appears to be relatively broad in both government and management. However, the direct economic benefit of this tool is not obvious to the majority of corporate managers concerned about profitability, as financial or economic aspects are not considered in material and energy flow accounting. This may reduce the breadth of anchorage in management and thus the attractiveness of this specific direct link.

Use of information for government: Ecological information generated by material and energy flow accounting is valuable to government agencies. PEMA information about material and energy flows at the corporate level can be used in environmental agency assessments of emissions and energy usage at local and national levels. Such projects include enforcement, environmental impact assessment, environmental planning, and environmental protection measures to obtain better policy design.[14] Although information about corporate material and energy flows provides an important input to the work of environmental government agencies, it does not provide sufficient information for assessing the general ecological condition in a region. Furthermore, information generated at the corporate level tends to be rather detailed and is often related specifically to individual processes and products. Such detailed information is of less use to government agencies.

Operative status: Not surprisingly, the potential range of information uses, when combined with the relatively close matching found above, reveals that this specific direct link is operative. Examples of the link are illustrated in Table 7.

[14] The attainment of these information needs depends, in principle, on reporting activities that will be discussed in detail in Chapter 4.

Administrative Level	Example of government initiative	Literature
National	- UK Environment's Environmental Technology Best Practice Programme	- UK Environment Agency 2000b
Regional/Local	- The Washington State Department of Ecology (DOE) legislation on pollution prevention - The Massachusetts Toxic Use Reduction Act (TURA) - The New Jersey Pollution Prevention Act	- DOE 1992a, 1993a; Stinson 1995; UNDSD 2000, 58; Schaltegger & Burritt 2000, 6.2.6 - Becker, Geiser & Keenan 1997 - Wise & Gray 1992
...	...	...

Table 7. Examples of operative specific direct links with material and energy flow accounting.

4.2.6 Specific Direct Link with Physical Environmental Budgeting

Physical environmental budgeting is a future-orientated PEMA tool. Its purpose is to assign budgets of materials and/or energy to future activities that have an impact on the environment. Analogous with the future-orientated MEMA tools discussed above, physical environmental budgeting builds upon the foundation of material and energy flow accounting.

To facilitate understanding of the following discussion, Figure 14 depicts the findings of the structural analysis conducted for this link.

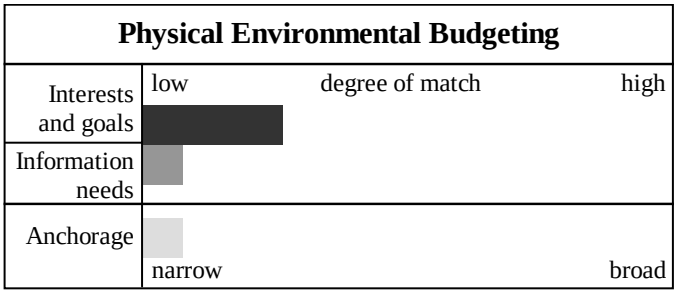

Figure 14. Findings for the specific direct link with physical environmental budgeting

Match of interests and goals: The basic *goals of environmental agencies*, in relation to physical environmental budgeting, are associated with the sustained improvement of the environmental situation in the administrated region or area, the promotion of integrated pollution prevention, the integration of ecological aspects into mainstream corporate decision processes, and a specific commitment by industry to contribute to those goals.

On the other side of this specific direct link, the main goals and interests of *corporate management* are to realize environmental improvement opportunities (through the environmental department), to deal with environmental stakeholders and their information demands, to build up a "green" image (environmental department as well as marketing and public relations), and to improve security in planning and the safety of operations (through the research, development and design department and production management).

In the context of physical environmental budgeting, the *match of these interests is, at best, general* - as described in section 3.2.1. Even though there are no fundamental divergences between the interests of the relevant government agencies and management departments, no distinct match could be identified. This may be because of the relatively wide gap between the company-specific internal allocation of physical resources and the more general approach to resource allocation that government agencies have to adopt.

Match of information needs: In a conceptual sense, the information created through physical environmental budgeting could be of some interest to environmental agencies and tax agencies if companies systematically had plans for environmentally harmful physical resources and allocated them to different business activities. However, analysis of links with physical environmental budgeting shows that the *information needs* of government agencies for more general, regional, comparable (standardized) and reliable data, may differ considerably from those of corporate management who are more concerned about individual allocations of physical resources in corporate budgeting - information which is mostly confidential.

Anchorage: Anchorage of the link that could be established between government and corporations through physical environmental budgeting is relatively weak. One problem is that direct financial aspects are missing, a second is that the scope of interests within the government bodies that (potentially) could be involved is relatively narrow.

Use of information for government: The strictly internal focus and individual corporate nature of physical environmental budgeting hinders an extensive use of this type of information by different administrative agencies. However, when combined with reporting activities, as for material and energy accounting, physical environmental budgeting information may contribute to a better information basis for environmental planning and the formulation of quality goals for the environment.

Operative status: Existing government programs do not address this PEMA tool directly, however the link through physical environmental budgeting could be considered indirectly operative because of the implicit need for this kind of information. Table 8 shows some examples of government initiatives that implicitly address the link to physical environmental budgeting.

Administrative Level	Example of government initiative	Literature
...	-	-
Regional/Local	- The Washington State Department of Ecology (DOE) legislation on pollution prevention - The Massachusetts Toxic Use Reduction Act (TURA) - The New Jersey Pollution Prevention Act	- DOE 1992a, 1993a; Stinson 1995; UNDSD 2000, 58; Schaltegger & Burritt 2000, 6.2.6 - Becker, Geiser & Keenan 1997 - Wise & Gray 1992
...	...	...

Table 8. Examples of government initiatives that establish indirectly operative specific direct links with physical environmental budgeting.

4.2.7 Specific Direct Link with Physical Environmental Investment Appraisal

Physical environmental investment appraisal is a long-term future-orientated PEMA tool that determines whether, and if so by how much, environmental impacts would be reduced or increased by any specific project. Physical environmental investment appraisal is used to

calculate the net ecological impact of investments in pollution prevention and site restoration (Schaltegger & Burritt 2000, Chapter 11.8). Even though there is an ongoing academic discussion about this tool (e.g. Feist 1986; Spreng 1988; Fritsche et al. 1989; Sutter & Hofstetter 1989; Schaltegger & Sturm 1994; Schaltegger et al. 1996) it is only used by a few corporations.

Figure 15 summarizes the results of the discussion about the match with this specific direct link.

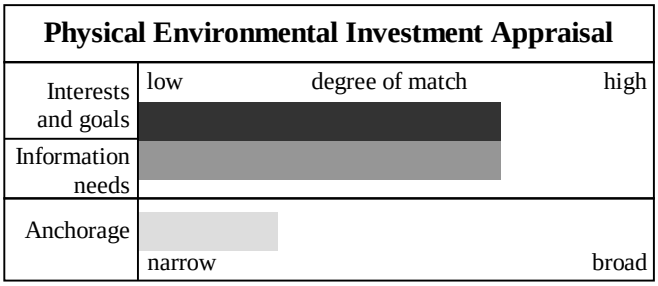

Figure 15. Findings for the specific direct link with physical environmental investment appraisal

Match of interests and goals: As with all PEMA tools, the *environmental protection agency* is the most interested *government agency*. Physical environmental investment appraisal corresponds with the agency's basic interest in enhancing sustained improvement of industry's ecological performance. In addition, this tool can serve to integrate ecological issues into core corporate decision processes, and to promote integrated and long term pollution prevention. Furthermore, physical environmental investment appraisal contributes to the process of improving enforcement of and compliance with regulations. Tax agencies can use information from such appraisals for the planning of green taxes on income and capital.

On the *corporate side* of this specific direct link physical environmental investment appraisal meets the goals of environmental protection managers seeking to assess the long term effectiveness of pollution prevention measures. Furthermore, physical environmental investment appraisal helps meet the goals of the R&D and design and accounting and finance departments to reduce environmentally-induced risks of investment in new product and process developments. It may also help corporate marketing and public relations managers to establish a "greener" corporate image based on a record of environmentally sound investments. Physical environmental investment appraisal helps managers responsible for corporate legal affairs to secure compliance with environmental legislation. Finally, this tool helps to reduce uncertainty about long-term environmentally-induced impacts when planning future business activities.

Apart from the issues raised in relation to the *general* link to EMA (Section 3.2.1), one *further aspect,* the *long-term focus* of physical environmental investment appraisal, seems to be very relevant. The long-term focus seems to be of special interest to government agencies (for the assessment of future environmental impacts, planning and policy design) and to corporate managers (mainly for planning and investment decisions). Thus, there are quite a number of overlapping interests between government agency members and corporate managers, and a relatively close match exists between the interests identified.

Match of information needs: The *match between information needs* of the relevant government agencies and management departments is characterized by the strictly internal, indivi-

dual, and confidential nature of the information generated by physical environmental investment appraisal. In consequence, government agencies may look for information that focuses on the question of how broadly physical environmental investment appraisal is already implemented and used by industry. In contrast, company managers focus on their individual investment decisions, and require specific project- or product-related information. However, despite the problems of confidentiality and detail, there is quite a high match between stakeholder information needs at the two focal points. Such a match is mainly based on the long-term orientation of the information provided by this PEMA tool. Environmental agencies and management support departments both benefit from the use of this information for planning and risk reduction purposes – even given the differences in degree of detail required. In addition, the information provided by physical environmental investment appraisal helps environmental agencies and legal affairs management to ensure occupational and product compliance with environmental regulation.

Anchorage: A relatively narrow anchorage in government and corporate management characterizes the link. On the government side, only environmental agencies are closely involved with physical environmental investment appraisal. Within corporate management, physical environmental investment appraisal is mainly the concern of management support departments. Physical environmental investment appraisal only addresses the aims and information needs of stakeholders in physical terms. Its narrow scope reflects the fact that financial or economic aspects, which are of concern to the majority of stakeholders, are not addressed.

Use of information for government: Problems with information needs related to confidentiality and detail reduce the potential use of physical environmental investment appraisal information for government decision making. Government may be more interested in obtaining information about the extent to which the tool is applied in corporations than in the results of its specific application in any individual enterprise. Nonetheless, environmental agencies would surely welcome more detailed information about future corporate environmental performance to help them with environmental planning, policy design, and enforcement issues.

Operative status: As discussed at the beginning of this section, physical environmental investment appraisal is not yet well established in many corporations. It is therefore not surprising that this specific link is *inoperative* and has not been considered in government programs designed to promote corporate EMA.

4.3 Summary of the Analysis of Direct Links

The in-depth analysis of general direct links and specific direct links conducted in this chapter provides insight into the structural background of the different direct ways it is possible for governments to promote use of corporate EMA. The analysis revealed the links that are either considerably or highly suitable as effective paths for governments wishing to encourage corporations to implement and use EMA.

EMA tools / Criteria	MEMA tools				PEMA tools		
	Environ-mental cost accounting	Accounting for environ-mental benefits	Monetary environ-mental budgeting	Monetary environ-mental investment appraisal	Material and energy flow accounting	Physical environmental budgeting	Physical environmental investment appraisal
Match of interests and							
Match of information							
Anchorage							
Suitability	medium	medium	low	high	medium	low	medium
Use of information for government	medium	medium	low	high	high	low	high
Operative status *	operative	operative	inoperative	operative	operative	operative	inoperative

* Status is operative if at least one example could be found. The respective link may not be operative in all countries

Figure 16. Summary of the results of the structural analysis of specific direct links.

In addition to the general direct link that has been found suitable but not sufficient for successful promotion of EMA, seven direct links through specific EMA tools (specific direct links) have been analyzed. The results of this analysis are summarized in Figure 16.

The structural analysis shows that one specific direct link demonstrates high suitability, and four demonstrate medium suitability for government promotion of corporate EMA . Only the specific links through the two budgeting tools were found to have low suitability for this purpose. This is mainly because of the internal, short-term orientation of budgeting tools. Despite their high value for internal company decision making, these two tools demonstrate only a low suitability as leverage points through which governments can promote EMA.

The most suitable specific direct link turned out to be the link through monetary environmental investment appraisal. This was followed by environmental cost accounting, accounting for environmental benefits, material flow accounting, and physical environmental investment appraisal. Table 9 lists those government agencies and corporate management departments involved with each suitable link.

Specific direct links (ranked in order of suitability)	Government agencies involved	Management departments involved
Monetary environmental investment appraisal	• Environmental agencies • Commerce agencies	• Accounting and finance department • Production management • R&D and design department • Logistics department • Top management • Environmental management department • Corporate marketing and PR • Legal department
Environmental cost accounting	• Environmental agencies • Commerce agencies	• Accounting and finance department • Production management • R&D and design department • Logistics department • Top management • Environmental management department
Accounting for environmental benefits	• Environmental agencies • Commerce agencies	• Accounting and finance department • Production management • R&D and design department • Logistics department • Top management • Environmental management department
Material and energy flow accounting	• Environmental agencies • Tax agencies	• Environmental management department • Corporate marketing and PR • Legal department • Logistics department • Waste and recycling management
Physical environmental investment appraisal	• Environmental agencies • Tax agencies	• Environmental management department • R&D department • Accounting and finance department • Corporate marketing and PR • Legal department

Table 9. Stakeholder groups involved in the suitable specific direct links

This overview summarizes the results of the analysis of which links are suitable for direct government programs designed to promote corporate EMA. On the basis of these findings, government programs should address the stakeholder groups most involved with each suitable tool.

An additional interesting result concerns the operative status of the specific direct links. It is surprising that not all the suitable links have as yet been included in government programs to promote EMA. In addition, the poor representation of programs covering the link towards accounting for environmental benefits is disappointing: only a rather preliminary project could be found here. Besides its considerable suitability, this link offers a high potential for win-win situations and positive communication of the benefits of environmental protection measures.

Suggestions for specific physical environmental investment appraisal tools have been made in the academic literature (e.g. Schaltegger & Burritt 2000, 11.8), and so a basic framework is available. This promising but inoperative link should be included in the future in government efforts to promote the use of EMA by corporations.

Finally, the potential use of EMA information generated at the corporate level turns out to be rather high for government. With the exception of short-term budgeting information expressed using monetary and physical measures, information produced by these tools is in one way or another valuable for government agencies. However, an answer to the question 'how useful is the EMA information to government' depends on the particular government perspective and general public policy adopted. From the perspective of environmental agencies at different administrative levels, material and energy flow accounting and physical environmental investment appraisal as PEMA tools may be most useful, whereas from the perspective of government agencies with a more economic orientation (commerce and tax agencies) MEMA tools tend to generate a more desirable kind of information.

5 ANALYSIS OF INDIRECT LINKS

This chapter examines indirect links. In addition to the two focal points – government and EMA – it addresses various "intermediate elements" such as other accounting, reporting and management systems. The main interests, goals, and information needs of the main stakeholders involved in each intermediate element are discussed. In addition, the anchorage and operative status of the indirect links are examined. The generic analysis of indirect EMA-links is organized according to the different analytical steps introduced in Section 2.3.3.

5.1 Identification of Intermediate Elements

Intermediate elements are systems or elements that could be used to set up indirect links between government and corporate EMA. The following three groups of intermediate elements are distinguished for the generic analysis of indirect EMA-links (Table 10):

1. Corporate accounting systems; other than EMA
2. Management systems; and
3. National accounting systems.

Intermediate elements		Main measure	Proximity with EMA
Corporate accounting systems other than EMA	*Other conventional corporate accounting systems in financial units* • Conventional management accounting • Conventional financial accounting and reporting	 M M	 h m-h
	Other environmental accounting in physical units • EXTERNAL PHYSICAL ENVIRONMENTAL ACCOUNTING AND REPORTING	P	m-h
Management systems	*Financial management systems*	M	m
	Environmental management systems and health and safety management systems	P	m
	Quality management systems and human relations systems	M + P	l-m
National accounting systems	*National environmental accounting*	P	m-h
	National economic accounting	M + P	l

MAIN MEASURE: M = MONETARY; P = PHYSICAL
METHOD PROXIMITY TO EMA: H = HIGH; M = MEDIUM; L = LOW

Table 10. Intermediate elements between government and corporate EMA

5.2 Characterization of Intermediate Elements

Each intermediate element is characterized whether it provides monetary, physical or both types of information to stakeholders (see Table 10). The range of intermediate elements

illustrated in Table 10 shows that some intermediate elements, such as conventional external financial accounting and financial management systems, focus on the provision of monetary information, whereas other systems predominantly focus on physical information, e.g. environmental management systems and national environmental accounting. Furthermore, other systems, such as national economic accounting, provide both monetary and physical information. One further important aspect shown in Table 10, and introduced earlier in the criteria of analysis (see section 2.2.3), is the *method proximity* of the different intermediate systems with EMA. Table 10 reflects that, in general, corporate accounting systems have the highest degree of method proximity to EMA. Method proximity also provides a rationale for the order when different intermediate elements are considered in the analysis. The different intermediate elements are characterized in more detail in the following sections.

5.2.1 Corporate Accounting and Reporting Systems other than EMA

A number of corporate accounting and reporting systems represent intermediate elements through which government may act to promote EMA.

Corporate accounting systems can be classified according to three types of criteria:

- ***Internal vs. external focus:*** This criterion helps identify whether corporate accounting systems provide information for decision makers within corporations, or whether they serve to contribute towards the information needs of external corporate stakeholders.

- ***Monetary vs. physical measures:*** Through this criterion corporate accounting systems are distinguished according to the type of information they generate, by either employing monetary units or by using physical units.

- ***Conventional vs. environmental aspects:*** This final criterion classifies corporate accounting systems on the basis of whether they specifically refer to environmental issues. Conventional accounting does not specifically address environmental issues, whereas environmental accounting, by definition, is the set of accounting systems related to the provision of environmental information.

Conventional internal accounting systems expressed in physical units (such as production planning systems or inventory accounting systems) provide information as an input to other corporate accounting systems.

The EMA accounting system is classified as internal environmental accounting. As already argued in Chapter 2 (see Figure 3), EMA accounting includes two sub-systems: monetary environmental management accounting (MEMA), which is internal environmental accounting expressed in monetary units; and physical environmental management accounting (PEMA) which is internal environmental accounting stated in physical units.

Several separately identifiable corporate accounting systems will be analyzed as intermediate elements and related to MEMA and PEMA because they have close method proximity to EMA. These intermediate elements include the following:

- Conventional management accounting – dealing with internal information in monetary units;
- Conventional financial accounting and reporting – being an external accounting system using monetary measures; and
- External physical environmental accounting and reporting – which provides external environmental information in physical units.

The first two accounting systems form the main category of conventional accounting in financial units (see Section 4.1.1.1), whereas external environmental accounting and reporting (plus PEMA) is classified as environmental accounting in physical units (see Section 4.1.1.2).

Conventional Accounting in Monetary Units

Conventional management accounting is the basic tool for internal management decision making. It provides information that is not usually available to external stakeholders and measures and reports financial information that helps managers make decisions to fulfill corporate goals. Management accounting focuses on internal reporting. Synonyms for management accounting are “managerial accounting” and “cost accounting.”

The methods, techniques, and types of conventional management accounting information are closely connected to EMA, in particular to MEMA. This is illustrated by the fact that MEMA can also be seen as environmentally-differentiated management accounting. Thus, there is a *high method proximity* between conventional management accounting and EMA.

Conventional financial accounting and reporting is designed to satisfy the requirements of third party external stakeholders for financial information about the corporation in which they have an interest (see Maunders and Burritt 1991 for comment about the inability of conventional accounting to satisfy stakeholders with environmental interests). It can be defined as the branch of accounting that provides periodic information to people outside the corporation (Horngren et al. 1997, 816).[15]

From a technical point of view financial accounting and reporting is also quite closely related to EMA because internal management accounting data and related tools provide the foundation for any information disclosed. This is true for environmentally-related monetary disclosures as well as for conventional ones. Hence, a *medium – high method proximity* occurs here.

Accounting systems that provide environmental information to external corporate stakeholders expressed in financial units (i.e. environmentally differentiated financial accounting systems) are not dealt with as separate intermediate elements. This is not necessary

[15] Conventional regulatory accounting systems are designed to satisfy the specific need of financial and physical information of different government agencies. Thus conventional regulatory accounting systems represent a specific subset of conventional financial accounting and reporting which is, however, not addressed separately as an intermediate element.

because when conventional financial and regulatory accounting and reporting systems refer to EMA information, within the structural analysis adopted environmental differentiation is implied.

Environmental Accounting in Physical Units

PEMA, being internal ecological accounting in physical units, is a sub-set of physical environmental accounting but at the same time an integral part of EMA (see Section 2.1 and Figure 3). Consequently, it cannot be considered as an intermediate element.

However, at least one further physical environmental accounting system, other than PEMA, can be considered to be an intermediate element: external physical environmental accounting and reporting.[16]

External physical environmental accounting and reporting is designed to satisfy the requirements of external or third party stakeholders for physical information about the corporation and its environmental performance.

As the homologue of financial accounting and reporting, but expressed in physical units, external ecological accounting and reporting also shows a *medium – high method proximity* to EMA, in particular to PEMA, because all disclosures must have previously been generated by internal information tools.

5.2.2 Management Systems

Management systems provide a second group of intermediate elements between government and EMA. Their purpose is to organize the different processes and responsibilities within corporations in an effective and efficient manner, as well as to provide information to management in monetary and/or physical terms. Thus, in contrast with accounting systems that are more concerned with the way information is generated, management systems refer more to organizational and procedural aspects. Management control[17] is the core notion in the context of management systems. All management systems are more or less based on a circular process of goal setting, planning, implementation, and control. This holds true for both, strategic and operational management.

From an external perspective, companies consist of one comprehensive management system which is designed to ensure efficient and effective operations and long-term survival of the corporation. However, from an internal view different management functions can be distinguished and these are addressed by different management systems. The extent to which these functional management systems are integrated into the comprehensive corporate management system varies from company to company. Thus, in practice there is often considerable overlap between these different functional systems. Corporate managers

[16] As with external financial accounting, external physical environmental accounting and reporting can be further distinguished into different subsets according to the target audience. Regulatory physical environmental accounting systems represent such a subset as they address the specific information requirements of regulatory bodies and agencies. They are, however, not addressed as a separate intermediate element.

[17] Referred to as ‘controlling’ in Germanic speaking countries.

in different departments (as identified above in section 3.1.2 and Figure 5) act within their own sub-systems of the comprehensive management system.

For the purpose of identifying potentially suitable intermediate elements in order to establish indirect links for the promotion of corporate EMA use, it is most appropriate to examine these different functional management systems or sub-systems in which corporate managers act. In the remainder of Chapter 4, five generic types of management systems have been taken into account, as shown in Table 11. Each system is considered briefly below.

Management systems	Financial management systems	Environmental management systems	Health and safety management systems	Quality management systems	Human resources management systems
Measurement focus	Financial measures	Physical measures	Physical measures	Financial and physical measures	Financial and physical measures

Table 11. Common types of management systems

Financial Management Systems

In general, financial management systems are concerned with the efficient organization and coordination of corporate financial issues. This includes the design, organization and systematization of enterprise competencies and processes, as well as the choice and coordination of the different accounting and financing tools, and the integration of the financial performance with the strategic goals of the corporation. Financial management usually includes one key dimension, it is mainly concerned about financing decisions and the financial structure of an organization (e.g. capital structure, financial risk management, alternative financing instruments, dividend policy, mergers and acquisitions). In practice, there is considerable overlap between financial management and conventional management accounting.

Financial management systems, as an intermediate element, show a *medium method proximity* with EMA. These management systems deal with information generated by EMA systems but they are also concerned with the organization and coordination of processes and competencies, something that is not directly related to the contents of EMA information.

Environmental Management Systems

Environmental management systems (EMSs) are concerned with establishing systematic planning, implementation and control activities in order to achieve continual improvement of corporate environmental performance. Environmental management systems provide the basis for learning by people in enterprises and associated changes in attitudes, behavior and performance levels (http://www. whitehouse.gov/ PCSD/Publications/final_report/em_fp.html, on 7.8.00).

A set of international and supra-national EMS standards has been developed in the 1990s. The major international standards have been issued by the International Standardization Organization (the ISO 14000 series). These standards are adopted voluntarily by enterprises. In the European Union another voluntary environmental management standard, called the Eco-Management and Audit Scheme (EMAS), was opened for participation from 1995. At present, the aim of the scheme is to promote continuous environmental performance improvements of industrial activities by committing sites to evaluate and improve their own environmental performance. EMS includes information systems that organize the collection and exchange of information. Environmental information is needed to help enrich collaborative decision-making, to measure progress towards environmental targets. It needs to be of sufficient quality not to mislead decision makers. One core aspect of EMS standards is the independent audit and verification of corporate environmental management organization and processes.

Any EMS, representing as it does an internal organizational approach towards environmental aspects of corporate activities, uses EMA information and combines with different EMA tools. However, EMS standards do not specifically address aspects of accounting. Therefore, a *medium method proximity* to EMA is shown by EMS.

Health and Safety Management Systems

The purpose of health and safety management (HSM) systems is to safeguard the safety, health and welfare of employees and to manage their activities in such a way that the risk of occupational accidents and ill-health is minimized. There typically is a close relationship between HSM and EMS. For example, the well known US Global Environmental Management Initiative (GEMI) has as its mission “To help business achieve environmental, health and safety excellence”. It provides an integrated set of results in its review of business environmental, health and safety cost accounting and investment practices (GEMI 1997). Such issues as toxic waste control, compliance with legislation, and the need for continual improvement are shared with EMS. Because of this close connection, HSM issues are not examined separately in this workbook but will be subsumed within EMS.

Another reason for integrating the analysis of HSM within EMS is that taken by itself HSM shows only a limited method proximity to EMA and its related tools because accounting information is only a marginal aspect of HSM systems.

Quality Management Systems

Quality relates to whether a product meets the stated requirements of the customer and the design specifications of engineers (Horngren et al., 2000, 676). Customers are intolerant of poor quality products. Quality management addresses the issue of how to promote continual improvement in the corporation’s products, and includes environmental aspects of product quality. Conventional accounting provides the means for showing the economic effects of poor quality, especially through achieving the right mix between the costs of preventing poor quality and the costs of failing to achieve desired product quality.

A set of international quality management standards, the ISO 9000 series, has emerged over a period of years. International standards enable corporations to document and certify the elements in their quality management systems. In this context, management considers cost-effective ways to improve environmental quality of products.

The *method proximity* of quality management systems with EMA is *low – medium*. Although EMA information may be useful to improve environmental quality of products the tools and techniques used within quality management are quite different from those used in EMA.

Human Resources Management

Another management system, of particular concern to employees, is the human resources management system. HRM addresses staffing needs, outsourcing of work, quality of employees and performance system issues, compensation systems, personnel records and employment policies. HRM, is similar to quality management, in that only a very limited method proximity to EMA can be found. The analysis of HRM is therefore integrated in the discussion of quality management systems in this workbook. Consequently, this HRM will be subsumed within QMS systems for the purpose of this report. Closeness to EMA stems from the connection with performance measurement and compensation systems. In addition, there are clear associations with balanced scorecard performance metrics, costing and investment systems.

In summary, it appears that three management systems can be taken as representative of all management systems for the purposes of this workbook – financial, environmental and quality management systems.

5.2.3 National Accounting Systems

National accounting systems provide aggregate information about physical and monetary aspects of environmental impacts. They are not specifically designed to address the decision needs of any particular corporation. Instead, they provide information that might be useful in establishing national or industry trends. Such information could be useful for benchmarking, provided that the collection, classification and reporting of information is in accord with similar information gathered by individual corporations. This requirement is essential for the information to be comparable. Unfortunately, the quality of information provided for national accounting systems is lower than, and the accounting rules used for its compilation differ from, the quality level and rules related to internally generated information about environmental impacts. National accounting systems tend to be of particular interest to government policy makers, regulators and oversight committees. There is one exception examined below, however, and that relates to the top down experimental approach designed to encourage the use of national accounting systems at regional, state and local government levels. Two types of national accounting systems are examined below.

National Environmental Accounting

Macroeconomic environmental accounting systems, no matter whether supra-national or regional, are addressed here using the term "national environmental accounting". Such environmental accounting systems have a wide geographical focus and classify and record physical information about a nation, a supra-national organization (such as the EU) or a region. National environmental statistics are not considered in this section as they have been excluded from the investigation by the UN expert group on its Vienna meeting in May 2000. For such *statistical reports* (such as State of Environment Reports: SOERs; e.g. the Norwegian Natural Resource Accounting (see e.g. Alfsen et al. 1993)), data are centrally collected by a statistical office on the basis of statistical samples in order to result in a representative picture using an inductive approach. The macroeconomic environmental accounting systems considered here aggregate information from individual corporations reporting to a government agency. Therefore they are based on the full range of corporate data derived from their accounting systems. They provide data for the communication of environmental impacts in reports commonly referred to as Pollutant Release and Transfer Registers (PRTRs). A Pollutant Release and Transfer Register (PRTR) is defined as a national environmental database of harmful releases to air, water, land and waste. The database contains information on releases (emission data) of polluting substances, reported annually by individual facilities.

From a technical and informational point of view national environmental accounting systems are rather close to EMA. This is especially true for those approaches where corporate information is aggregated at a national level while being derived from, and traceable to, individual corporations (as e.g. in toxic release inventories). In this case a *medium – high method proximity* to EMA can be found as EMA tools and techniques remain highly relevant.

National Economic Accounting

The United Nations System of National Accounts (SNA) is the pro forma for national income and product accounts, input-output accounts, and balance sheets at the national level (UN 1993). The initial SNA was published in 1968 and revised in 1993. Revisions included the introduction of provisions for satellite accounts designed to supplement the main national economic accounts. One major satellite account, that complements conventional national economic accounts, is the integrated System of Environmental and Economic Accounting (SEEA) referred to in the revised SNA. National measures of economic performance, such as Gross National Product (GNP) have been criticized for omissions relating to natural capital resources and their depletion. While adjustments have been suggested in order to develop a ‘Green GDP’ figure (see e.g. van Dieren 1995), there has also been a move towards the development of SEEA (which uses monetary and physical measures) and of physical ecological reports at the national level.

National economic accounting systems show only a *low method proximity* to EMA techniques. This is mainly because of the highly aggregated form of data generated which makes specific corporate figures less discernible and corporate EMA tools lose their relevancy.

5.3 Identification of Relevant Intermediate Stakeholders

A range of stakeholders have an interest in the intermediate elements identified and introduced above. Administrators in government agencies and corporate management represent the most important stakeholders associated with government and EMA focal points. These were discussed in Chapter 3. This section identifies the main additional stakeholders having an interest in intermediate elements.

The stakeholder groups considered as intermediate stakeholders for this generic analysis comprise the following:

- Shareholders and financial analysts
- Creditors (banks) / insurance companies
- Industry associations
- Standardization organizations
- Professional accounting associations
- Neighbor groups
- Suppliers and purchasers
- (Environmental) NGOs
- International Organizations
- Employees (other than management)

This set considers most of the major types of stakeholders. It includes parties with a close contractual relationship with companies, as well interest groups, politically active stakeholders, and relevant professional groups.

5.4 Characterization of Intermediate Stakeholders

This section identifies the basic goals and desired types of information of the intermediate stakeholder groups identified above. The results of this characterization are noted in Table 12. Although emphasis is placed on the interests of particular stakeholder groups in a single intermediate element, attention will be drawn to situations where stakeholders are concerned about several intermediate elements.

Relevant Stakeholder	Basic Goals	Type of Information desired
Shareholders and financial analysts	- Good financial performance of investments. - Reliable profitability/risk assessments for the different investment options. - For a minority of ethical investors: social and environmental correctness of the investment. - ...	- Monetary information about business results, especially the dividend stream and capital gains from movements in share prices. - Information on financial strength and business risk aspects of environmental impacts related to corporate activities.
Creditors (banks) / insurance companies	- Calculation of appropriate premia, including the premium for risk. Reduction of (environment-related) credit/insurance loss or risk. - Reliable assessments of credit and insurance risks. - Encouraging companies to reduce environmentally induced and other risks. - ...	- Monetary information on liquidity, reliability, economic strength etc. of a company as well as on potential environmentally induced financial impacts. - Physical information on the past, present and future ecological impacts of a company's operations.
Industry associations	- Representation of their member's interests (= the corporations making up an industry). - Provision of information and assistance to the member corporations in order to enhance favorable business opportunities. - Lobbying against threatening policy trends. - ...	- Aggregate monetary information on the economic performance of member corporations. - Aggregate physical information on the environmental performance of member corporations.
Standardization organizations	- Enhance comparability of corporate management practice. - Reduction of transaction and information costs. - Promote sound management practice. - …	- Methodological information.
Professional accounting associations	- Representation of their member's interests (= accounting and audit firms, and internal corporate accountants and auditors). - Promote implementation of sound management systems to show that corporate actions are in the public interest. - Promotion and development of accountancy including the development of accounting systems. - ...	- Information about accounting systems.
Neighbor groups	- Obtain safe and sound living conditions. - Minimize health risks caused by exposure to a company's emissions. - ...	- Physical information on a company's (local) environmental performance, on ambient conditions, environmental resources, and environmental conditions.
Suppliers and purchasers	- Establish stable and profitable supplier-customer relations. - Build up strategic alliances with the corporations. - Deliver or receive high quality products - Attaining good prices for products and goods delivered or purchased. - Secure good environmental performance of suppliers in order to fulfil environmental targets. - ...	- Monetary information on the economic position of the corporation with which goods and services are provided. - Physical information on production and delivery schedules or about the properties and constituents (e.g. functions) of products purchased. - Monetary information about product prices.
(Environmental) NGOs	- Representation of their member's interests (= conserving the environment for present and future generations). - Promote environmental, social or other, mainly public interests. - Cooperation or confronting and challenging corporations. - Attract and keep their supporting and paying members. - ...	- Physical information on a company's environmental performance.

International Organizations	- Promoting economic growth and welfare at the relevant supranational level. - Monitoring and improving the environmental situation at the given supranational level. - Enhancing transparency and accountability at the local, national, and supranational level. - ...	- Monetary information to receive an aggregate view of the economic situation at a given supranational level. - Physical information to receive an aggregate picture of the environmental situation at a given supranational level.
Employees (other than management)	- Security in and rewards from their jobs. - Information about what is expected of them at work. - Safe working conditions. - Identification with the workplace (job motivation). - ...	- Monetary information about the financial strength of their employer and relationships with pecuniary rewards. - Physical information about the intrinsic rewards associated with their work.

Table 12. Characteristics of stakeholders others than government and corporate management

As can be observed in Table 12, the primary general and environment-related interests and information needs of each stakeholder differ from group to group. In consequence, the main influence of these additional stakeholder groups depends on the interests and goals, and types of information they wish to obtain. Some stakeholders, such as shareholders and financial analysts, are mostly concerned with monetary information; others, such as environmental NGOs and neighboring communities, are mainly concerned with obtaining physical information about the physical environmental impacts of local enterprises. A third set of stakeholders are concerned with both monetary and physical information, e.g. green purchasers and some international organizations. A link can be based on a match of interests and goals, and on the information requirements of the stakeholders involved. These two issues are analyzed separately for consistency with the analysis of direct links and, also, based on the fact that some stakeholders may not require information for making specific decisions related to their specific goals, rather they may want information to ensure that corporations fulfill their duty to be accountable for environmental impacts. Furthermore, *a link based on information needs can refer both to, information generated by the different intermediate elements, and information about the intermediate element*. In the following subsections, the pertinent stakeholder groups are characterized in greater detail.

5.5 Assignment of Intermediate Stakeholders

Before beginning with the suitability assessment of the different indirect EMA-links, the intermediate stakeholders identified and characterized above have to be assigned to the different intermediate elements being considered. This assignment determines the scope of the suitability assessment for each intermediate element. Table 13 shows the intermediate stakeholders that have been considered relevant in the context of the different intermediate elements for the generic analysis of indirect EMA-links.

Intermediate element	Relevant intermediate stakeholders
Conventional management accounting	• Creditors (e.g. banks)/Insurance companies • Professional accounting associations • Suppliers and purchasers • International organizations
Conventional financial accounting and reporting	• Shareholders and financial analysts • Professional accounting associations • Suppliers and purchasers • Industry associations • International organizations • Employees
External physical environmental accounting and reporting	• Creditors/insurance companies • Professional accounting associations • Industry associations • Neighbor groups • (Environmental) NGOs
Financial management systems	• Shareholders and financial analysts • Creditors/insurance companies • Professional accounting and finance associations • Employees
Environmental management systems and health and safety management systems	• (International) Standardization organizations • Industry associations • Employees • Creditors/insurance companies • (Environmental) NGOs
Quality management systems and human relations systems	• Shareholders and financial analysts • Creditors/insurance companies • Suppliers and purchasers • Employees • Standardization organizations
National environmental accounting	• NGOs • Neighbors • Industry associations • International organizations
National economic accounting	• Industry associations • (Environmental) NGOs • International organizations

Table 13. Assignment of intermediate stakeholders.

5.6 Assessment of Suitability of Indirect Links

Analysis of the indirect links between government and EMA via intermediate elements provides the second track in the two-track structural analysis. The purpose of this stage of the analysis is to reveal the suitability and attractiveness of the different specific indirect relationships as paths for the promotion of EMA through intermediate elements. As described in Section 2.2 above, in order to keep the analysis simple, in spite of the high number of different stakeholders with an interest in the different intermediate elements, this section will concentrate on matching stakeholder interests and goals and their information needs. In addition, the anchorage of the links will be assessed. Finally, the analysis will be completed by examining which indirect links are operative through existing government programs.

According to the two partial relationships depicted in Figure 4 (see the two sub-arrows (a) and (b)) structural relationships include the possibility of matching the interests and informa-

tion needs of government stakeholders, stakeholders with an interest in an intermediate element, and internal company stakeholders. This analysis will help establish:

- the structural relationships between government and intermediate elements (sub-arrow (a) in Figure 4), looking at the government agencies that reveal a close relationship with any intermediate stakeholders;

- the structural relationships between intermediate elements and EMA (sub-arrow (b) in Figure 4), investigating which *corporate management departments concerned with EMA* are susceptible to influence through any intermediate element; and
- by deduction, the most logical paths between government, intermediate elements, and EMA.

As a result, each indirect link can be judged on the basis of the potential influence that government can have over corporate management in promoting EMA through the different intermediate elements. Stakeholder group interests in each intermediate element are addressed in the following sub-sections, based on possible intermediate accounting and management elements that have been identified (see Section 5.1 and Table 11). In summary, these intermediate elements are:

- Conventional management accounting (Section 5.6.1)
- Conventional financial accounting and reporting (Section 5.6.2)
- External physical environmental accounting and reporting (Section 5.6.3)
- Financial management systems (Section 5.6.4)
- Environmental management systems (Section 5.6.5)
- Quality management systems (Section 5.6.6)
- National environmental accounting (Section 5.6.7)
- National economic accounting (Section 5.6.8)

5.6.1 Indirect Link via Conventional Management Accounting

Conventional management accounting is the first intermediate element to be addressed. This accounting approach is concerned with the provision of internal corporate measures and reports in monetary terms. It forms the basic tool for internal management decision making and is not orientated towards external parties.

The major intermediate stakeholders interested in relationships with conventional management accounting include:

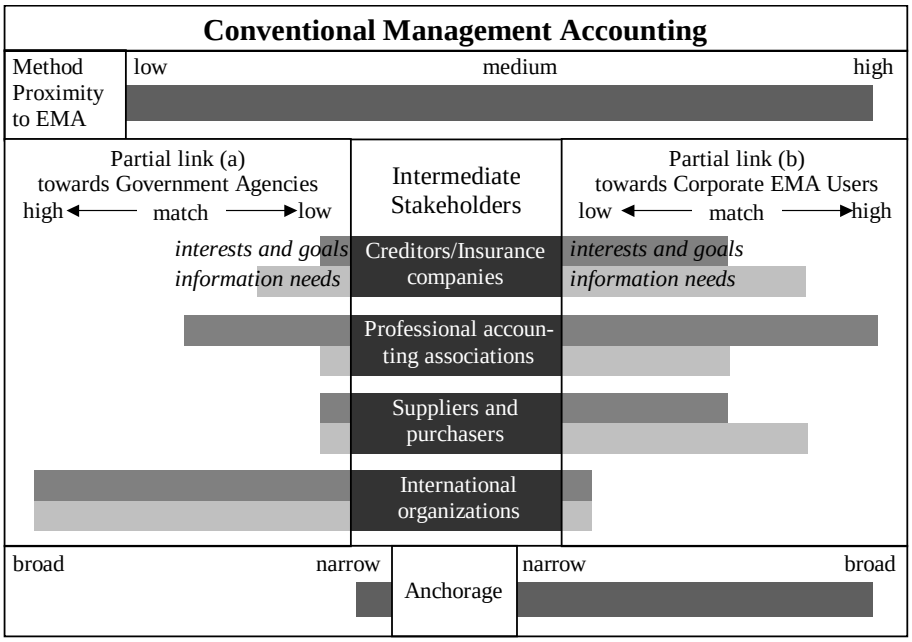

Figure 17. Suitability of the indirect link via conventional management accounting

- Creditors (e.g. banks)/Insurance companies (Section 5.6.1);
- Professional accounting associations (Section 5.6.1);
- Suppliers and purchasers (Section 5.6.1); and
- International organizations (5.6.1).

Figure 17 displays, for conventional management accounting, how well the basic goals and information needs of additional stakeholder groups match with an interest in and with the basic goals and information needs of government and internal corporate stakeholders. This analysis helps to reveal the suitability of conventional management accounting to serve as a targeted intermediate element to be used for the promotion of an indirect relationship between government and EMA. Each additional stakeholder group is examined in the subsections below. Figure 17 also shows the anchorage of this indirect link This third criterion for judging the suitability of links will be discussed in detail in Section 5.6.1.

Creditors/Insurance Companies

a) Partial Link (a): Government – Creditors/Insurance Companies

Match of interests and goals: Comparison of the basic goals of creditors/insurance companies, in relation to conventional management accounting, with the goals of government agencies does not expose a remarkable overlap. None of the interests of the government agencies identified in Section 3.1 is directly aligned with the *goals of banks/insurance companies* to assess and reduce their risks. Perhaps the main goal of the *commerce agency,* the promotion of economic growth, has some complementarity to these goals. Moreover,

commerce agencies may be interested in trying to obtain internal accounting information about the clients of creditors/insurance companies.

Match of information needs: Looking at the *information needs* of banks and insurance companies, risk related information, above and beyond publicly available figures, is needed in order to conduct risk assessments related to the granting of potential loans or the issue of insurance policies (e.g. tracking how loans are used within the client organization to ensure that the funds are applied in the way that was intended, or assessing the business risks that may lead to unexpected financial liabilities of a client and reduced ability to pay). Though motivated by different purposes, government agencies (mainly commerce and tax agencies), and banks/insurance companies seek different kinds of financial information about the economic performance of corporations. Even if there is no match in the detail of internal information required by government, and creditors/ insurance companies, corporations can draw upon their conventional management accounting systems to meet these diverse monetary information needs. This leads to a rather general and *quite loose match of information needs*.

b) Partial Link (b): Management – Creditors/Insurance Companies

Corporate management divisions represent the focal point for partial link (b). In the context of conventional management accounting representing an intermediate element that provides a potential path for EMA promotion, only those management departments that are concerned with corporate EMA are of interest (as identified in detail throughout the discussion in Chapter 3). Furthermore, those management departments interested in EMA must also be related to the intermediate element and stakeholders under consideration. In the case of conventional management accounting as an intermediate element and creditors/ insurance companies as intermediate stakeholders the relevant management departments mainly include top management, and accounting and finance managers.

Match of interests and goals: This partial link (b) between conventional management accounting and EMA is characterized by a high *match of interests*. The interest of creditors/ insurance companies in reducing the risk of credit failure or insurance losses complements top management's goal of securing profitable operations and maintaining sound management practices. The reduction of environmentally-induced financial risks and impacts is equally important to accounting and finance managers.

Match of information needs: Corporations seeking low cost loans for projects that have an environmental impact and insurance of their potential environmental liabilities will disclose available internal management accounting information in order to obtain favorable terms. Hence, the *match between the information needs* of creditors/insurance companies, and relevant internal corporate stakeholders is rather high, as creditors/insurance companies require additional project based monetary information related to project costs and benefits, and investment appraisal projections that exceed publicly available data, and can be accessed through conventional management accounting. However, creditors, and in

particular insurance companies will mostly seek rather specific information concerning the object financed or insured. Thus the match of their information needs with those of management is not complete. When specific information about environmental costs, benefits and investments is required, the strong relationships between conventional management accounting and MEMA will be to the fore. Of course, extensive provision of detailed internal information may be contrary to a corporation's need for confidentiality and both parties will regard such information as 'commercial in confidence'.

Professional Accounting Associations

a) Partial Link (a): Government – Professional Accounting Associations

Match of interests and goals: Professional accounting associations and *commerce and environmental agencies* are concerned to create an appropriate basis for transparency and accountability of businesses, and to encourage corporations to act in the public interest. Hence, there appears to be a *moderate degree of overlap between goals*, but in a rather general way.

Match of information needs: There is a high divergence of information needs between professional accounting associations and government agencies with regard to information generated by conventional management accounting. The information professional accounting associations requires does not stem from corporate management accounting systems. While the accounting profession encourages its members to develop and implement improved conventional management accounting systems it does *not use that information* in its own decision making. The profession is more concerned with membership levels, participation and services that need to be offered to maintain or increase these levels.

Likewise, government agencies such as commerce or tax agencies, obtain information by imposing separate regulatory accounting systems on corporations rather than by using information from corporate management accounting systems, to which they have only very limited access. However, at present, neither government agencies nor professional accounting bodies need management accounting information to achieve their own goals.

b) Partial Link (b): Management – Professional Accounting Associations

The most important corporate management department involved with EMA *and* connected with conventional management accounting and professional accounting associations is the accounting and finance department.

Match of interests and goals: Here, a high degree of complementarity of interests towards professional accounting associations exists. A key goal of many accounting associations is to improve and encourage development of best management accounting practices. Accounting and finance managers have a strong interest in the improvement of their corporate accounting systems and, in the context of conventional management accounting, there is a strong

relationship between their aims and those of the professional accounting bodies to which they belong. Extensive interaction exists between these two groups. Inclusion of environmental issues in management accounting systems, especially through the use of monetary measures, is of considerable interest to professional accounting bodies in search of best practice systems for their members. Hence, professional accounting associations with an interest in conventional management accounting systems provide one of the most promising indirect relationships for promoting EMA, but this is because of the close interrelationship between their members and specialist managers who introduce and implement EMA systems.

Match of information needs: The type of information accountants and finance managers, and professional accounting associations need, *only partially matches*. The overlap is mainly supportable because both stakeholder groups deal methodically with information in similar ways. What weakens the match of information needs is the fact that accounting associations are not interested in the information generated by conventional management accounting systems in the same way as corporate accountants and finance managers but, instead, seek information about how well conventional management accounting is conducted in corporations.

Suppliers and Purchasers

a) Partial Link (a): Government – Suppliers and Purchasers

Match of interests and goals: Suppliers and purchasers wish to establish stable and profitable relationships with their corporate customers and will therefore be receptive to government initiatives that promote such outcomes. Commerce agencies wish to promote economic growth and the encouragement of sound outsourcing relationships. Promoting supply management is one general way of *supporting* this *goal*. However, these rather general findings do not lead to any considerable match of interests between the relevant government agencies and suppliers.

Match of information needs: Apart from the interest of *commerce agencies* in transparency of economic activities, which could be achieved through management accounting, *no particular match of information needs* seems to exist. Environmental agencies wish to make suppliers and purchasers aware of their environmental costs and promote life cycle costing, a process in which suppliers and purchasers play an important part. By giving encouragement to suppliers and purchasers that are responsible for reducing input costs, perhaps through improved process and product design or the substitution of less expensive materials, environmental agencies could promote their goals if environmental impacts are reduced at the same time. However, in general, goals of government agencies and suppliers and purchasers are somewhat dissimilar and are not helped by information provided from conventional management accounting systems. As contractual relationships are mainly left to the parties involved no specific government influence on the flow of management accounting information between suppliers and their customers takes place, even though certain concepts such as supply management, and life cycle costing might be promoted. Whereas suppliers and

purchasers mainly concentrate on information concerning the specific product or service they buy, government agencies look for highly aggregated measures in this context. In addition, both are considerably restricted in their access to management accounting information. Hence, as was the case for interest and goals, the match of information needs between government agencies and suppliers is found to be low.

b) Partial Link (b): Management – Suppliers and Purchasers

With regard to conventional management accounting and suppliers and purchasers the most important corporate management departments also concerned with EMA are marketing and sales, production, logistics and purchasing, and R&D and design.

Match of interests and goals: In general, *supplier and purchaser – corporate relationships* can either be close or distant but the aims of both parties are similar in terms of stable, profitable relationships. Relationships can be at arms length when conventional management accounting has a potentially less significant role to play and when market information and financial reporting become important. Relationships between suppliers and corporate departments can be very close, for example when outsourcing arrangements combine with modern Just-In-Time inventory management systems, or when strategic alliances are established. Contracts to supply goods or services require the supplier to be aware of its customer's ability to pay, and the customer to be aware of the ability of the supplier to continue operations in line with required customer scheduling.

The relevant management departments such as purchase, R&D, logistics, and production also seek to establish (mutually) favorable supplier relations, and so there is *quite a strong matching* between suppliers and managers in relation to conventional management accounting. The closeness of the integration of interests depends on the strategy a company follows with regard to suppliers (e.g. the degree of outsourcing). Large enterprises can exert considerable influence and pressure on suppliers which, from their point of view, try to retain a certain degree of independence. Whether environmental aspects are integrated in these interests depends on the strategic orientation of the enterprise, the purchasing policy of the customer and the competitive implications of developing close relationships between legally distinct parties.

A close similarity exists between the goals of purchasers in the retail market. The general interest of purchasers in receiving high quality products that meet their needs is in line with the fundamental corporate goal of high customer satisfaction. Conventional management accounting systems help marketing and sales managers, charged with pricing decisions, as well as R&D and design management, to fulfill their interest to meet purchaser preferences. Where environmental issues are part of market demand or corporate product policy, they could be included in internal information systems. The overall match of interests found for this partial link, however, is *only medium*, as companies in general seek maximum profit margins which is not always in line with the demand of suppliers and purchasers for low prices.

Match of information needs: *Where relationships are close, considerable exchange* of detailed monetary information (and physical information provided through conventional accounting in physical units) *may take place.* Information needs of suppliers and purchasers are very specific and depend mainly on the goods and services provided, and on the closeness of the relation with the customer. Such information tends to be closely matched because it is contract specific. However, information desired by suppliers and purchasers mainly refers to products and goods, which focuses only on a small subset of management accounting information. Environmental aspects of the information exchanged are no different in this respect. Exchange of detailed conventional management accounting information may precede the signing of any contractual arrangement, especially when a long term arrangement is envisaged. It may also be part of an ongoing mutual monitoring process. Fundamentally, based on the interests of both sides in establishing mutually favorable relationships, a close match of information needs can be found.

International Organizations

a) Partial Link (a): Government – International Organizations

Match of interests and goals: International organizations often have very *similar goals and information needs to government* in relation to conventional management accounting. The main interest of most international organizations in respect of enterprises in general is to promote economic growth and to encourage sound management practices, particularly at the macro-economic level. Such goals closely match the stated interests of commerce agencies and the pragmatic approach adopted by environmental agencies when working with business.

Match of information needs: The information needs of government agencies and of international organizations are also *closely matched*. In part this is because international organizations often have similar roles at the supra-national level to the roles of government agencies at the national or regional level. They also have similar interests in aggregate information. Therefore, the potential for cooperation between these two groups is *high*.

b) Partial Link (b): Management – International Organizations

In the context of international organizations and conventional management accounting the corporate management departments simultaneously concerned with EMA can mainly be found at the level of top management.

Match of interests and goals: International organizations adopt a macroeconomic perspective. Their goals can, therefore, clash with the particular interests of specific corporations. On the other hand, operative management is concerned with much more detailed and project-related issues that are not reflected in international organization's interests. Thus, only general basic goals, such as economic growth, can be found to be complementary. This gap

in the match of interests matches is mainly due to the fact that international organizations only have loose relationships with corporations, often as part of an industry group, and this restricts their interest in conventional management accounting. Unlike government, international organizations have no sovereign right to dictate accounting practices to corporations if it is considered appropriate. Neither do international organizations have a particular contractual reason to obtain close proximity to conventional corporate management accounting information – in the way that creditors, insurance companies, suppliers and purchasers do. International organizations can establish benchmark practices and standards and leave it to companies to adopt such practices if they feel it is appropriate. These differences between international organizations and enterprises lead to a *low match of interests.*

Match of information needs: The reasons found above, which hinder a higher match of interests and goals between international organizations and corporate management, are even more valid when considering information needs. Because of the great distance between aggregate information needs at the international level and the detail required at the corporate level, there is a considerable gap between the type and detail of information desired by these two groups. In addition, this great distance aggravates any attempts to gain access to management accounting information that by definition is already fairly tightly restricted to internal use. Hence, only a *loose match of information needs* can be found.

Further Results and Conclusion

Anchorage: As outlined above in Chapter 2.2.3, the anchorage of a link forms another important criterion for judging suitability for the promotion of corporate EMA use. For *partial link (a),* between government agencies and intermediate stakeholders, a *low anchorage is found*, because relations between government agencies and intermediate stakeholders are limited and very general, with the exception of international organizations that play a similar role to governments. With the exception of international organizations, all intermediate stakeholders considered to be affected by conventional management accounting are either quite closely related to vital corporate functions and processes in the value chain, such as financing, purchasing, or sales and marketing, or they represent interests of members involved in these corporate functions. Consequently, the number and variety of management departments involved is high which results in a *high anchorage for partial link (b)* (see also Figure 14).

Overall Suitability: Given this pattern and considering the suitability of different stakeholder groups as targets for government promotion of EMA, this explains why creditors/insurance companies, suppliers, purchasers, and professional accounting associations – i.e. the stakeholders standing in a close relationship to corporations – have a *high potential to bring their influence to bear on corporate management accounting activities.* As argued above and depicted in Figure 14, the position of professional accounting associations is underpinned by a high match between interests and a medium-range match of information needs. *Professional accounting associations* appear to be the most promising stakeholder group for government to try and influence in any attempts to promote the relationships between

conventional management accounting and EMA. Even if they have a rather low matching with the goals and information needs of government agencies, professional accounting associations already lobby government on a range of issues related to accounting systems, are familiar with this process and are likely to be receptive to building up relationships with government over EMA.

In spite of *international organizations* having a close match with government interests their suitability to act as an intermediate to promote EMA via conventional management accounting is low because they have very little access to and influence over internal corporate issues such as management accounting.

In the special case when *government acts as a significant purchaser* of corporate products, it needs to be familiar with the internal workings of corporate cost and management accounting systems, their allocation processes, cost bases, investment techniques and approaches to continual improvement, if value for money is to be gained from public expenditures.

In conclusion, in spite of the high method proximity of conventional management accounting with EMA, the indirect link between government bodies and corporate EMA via this intermediate element is *only partially suitable and attractive for the promotion of EMA*. This is mainly because of the fact, that conventional management accounting is largely an internal matter for corporations and any changes made are largely at the discretion of management. In general, only groups with a close contractual relationship to the corporation are given access to internal corporate information processes. As these groups mainly represent businesses as well, they are in general no more susceptible to government influence than are the target companies (see the mainly low matches on the left hand side of Figure 17). One exception to this is professional accounting associations which appear to have several advantages as a target – they are familiar with conventional management accounting and EMA, their members are also members of corporations that might implement EMA, and they are familiar with government negotiating processes. The main problem is that they have previously ignored corporate environmental impacts and a certain amount of reconditioning of their attitudes would be inevitable (Maunders & Burritt, 1991). To establish an indirect link via conventional management accounting would therefore require a new public-private partnership or cooperation of government with professional accounting associations and corporate management. A general advantage in any attempt to extend conventional management accounting towards EMA is that accounting associations are already familiar with conceptual and practical aspects of management accounting.

Operative Status: This indirect link has not been covered by policies or guidelines, either from government agencies (partial link (a)) or from any intermediate stakeholder groups (partial link (b)), designed to extend conventional management accounting towards EMA and thereby promote corporate use of EMA. The government agencies that would theoretically be appropriate to encourage EMA use, environmental protection and commerce agencies, have too little influence on internal corporate management accounting. On the other hand, professional accounting associations, as the intermediate stakeholder group most open to

issue such guidelines, have been slow to embrace their potential to exert influence towards EMA. Consequently, this indirect link remains fairly inoperative.

5.6.2 Indirect Link via Conventional Financial Accounting and Reporting

In this Section conventional financial accounting and reporting systems are analyzed as an intermediate element. They classify and record dated financial information about an enterprise. They provide the infrastructure for financial reporting which is used by managers to communicate information about the dated financial position and changes in financial position of an enterprise to external parties. Periodic financial reports are the primary financial documents available to help external parties assess the financial value of an enterprise. Independent auditors express their opinion on the veracity (truth and fairness) of this financial information reported to third parties. Independent audit establishes the credibility of reported information.

Standards and guidelines address issues relating to the recognition, measurement and disclosure of assets, liabilities, equity, revenues and expenses in an accrual accounting system whose output is represented in the periodic publication of balance sheets and income statements. Issues addressed by standards in financial reports include: whether outlays, including environmentally-induced outlays, should be capitalized or expensed; how standards and guidelines treat the disclosure of liabilities, including environmental and contingent liabilities; and how assets, including environmental assets, are to be measured.

Unlike conventional management accounting, financial accounting and reporting are not conducted on a voluntary basis at the discretion of management; instead, they are strictly regulated and standardized, usually backed up by legislation. Financial accounting and reporting standards have, therefore, a big influence on what information is collected, analyzed, and considered for disclosure by management.

Major stakeholders interested in conventional financial accounting and reporting include:

- Shareholders and financial analysts;
- Professional accounting associations;
- Suppliers and purchasers;
- Industry associations;
- International organizations; and
- Employees.

Figure 18 summarizes the match between basic goals and information needs of these relevant stakeholders concerned with conventional financial accounting, and the goals and information needs of government and management. Environmentally-related financial impacts of corporate activities, that are required to be included in financial accounting and reporting systems, might be founded upon EMA information systems. Financial accounting and reporting is particularly important to stakeholders that do not have access, or the contractual capacity, to obtain detailed information directly from management, or from regulatory accounting systems. The links between government, financial accounting and EMA for each relevant stakeholder group are examined in the following sections. In the

following subsections, firstly, *partial link (a) between government and the particular stakeholder*, and, secondly, *partial link (b) between management and the stakeholder,* will be analyzed in the context of EMA issues relating to conventional financial accounting. In addition, the anchorage of this indirect link, as shown in Figure 18, will be discussed in Section later.

Shareholders and Financial Analysts

a) Partial Link (a): Government – Shareholders/Financial Analysts

Match of interests and goals: Comparison of the goals and information needs of shareholders and financial analysts with government reveals a rather high overlap in goals, but only a moderate overlap in information needs.

Shareholders and financial analysts are primarily involved with assessing the financial value of an enterprise and expected changes in that value as a basis for investment. In particular, their goals are to maximize the return on investment, and to anticipate the dividend stream and changes in capital value that will flow from changes in share prices. Evidence remains mixed about whether corporations with a good record of environmental performance also ex-

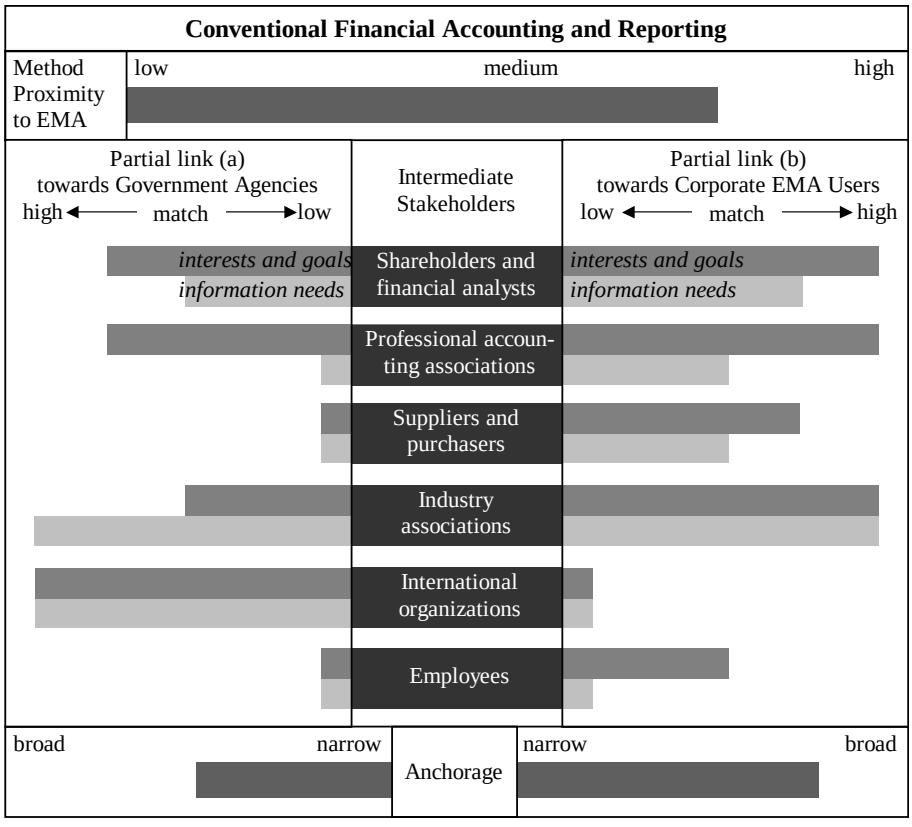

Figure 18. Suitability of the indirect link via conventional financial accounting and reporting

hibit good financial performance. However, in a growing ethical investment sector, returns are related to shares held in a screened portfolio that has been selected using ethical, environmental or social screening criteria, in addition to expected monetary returns.

Commerce agencies have a strong interest in contemporary financial accounting and reporting systems because these provide the core external financial accountability and transparency mechanism designed to elicit continuing support for the legitimate existence of corporations. This is one reason why the International Organization of Securities Commissions (IOSCO), which aims to ensure high standards in the regulation of securities markets, in May 2000, recommended that IOSCO members permit incoming multinational issuers of shares to use the 30 IASC 2000 standards to prepare their financial statements for cross-border offerings and listings (http://www.iosco.org/iosco.html, on 21.8.00). Likewise, *tax agencies* interested in securing tax revenue from corporations, to support public programs in an equitable way, need to undertake an assessment of the financial value of an enterprise and changes in that value as a basis for imposition of periodic tax. This means that financial accounting is closely allied to the goals of tax agencies. *Environmental agency* goals, within a sustainability framework, include the need to encourage the integration of financial incentives into policy design and for external costs to be internalized by corporations. Environmental agencies work with tax agencies to encourage tax (and subsidy) systems that do not lead to environmental degradation. Even if the interest of government agencies in conventional financial accounting differs from that of shareholders and financial analysts their interest in transparent, 'true and fair' information on corporate economic performance is rather highly linked with goals of shareholders and financial analysts. This *rather high match* is underpinned by the fact that government agencies act to secure the interests of shareholders because the latter do not have the sovereign power to require corporations to provide transparent information.

Match of information needs: Although the goals of government agencies and shareholders and financial analysts are quite well matched in relation to financial accounting, their information needs are less closely connected. *Tax agencies* need more deterministic figures than those provided in financial reports that leave considerable discretion with managers. Therefore, they have the power to implement special tax accounting rules. For *commerce agencies*, financial accounting information is considered to be necessary for the purpose of fulfilling corporate accountability to third parties that are keen to learn about recent income history and financial position. This necessary information is enhanced by the fact that an independent auditor is required to express an opinion on the 'truth and fairness' of the reported figures. Finally, the financial accounting information needs of *environmental agencies* are less closely connected to the specific needs of shareholders and financial analysts, although knowledge of a corporation's ability to pay for pollution prevention or clean up activities means that there is a moderate overlap.

b) Partial Link (b): Management – Shareholders/Financial Analysts

The most important corporate management department involved in EMA *and* related to conventional financial accounting and shareholders and financial analysts are top management and the accounting and finance department. Goals of other managers are not so closely aligned because they seek to achieve goals closely related to their own departmental

activities, rather than trying to enhance profitability and solvency of the legal enterprise in which a share can be held.

Match of interests and goals*:* When partial relationship (b) is considered, there is *a high match* of interests in relation to *shareholders and financial analysts*. Shareholders, financial analysts and management all have similar financial goals. Top management has a fundamental interest in corporate profitability. Whereas top managers plan for long term corporate profitability and corporate survival, shareholders look for increasing profitability in the short and long term. Financial analysts sell their services to clients wishing to invest. Their goal is to identify future movements in corporate value and sell this information to clients. Finance managers look for beneficial financial market conditions and, therefore, are interested in promoting a positive perception of the company's economic value and performance. An additional aspect is that top management compensation often includes the issue of shares, or options over shares, in the companies they manage. In these circumstances, managers are also shareholders: their goals become identical.

Match of information needs: The match between information needed by shareholders, financial analysts and different levels of management appears to be *rather high*. With the goal of increased profitability in mind, financial accounting provides the main information delivery mechanism for external stakeholders such as shareholders and financial analysts. Both shareholders and financial analysts, as external groups, and top management, look for aggregate financial information about the enterprise as a whole and segmental information about different corporate activities. Lower level managers need information about the segments and activities for which they are responsible, including information about environmental costs and environmentally-related savings. Such 'segmental' information would usually be obtained from information recorded in the management accounting system.

Of course, shareholders and financial analysts do not in usually have access to management accounting information, including EMA. If they require environmentally-induced financial information, because they think that it has a material impact on financial results, shareholders have to rely on disclosures in financial reports. If, as the World Resources Institute suggests (Ditz et al. 1995), environmentally-induced financial information is an important component in income and financial position calculations, then managers will be under pressure to disclosure this information in financial reports. In such a situation, the integration of EMA and financial accounting could help with promotion of EMA but only through the combined interests of top management with shareholders and financial analysts.

Professional Accounting Associations

a) Partial Link (a): Government – Professional Accounting Associations

Match of interests and goals: As mentioned in the discussion of conventional management accounting, professional accounting associations, such as the FASB in the US, the ACCA, ICAA and CPA Australia, and *commerce and environmental agencies* are concerned to

create an appropriate basis for transparency and accountability of businesses, and to encourage corporations to act in the public interest. This leads to a *generally moderate* overlap in goals between government and professional accounting associations. There is one important exception, however. One of the services to members provided by professional accounting associations relates to the development of financial accounting standards and involvement in the standard setting process that proscribes many of the rules and guidelines to which professional accountants and auditors must adhere. Where standards are backed by legislation (e.g. in Canada and Australia), financial accounting standard setting powers are delegated to the accounting profession (e.g. to the FASB by the US SEC), or government itself issues standards (as e.g. the Georgia General Assembly), *commerce agencies* are also integrally involved in the development of an effective and efficient financial accounting standard setting process. Hence, the goals of commerce agencies and professional accounting associations, tend to be closer than they are for conventional management accounting where standard setting is not the normal practice. However, in negotiations, professional accounting associations still adopt the perspective of their members (accountants and auditors) in order to represent their interests.

Whether the standard setting process is driven by government, or by the profession, environmentally-induced financial impacts of corporations may be included in the process. If there is a clamor of complaint for standards to specifically address environmental issues (e.g. recognition of environmental liabilities, separate acknowledgement of clean up costs, measurement of environmental assets) the profession, and where government drives the standard setting process, the government, clearly needs to take appropriate action. In consequence, in the environmental context, a close interrelationship exists between the goals of these two stakeholder groups.

Match of information needs: Overall, there is *little match* between the information needs of the professional accounting associations and government agencies. In general, the information they require for achieving their own goals is not derived from corporate financial accounting systems because the accounting profession's main concern is with membership levels and professional development, rather than with corporate profitability *per se*. Likewise, government agencies tend to impose separate regulatory accounting systems on corporations rather than use information from corporate financial accounting systems.

b) Partial Link (b): Management – Professional Accounting Associations

Once again, top management and accounting and finance staff represent the groups who are concerned with financial accounting and professional accounting associations, as well as with EMA.

Match of interests and goals: In a similar way to the situation for conventional management accounting discussed above, there is also *a high overlap* of interest in financial accounting and EMA between professional accounting associations and the relevant management departments. This similarity of interest is mainly based on the common goal of

improving corporate accounting systems, and gaining a high rate of membership. As soon as incentives from external third parties encourage the inclusion of environment related monetary figures in financial reports, or corporate management decides to include those figures because the cost of information has fallen, accounting associations and management have a mutual interest in complementing the existing accounting systems by introducing some MEMA components which deliver the information.

Match of information needs: Information desired by the relevant corporate managers relates to the financial condition of organizations, the rules that are adopted for deriving and presenting such information and the systems in which financial accounting and MEMA information is embedded. Professional accounting associations are mainly concerned with systematic production of information and not so much about the information generated by the accounting systems they promote, which is not directly relevant to the marketing of services to members, promoting membership, or increasing rates of member participation and involvement. However, professional accounting associations have an interest in MEMA information because management accounting as such (including MEMA) provides the foundation for all other accounting systems and signals potential changes that will need to be addressed in external accounting and reporting systems. Additionally, MEMA information helps accounting associations to meet the need of their members to find out about the importance and future development of environmentally-induced financial impacts.

Suppliers and Purchasers

a) Partial Link (a): Government – Suppliers and Purchasers

Match of interests and goals: Goals and information needs of suppliers and purchasers for financial accounting information are similar and have been combined in this section. The match between suppliers and purchasers and government goals and information needs through conventional financial accounting is *low*. *Commerce agencies* are keen to ensure that competitive relationships are maintained, investment markets remain liquid, corporate failures are minimized and economic growth is encouraged. Suppliers and purchasers, on the other hand, have little direct involvement with government but they have to operate within the legal framework that government establishes. They seek stability and certainty in this framework.

Match of information needs: The presence of conventional financial accounting and reporting systems does little to enhance supplier/purchaser and government interrelationships. Indeed, in their relationships with government, suppliers and purchasers do not use or rely upon financial accounting information systems. The situation is different when partial link (b) is considered.

b) Partial Link (b): Management – Suppliers and Purchasers

The corporate management departments affected by EMA and concerned with conventional financial accounting and suppliers and purchasers include mainly the operational parts of the value chain, such as purchase managers, production managers, the marketing and sales department, and logistics, as well as R&D and design managers.

Match of interests and goals: Suppliers and purchasers, that have a close working relationship with corporations, have similar goals relating to their desire for stable and profitable activities. Although the goals of management and suppliers/purchasers have a *high match* in relation to their desire for the production and sale of profitable products to customers, they have conflicting goals concerning who receives how much of the value added created in this economic process. In close relationships, or stable strategic alliances, these stakeholders are likely to exchange detailed management accounting information. When relationships are less close, for example where a new business is being established, suppliers, purchasers and management will still need information to establish the ability of their customers to pay, and the financial strength of the parties they are contracting with. External corporate financial reports provide one source of such information. Here again, financial accounting and reporting functions in the interests of both management and suppliers and purchasers, because it helps to built up close business relationships. Thus there is a *rather high match of interests and goals*.

Match of information needs: When close, trusting business relationships have not yet been built, or when contracts are at arms-length rather than through alliances or partnerships, financial accounting information will be important for suppliers and purchasers in establishing the creditworthiness of their contracting customers. The importance of this relationship is signified by the fact that credit rating agencies have been developed to provide specialized advice on corporate creditworthiness. One important source of information for credit rating agencies is financial accounting information. Growing interest in the importance of environmentally-induced financial impacts means that suppliers, purchasers and credit ratings agencies seek this information about the contracting parties. Conventional financial accounting provides little of this information, to date; EMA would provide detailed information. However, it appears unlikely that demand from potential suppliers or purchasers for more EMA information will be exerted trough an extension of conventional financial reporting. Rather, the contractual parties are likely to build up relationships, leading to a direct exchange of EMA information. This means that suppliers and purchasers entering into normal market transactions rely, directly, or indirectly through financial reports and ratings agencies, on external published financial information if they are to learn about environmentally-induced financial impacts and their implications for stable and profitable relationships. Thus, there is a corresponding need for information about creditworthiness and environmentally-related issues in this context. The problem is that (potential) suppliers and purchasers only have restricted means to influence conventional financial accounting and reporting, and prefer to engage in direct information exchanges once business relations have been established. This leads to a *moderate match of information needs*.

Industry Associations

a) Partial Link (a): Government – Industry Associations

Match of interests and goals: Enterprises in an industry may find it necessary to deal with different levels of government. If there is an industry-wide problem that needs to be resolved government agencies will prefer to have an industry association represent industry members as this will simplify representation and negotiation procedures. Industry associations work at close quarters with government, largely through participation in the lobbying process where the associations represent their members' interests to government agencies.

Depending upon the particular type of government agency, an industry association will tend to have similar goals (e.g. *commerce agencies* which seek economic growth in certain industry sectors; *environmental agencies* that are looking for win-win partnerships with industry) or goals in conflict with the industry association (e.g. *environmental or tax agencies* that wishes to impose a high carbon tax; *commerce agencies* that seek to remove monopoly profits). Nevertheless, negotiations, compromise and alternate enforcement mechanisms are the hallmark of industry association - government relationships. As a result, their goals can differ from identity to complete opposition. In the context of conventional financial accounting and reporting, however, there is a general common interest in enhancing transparency about economic activities and for legitimizing the existence of corporations. Thus, in spite of the amplitude of particular interests *a medium match* between the interests and goals of government agencies and industry associations can be found.

Match of information needs: Information needs of industry associations seem *highly matched* with those of government agencies. Both require the same aggregate industry based financial information to form the foundation for their negotiations with each other, even though their views of the information and the inferences they draw from the information may differ. Both are keen to establish benchmarks, about good management practices and process and performance improvement, which can be shared between industry members at a reasonable cost. Financial accounting systems can provide such information. In addition, government agencies and industry associations both seek information about environmental performance, environmental accounting and environmental management of corporations. Through the information they obtain and disseminate, industry associations provide an important mediating function between government and management. This is also true for the extension of conventional financial accounting towards environmentally-induced aspects, fostered by EMA information. There is a *high match* in the information needs of government and industry associations as the two types of stakeholder either complement each other's activities, or compete with each other to influence or represent industry.

b) Partial Link (b): Management – Industry Associations

For the partial link between industry associations and corporate management top management is the most relevant group concerned about conventional financial accounting and EMA.

Match of interests and goals: Partial link (b) reveals a *high match* of interests between industry associations and top management goals, particularly at the level of *top management*. Industry association goals and goals of corporations are identical because industry associations only exist to serve their members and their members are corporations in a particular industry. Therefore, industry associations will support all the interests which enhance corporate profitability and survival of the industry in which the corporation operates. Industry associations may also have the same goals as more specialized managers, however, they tend to be concerned about corporations at more general level. Also, when looking at financial accounting and reporting issues, industry associations will adopt and defend the standpoint of the corporations in the branch they represent. Whether industry associations will support any inclusion of environmental aspects in financial accounting and reporting, and thereby help to establish a need for corporate EMA use, depends on the preferences of the corporations that are represented. Once the industry association is convinced of the need for EMA tools to be adopted by its members through amended financial reporting requirements it will focus on informing members about the net benefits of introducing the tools. However, industry associations, being rather reactive in general, are not likely to set the pace for the inclusion of environment related figures in financial accounting and reporting. Environmental industry associations are more likely to promote this view.

Match of information needs: In order to be able to represent the interests of their members, industry associations must be well informed. Hence, a *high match* can be identified between the information needs of industry associations and management. Dissemination of broad and specific information to corporate members is an important part of industry association activities (e.g. through trade magazines, special workshops and conferences). When considering the possible extension of financial accounting to include environment related figures, an effective industry association will generate and disseminate information about the EMA tools that will serve a particular industry well. It can be seen that the match of information needs between industry associations and management is based on the need for industry associations to provide information to members in a relevant and methodical way. Also, associations will encourage the extension of financial accounting and reporting systems to include EMA related data, especially where the future of an industry is sensitive to environmental issues.

International Organizations

a) Partial Link (a): Government – International Organizations

Match of interests and goals: Looking at partial link (a) the goals of international organizations and government are closely aligned when considered in the context of conventional financial accounting. Their general concern is with improving the standard of living in economic, environmental and social terms. Financial accounting systems can help in the achievement of these goals by making changes in the standard of living transparent and providing a tool for accountability and for assessing effectiveness in relation to goals. Goals of *commerce agencies* are especially closely allied to those of international organizations such as the OECD, UN and EU, but these organizations have diverse interests and there is also a close correspondence between the goals of *environmental agencies*, *tax agencies* and international organizations. This *high match* is mainly caused by the similar role often played by international organizations and government.

Match of information needs: The information needs of government agencies and of international organizations are also *highly matched* in terms of their interest in obtaining aggregate monetary and environmental information that might be used for purposes of promoting sustainable development.

b) Partial Link (b): Management – International Organizations

If there are management departments affected by international organizations, in the context of financial accounting and reporting and EMA, these are likely to be top management and the accounting and finance departments.

Match of interests and goals: Consideration of partial link (b) reveals that the goals of international organizations and of corporate management are *widely divergent*. International organizations interests and goals remain at a macro level that contrasts with the more specific and individual interests and goals of corporate management. These organizations can recommend or provide guidance on good corporate practices for corporations to consider, related to the broad public interest, but they have no powers to insist that certain financial accounting and reporting standards be adopted, with or without EMA orientated information.

Match of information needs: There is a wide gap between information needs of international organizations and corporate management interests. Even though corporate financial accounting information can sometimes be aggregated across different sectors to provide the comparative figures desired by international organizations, the interests of management are much more specific. Likewise, when looking at the information generated by financial accounting and reporting systems, and the possible inclusion of EMA, the information appears far too specific for any considerable match of information to exist between international organizations and corporate management.

Employees

a) Partial Link (a): Government – Employees

Match of interests and goals: Employees look for security and equity in their employment, and a mix of financial and other rewards from their jobs. These goals are related to government goals for high aggregate employment levels, and equity and diversity in employment at the national level. Commerce agencies that have the most direct interest in these goals look for aggregate measures of income to assess the economic success of a country from period to period. The more personal goals of individual employees and the general macro-economic interests of government agencies do not extend beyond *a low and general degree of matching*.

Match of information needs: Neither agency is concerned about financial accounting information as a means to achieve their goals with respect to employees. It can be concluded, that there is *only a low match* between employee and government goals, information needs and financial accounting systems.

b) Partial Link (b): Management – Employees

Where employee-related issues are concerned, within corporations the main focus lies with human resource management.

Match of interests and goals: Human resources management looks for stable employment patterns, motivated and satisfied employees, and flexible compensation packages; while employees are interested in maximizing total compensation for work performed, subject to stable and equitable employment opportunities. The presence of financial accounting systems enhances the achievement of these goals through general transparency of financial affairs within the employee – management nexus, leading to a *moderate match* at a rather general level.

Match of information needs: For employees, financial accounting information may be of use when deciding upon a new employer, or for monitoring activities of corporations during continuing employment relationships. However, given the goals of employees and employee access to informal sources of information, it cannot be said that financial accounting information about the employing corporation plays anything other than relatively small part in the total relationship. Consequently, informal sources of information, rather than financial accounting or EMA, are likely to be used for gaining knowledge of environmentally-induced corporate financial impacts and a *low match* exists.

Further Results and Conclusion

Anchorage: The rather broad variety of different stakeholder groups involved in the indirect link via conventional financial accounting and reporting gives a first hint that there is quite good anchorage. This is especially the case for the range of intermediate stakeholders that have different backgrounds and exhibit a variety of relationships with government agencies and corporate management. Looking at the anchorage within the two focal points, however, the number and variety of stakeholders is lower. In particular, on the government side, only the commerce agencies appear to be considerably involved. Environmental agencies do not seem to have engaged with conventional financial accounting and reporting, which is regrettable because introduction of financial incentives for good environmental performance would require the need for corporations to provide some EMA data. Therefore, the anchorage for partial link (a) is *only moderate*. On the corporate side, top management and accounting and finance managers are involved. Even if the number of stakeholders within this focal point is low, at least two of the most important well established management departments are addressed. Thus, for partial link (b) a *fairly high* anchorage can be found (see Figure 15).

Overall Suitability: Stakeholders with an interest in financial accounting and reporting systems, and in the information provided by those systems, are varied in the match between their goals and government goals. While shareholders, financial analysts, professional accounting associations, industry associations and international organizations have a moderate or high common interest with government, in the goals they seek, only industry associations, international organizations and shareholders have a close or moderate match in the information provided by financial accounting to help achieve these goals. International organizations, industry associations, shareholders and professional accounting associations have the highest level of similarity with government in relation to goals and information needs linked with financial accounting, and would appear to provide the most sensitive link. For shareholders, government agencies act in their interests in order to compensate for their lack of power to obtain specific types of information. International organizations on the other side have a very similar role to governments and are, thus, a promising partner for cooperative promotion ventures, but without possessing much potential as an intermediate element to influence corporate behavior.

Suppliers and purchasers are mostly concerned about contractual arrangements with corporations, through management, and only the infrastructure for these arrangements is influenced by government, hence, there is only a low match of interests. Employees similarly have a low match because they are concerned about the infrastructure of employee – employer relationships set down by government, but little of this is reflected in financial accounting systems. Consequently, these two intermediate stakeholder groups are not sensitive despite their relative high matching with management.

Looking at partial link (b), the remaining intermediate stakeholders, in particular professional accounting associations and industry associations, show a rather close match in both interests and information needs.

Thus the structural analysis of the overall indirect link between government and corporate EMA, through financial accounting as an intermediate element, reveals industry associations, professional accounting associations, and shareholder/financial analysts as the three crucial intermediate stakeholders. All the three of them, but in particular industry associations, show a considerable match of interests and information with both focal points. These findings of the structural analysis are not rebuffed by the fact that, to date, EMA does not drive the contents of financial accounting reports, and financial reports per se have not led most organizations to develop EMA systems. Together with the medium – high method proximity, found for this intermediate element, the structural analysis shows a *high suitability* of the indirect link, based on government promotion of corporate EMA use, through industry and professional accounting associations.

Operative Status: When looking at the current operative status of these two suitable paths of influence within the indirect link, via conventional financial accounting and reporting, a rather ambiguous picture comes to light.

In recent years both partial links, via the professional accounting associations intermediate stakeholder, have been attended to by programs that address environmental issues in financial accounting and reporting, and thus indirectly via EMA. In respect of partial link (a), i.e. government agencies addressing accounting associations, as a rather general measure, financial accounting standard setting powers have been delegated to the accounting profession (e.g. to the FASB by the US SEC), including the power to include environmental issues. In respect of partial link (b), i.e. standard setting bodies addressing corporate financial accounting and reporting systems, a growing number of standards and guidance notes have been introduced addressing environmentally-induced financial accounting issues (see Table 14 below for examples):

Professional accounting guidance on the treatment of environmental costs within established financial accounting frameworks	
Initiating body	**Document**
USA - The Financial Accounting Standards Board (FASB)	• FAS 5 ‘Accounting for Contingencies’ • FAS 71 'Accounting for the effects of certain types of regulation' • FIN 14 ‘Reasonable Estimation of the Amount of a Loss’ • EITF 89-13 ‘Accounting for the Costs of Asbestos Removal’ • EITF 90-8 ‘Capitalization of Costs to Treat Environmental Contamination’ • EITF 93-5 ‘Accounting for environmental liabilities’ • GASB 18 ‘Accounting for municipal solid waste landfill closure and post-closure care costs’ • ...
USA - The American Institute of Certified Public Accountants	AICPA Statement of Position 96-1 (SOP 96-1), ‘Environmental Remediation Liabilities’, issued in October 1996 to provide authoritative guidance on accounting and disclosure requirements for environmental remediation liabilities
Canada - The Canadian Institute of Chartered Accountants (CICA)	Section 3060 CICA Handbook ‘Future removal and Site Restoration Costs’ ‘Environmental Costs and Liabilities: Accounting and Financial

	Reporting Issues'. In process 'Environmental costs'.
Australia - The Australian Accounting Research Foundation (AARF) and the Australian Accounting Standards Review Board (ASRB)	ASRB 1022 'Accounting for the Extractive Industries' Urgent Issues Group (Abstract 4) 'Disclosure of accounting policies for restoration obligations in the extractive industries'.
UK - The Institute of Chartered Accountants in England and Wales (ICAEW)	'Financial Reporting of Environmental Liabilities - a Discussion paper'.
Europe - The European Commission's Accounting Advisory Forum	'Environmental Issues in Financial Reporting'.

Table 14. Examples for existing standards referring to conventional financial accounting and reporting systems.

The indirect link via financial accounting and reporting based on professional accounting associations is, therefore, found to be operative across both parts.

Looking at the indirect link based on industry associations a rather different situation appears. Partial link (a) between government agencies and industry remains inoperative, since no programs covering this path could be detected.

Some industry associations have developed and enforced standards of good practice for their members. At present, however, most industry associations do not promote EMA by the way of issuing guidance for integrating environmental aspects in financial accounting and reporting. Thus, both partial links remain inoperative. This is disappointing because scope exists for industry associations to be brought into the diffusion process in a stronger way in future, provided that the issue is introduced with positive incentives and that the association does not focus on the need to 'protect' its industry against perceived unwarranted interference from a government agency.

In relation to the third sensitive intermediate stakeholder group, shareholders/financial analysts, no government guidelines or programs could be found, which tend to encourage shareholders and financial analysts to include EMA issues in their decision making. Thus partial link (a) remains inoperative. However, for partial link (b) guidelines of financial analysts for corporate management concerning environmental information in financial accounting and reporting are in place (e.g. the European Federation of Financial Analysts´ Societies, EFFAS 1994). This partial link is operative.

5.6.3 Indirect Link via External Physical Environmental Accounting and Reporting

External physical environmental accounting and reporting, being part of environmental accounting in physical units, is the next intermediate element to be considered. It provides physical information to stakeholders outside the enterprise and it has a close relationship with PEMA, or internal physical environmental accounting. Physical environmental information presented to external non-government stakeholders is largely provided on a voluntary

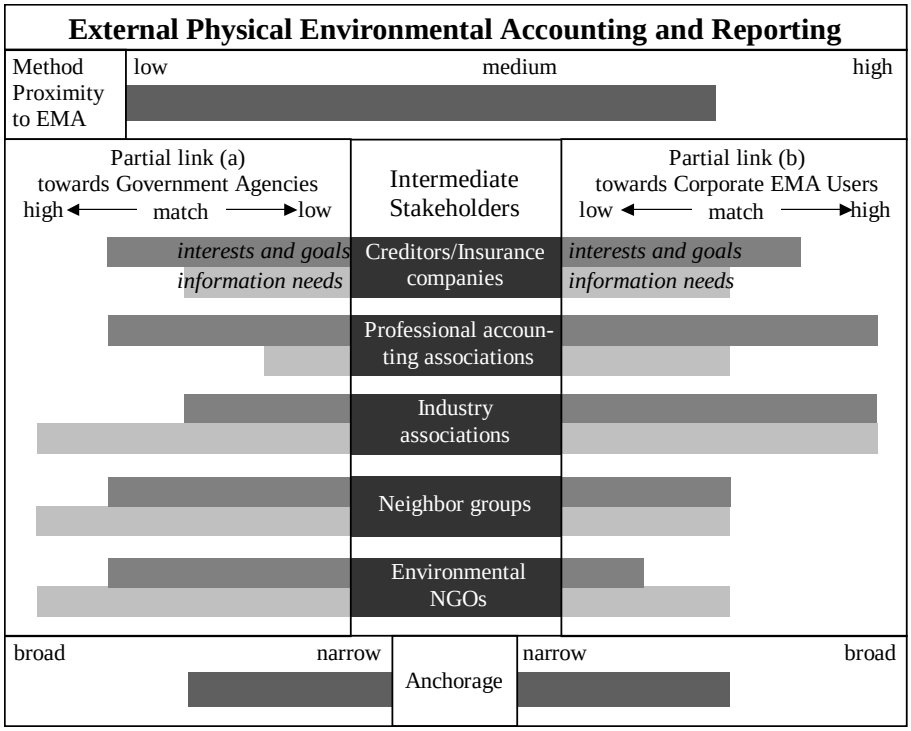

Figure 19. Suitability of the indirect link via external physical environmental accounting and reporting

basis. A range of stakeholders are concerned about external physical environmental accounting and reporting. These include:

- Creditors/insurance companies
- Professional accounting associations;
- Industry associations;
- Neighbor groups; and
- (Environmental) NGOs;

Figure 19 shows findings for the suitability of the indirect link via external physical environmental accounting and reporting. The match of interests and goals, and the match between information needs of the different intermediate stakeholders with government agencies and corporate management, are discussed in the following subsections. The anchorage of the link will be addressed in Section 5.6.4.

Creditors/Insurance Companies

a) Partial Link (a): Government – Creditors/Insurance Companies

Match of interests and goals*:* Partial link (a) reveals a rather high match between interests and goals of government agencies, and banks/insurance companies in the context of external physical environmental accounting and reporting systems. *Environmental agencies* look for an improvement of the environmental situation through environmental protection measures and pollution prevention (e.g. greenhouse gas emissions reduction). Such agencies would, therefore, welcome higher transparency about the environmental performance of industry through external physical environmental accounting and reporting. *Insurance companies* are also committed to recognizing environmental problems (such as global warming) and to encouraging reduction of harmful emissions because of the potential impact on environmental risks that are, or might be, insured. Banks and creditors may also find it necessary to take ecological risks into account when assessing the creditworthiness of companies. Hence, in relation to environmental impacts, there is a fairly high match between government and insurance industry goals. However, creditors/insurance companies are mostly not aware of all (potentially) harmful ecological impacts of corporate activities.

Match of information needs: To support the attainment of common goals, information concerning the environmental performance of enterprises, expressed in physical terms at national and sector level, is vital if government is to monitor the environmental situation, and if insurance companies are to be kept aware of any changes in the risk associated with different environmental problems. Of course, government can obtain this information either through regulatory accounting, or in a voluntary way, through external physical environmental accounting. Likewise, insurance companies can obtain the information by establishing direct access to internal physical environmental accounting rather than external physical environmental accounting and reporting. Because of the lack of standardization in external physical environmental accounting, this choice of sources tempers the match between information needs of government and insurance companies, even though goals are strongly related. With the exception of compliance issues (which are more likely to be addressed in the context of regulatory accounting), where company specific physical environmental information is needed, environmental agencies need aggregate information about the areas they administer. In contrast, for appropriate premia calculations, creditors/insurance companies need company specific figures. Given this situation, a moderate match of information needs can be found.

b) Partial Link (b): Management – Creditors/Insurance Companies

The most important management departments concerned with external physical environmental accounting and reporting and creditors/insurance companies, as well as with EMA, are top management, and the environmental management and legal affairs departments.

Match of interests and goals: Consideration of partial link (b) reflects the fact that the main concern of banks/insurance companies is with corporations as contracting clients, representing mutually profitable business opportunities, rather than with government. External physical environmental accounting systems can help both parties achieve their goals. *Corporate environmental management*, undertake their own assessment of environmental risk, and will be closely involved in the presentation of a particular case for a loan or insurance. *Top corporate management* is concerned with mutually profitable arrangements. An external assessment, or environmental audit, of trends in energy and material consumption, and waste generation and distribution, will provide information about physical environmental risks that may deter, or encourage a bank or insurance company. The goal of corporate environmental management is to show that environmental risks are small and declining. The *legal department* will also be involved in demonstrating corporate compliance with environmental legal requirements, thereby removing any 'surprise' law suits, penalties or licensing revocations that might concern banks/insurance companies. Consequently, at various levels of management, there is a fairly high match between their goals, those of creditors/insurance companies, and the function that external physical environmental accounting fulfils in ensuring that those goals are met. However, a full match may be hindered by the tendency of management to present the company in a positive light whereas creditors/insurance companies seek a more independent assessment.

Match of information needs: Banks need physical information about the environment to decide whether loans might be made or refused, and what the level of environmental risk premium might be for customers with environmental problems. Insurance companies use similar information to decide whether certain risks are insurable and, if they are, whether any risk premium should be charged. Management needs to reveal the extent of environmental risks posed by their companies to banks or insurance companies. Thus, all three parties – management, banks and insurance companies - need physical environmental information as a basis for their negotiations. It should be recognized that demand for external physical environmental information by banks or insurance companies is derived from their ultimate need to complete contractual financial arrangements with corporations. Hence, the demand for external physical environmental accounting information is a 'derived demand'. Banks/insurance companies will wish to establish the information about corporate ecological impacts that has been placed in the public arena, as this may form the basis of future law suits against clients and an associated diminished corporate capacity for clients to repay loans, or pay insurance premia. Because information provided by external environmental reports to the general public may be not sufficient, creditors/ insurance companies may look for additional more detailed physical information and try to establish access to internal PEMA information. Taking these findings into account means that a moderate match exists between the common information needs which can be met by external physical environmental accounting systems.

Professional Accounting Associations

a) Partial Link (a): Government – Professional Accounting Associations

Match of interests and goals: In contrast with the relationship between government – professional accounting associations, discussed in the previous sections, here the main involvement is through *environmental agencies* rather than commerce agencies. Whereas commerce agencies have contributed little on the subject of external physical environmental accounting and reporting, a core purpose of *environmental agencies* is to monitor environmental impacts of corporate activities on resource use, biodiversity and the quality of air, water and land. Therefore, such agencies wish to see rules for external physical environmental accounting and reporting being developed, implemented and monitored, in order to encourage transparency, accountability, and comparability between different sustainable growth patterns. Within government agencies there is considerable diversity of opinion about the merits of physical environmental accounting. However, in theory there should be same common interest between government agencies and professional accounting associations about the need to create an appropriate basis for transparency and accountability of businesses, and to encourage corporations to act in the public interest. The consideration of external physical environmental accounting within the activities of professional accounting associations is in line with their fundamental goal to pursue the interests of their members and the concern with information about levels of membership, participation in standard setting, and educational and professional development issues (FEE 1999a and 1999b, Schaltegger 1998). Thus a fundamental and therefore quite good match of interests can be found here.

Match of information needs: The information needs of the two groups are rather loosely matched. Government wishes obtain general, aggregate information about corporate environmental impacts. Professional accounting associations are likely to encourage general rules (or standards) for accounting purposes, having the general reader and preparer of accounting information in mind, but they also provide specific guidance for accounting in the different industry sectors to which their members belong (e.g. banks, manufacturing, public sector, local government). However, they do not look for specific information generated by physical environmental accounting systems. Instead, they are more concerned more about the methodical collection of information.

b) Partial Link (b): Management – Professional Accounting Associations

Management departments mainly concerned with external physical environmental accounting, professional accounting associations and EMA include the environmental management department, corporate marketing and PR.

Match of interests and goals: The partial link between professional accounting associations and corporate management, with regard to external physical environmental accounting and EMA, is rather high. Accounting associations, with their recently acquired

professional interest in internal and external environmental accounting systems, can oversee this intermediate element in the same way that they oversee management accounting and financial accounting systems. In consequence, the same fundamental interest of professional accounting associations in good accounting practice, as already found for the other intermediate accounting systems (see 5.6.1 and 5.6.2), also apply here. This aim for methodical excellence meets the goals of *environmental management departments* and *corporate marketing and PR* for a responsible and "green" image of the corporation with its external third parties. The above found close proximity to EMA is also reflected in the fact that association members in corporations may be responsible for both EMA and external physical environmental accounting, thereby underpinning this link.

Match of information needs: Information needs of professional accounting associations and management, related to partial link (b) are seen to have a moderately close connection. As for the professional accounting association – management relationships discussed previously for the other intermediate accounting systems, the match of information needs is mainly based on concern with the provision of methodical information. Thus, relevant management departments need to know how best to implement physical environmental accounting and reporting and how an appropriate informational base can be established for PEMA tools. As professional accounting associations need to establish close relationships with and to provide good services to their members they will respond to this information need.

Industry Associations

a) Partial Link (a): Government – Industry Associations

Match of interests and goals: Industry associations have a strong interest in external physical environmental accounting. Their goals are similar to goals of government agencies because it is in the interest of both parties to seek and provide transparency about aggregate industry impacts on the environment. Of course, the motivations of government and industry associations differ. Government, in particular *environmental agencies*, sees external physical environmental accounting as a low cost, voluntary, self-regulating activity, whereas industry associations see voluntary disclosure as a way of achieving the desire of their members to retain self-control of environmental issues. However, clearly industry associations will adopt the position of the companies they represent and will defend them against any perceived exaggerated demands for disclosures of physical environmental information. This may conflict with the interests of environmental agencies for greater transparency and accountability. *Commerce agencies* are less concerned with physical environmental data, and disclosure of information about the environmental performance of corporations only meets their general concern to maintain the legitimacy of private enterprises and act in line with the general public interest. Industry associations have a similar interest. However, in spite of a rather high overlap in their fundamental interests in physical environmental accounting and reporting, there is some potential for conflict in particular cases, which leads to a moderate match between the interests of the two parties overall.

Match of information needs: Information needs between industry associations and government agencies, in relation to physical environmental accounting and reporting, are highly matched. Aggregate physical information, derived from environmental reports, is used by both parties for disclosure and for negotiations through the lobbying process. Neither of the parties need any detailed company specific information.

b) Partial Link (b): Management – Industry Associations

Management departments, that are concerned about external physical environmental accounting and reporting, industry associations and EMA, mainly include top management, environmental management and corporate marketing and PR.

Match of interests and goals: The partial link (b) between industry associations and management provides a close match in the context of external physical environmental accounting. Industry associations represent their members and if their members, represented by e.g. top management and environmental management or PR managers, feel that the survival of their enterprise could be enhanced through aggregate, or individual, disclosure of information about ecological impacts they will encourage the process. In contrast, if management perceives physical environmental accounting and reporting demands as a burden, industry associations will lobby against them.

Match of information needs: If industry associations are to represent the interests of their member companies they need to be informed about the ecological impacts of their activities as well about current reporting issues. Thus, the match of needs for external physical environmental accounting information, between industry associations and corporate management departments such as top management or corporate marketing and PR, is high. Furthermore, industry associations may look for more detailed information about the PEMA methods behind external physical environmental accounting and reporting.

Neighbor Groups

a) Partial Link (a): Government – Neighbor Groups

Match of interests and goals: Neighbor groups aim to minimize their exposure to threats from corporate environmental impacts in order to maintain safe living conditions. This is backed up by the general interest of *environmental agencies* in improving the environmental situation. Hence, the interest for sound and safe living conditions and public health, as well as for high transparency of environmental impacts are highly matched between neighbors and government. This can be seen in various cases where governments act in the interest of neighbor communities, providing them with considerable rights to require information from polluters. Other interests and goals may, however, appear when *commerce agencies* and/or *environmental agencies* try to establish hazardous (chemical, radioactive, biomedical and recyclables) sites constructed and run by corporations or the state in, or near, a local com-

munity. The normal response is typified by the NIMBY (Not In My Back Yard) principle. Although good government – neighbor relationships may be encouraged by appropriate disclosures through external physical environmental accounting and reporting, there are often historical or political reasons for mistrust between the parties which reduces the effectiveness of such disclosures. In sensitive areas, physical environmental accounting and reporting may help governments to demonstrate that hazardous sites comply with the promised level of environmental impact. Taken together, there is still a *rather high* government – neighbor match of interests and goals.

Match of information needs: Neighbors wish to have access to physical information about environmental impacts and government want neighbors to be informed if credibility is to be maintained. This is in particular true for site related information. For partial link (a) therefore, there is a high match between the external physical environmental accounting information needs. External disclosure of environmental impacts will improve transparency and contribute to reducing the sensitivity of neighbors to negative aspects of corporate activities, and to build up trust over time.

b) Partial Link (b): Management – Neighbor Groups

With reference to neighbor groups and external physical environmental accounting and reporting, as well as to EMA, top management, environmental management and corporate marketing and PR are the main parties involved.

Match of interests and goals: Neighbor groups are concerned to find out about actual and potential environmental impacts of corporate activities in their neighborhood in order to ensure safe and sound living conditions. On the other hand, neighbors may welcome short traveling distances to their work places and good employment opportunities. Private enterprises construct and operate facilities, once government approval has been agreed. *Top management* is interested in favorable neighborhood relations in order to support long term survival of the company. *Corporate marketing and PR managers*, and *corporate environmental management* have the goal of building up and maintaining the trust of local communities and neighbors in NIMBY situations. However, without external reporting of environmental impacts there is no instrumental tool for building such trust between the conflicting parties (Fox 1975, 66). Hence, there is a moderate match of interests and goals between neighbor groups and corporate management for external physical environmental accounting and reporting.

Match of information needs: Environmental managers and corporate marketing and PR managers need external environmental information in physical measures in order to communicate with stakeholders, such as neighbor groups. Neighbor groups may look for more detailed, credible information than is provided in normal environmental reports. A systematic basis of disclosure of PEMA information in order to derive the disclosed figures would elevate the credibility and quality of the data provided to neighbor groups and, thus, help to build up trust. This results in a moderate match of information needs.

(Environmental) NGOs

a) Partial Link (a): Government – (Environmental) NGOs

Match of interests and goals: Over time environmental agency and environmental NGO goals have turned out to be quite close. *Environmental agencies* and environmental NGOs look for improved corporate environmental performance, a reduction in corporate pollution, and the development of a high quality environmental data base to support decision making. Nonetheless, environmental NGOs have criticized government agencies for not being strict enough in their efforts to protect the environment. In addition, environmental agencies place a strong emphasis on compliance issues, which are of less interest to environmental NGOs. Overall, there is a rather close match between the goals of government agencies, in particular, environmental agencies, and environmental NGOs in respect of external physical environmental accounting and reporting.

Match of information needs: *Environmental agencies* and environmental NGOs look for the same kind of information about corporate environmental performance, as they pursue similar goals. However, although environmental agencies gain additional access to physical data about environmental impacts through regulatory physical environmental accounting, this is not widely available to other stakeholders such as NGOs. Environmental NGOs would like access to similar data, so that they can monitor corporate environmental performance, however, they have to rely on public data available through voluntary physical environmental accounting disclosures. This means that although information needs of government and environmental NGOs are highly matched, because government needs to make sure that each enterprise complies with regulations, and NGOs wish to establish the environmental performance of each enterprise, they have to use different sources.

b) Partial Link (b): Management – (Environmental) NGOs

Once again, the most important management departments concerned with the context of external physical environmental accounting and reporting and environmental NGOs, being at the same time related to EMA, are top management, environmental management, and corporate marketing and PR.

Match of interests and goals: Partial link (b), between management and environmental NGO interest in corporate physical information about environmental impacts, is a sensitive one. Goals of environmental NGOs and management have often been very different, with NGOs seeking to expose poor corporate environmental performance. This may conflict with top management's goal to secure long term profitability and survival, as well as *environmental and PR managers* wishing to build up a green image by demonstrating that their performance is acceptable or even excellent. There is considerable potential for conflict, with management often focusing on external disclosure of good performance to the exclusion of bad performance (Deegan & Rankin 1996). However in recent years this situation has

started to change, as cooperation and partnerships have been developed between environmental NGOs and industry. However, the overall match of interests and goals remains rather low.

Match of information needs: Access to physical environmental information about corporate impacts is important to the mainstream goals of environmental NGOs. If such information is not available environmental NGOs may try to get the information for themselves. Systematic published reporting of physical information about environmental impacts is one way for corporations to engage NGOs in a more constructive, transparent approach to addressing environmental issues. Although their goals are different, management and environmental NGOs do have common, detailed information needs about site pollution. However, the need of *external* environmental information is not that highly matched between the two groups because NGOs seek independent, unbiased, reliable information, whereas management prefers to publish positive information about the company's environmental performance. PEMA tools can provide physical environmental information to management for internal decision making and, in the interests of transparency and accountability, to environmental NGOs. PEMA information can be used as the foundation for disclosure of unbiased external physical environmental information about corporate impacts.

Further Results and Conclusion

Anchorage: As already shown in Figure 19, the anchorage of the indirect link via external physical environmental accounting is found to be moderate. There is quite a wide range of different intermediate stakeholders through which a combined influence over external physical environmental accounting and corporate EMA could be brought. What is missing are stakeholders that have close contractual relationship with the corporations. The anchorage towards the government focal point (partial link (a)), however, remains moderate, as although environmental agencies are concerned with external physical environmental accounting and reporting, commerce agencies only have a rather general interest in reducing resource consumption and the dependence of industry on suppliers. On the corporate side, a moderate anchorage was found, with environmental managers as the most important group, and top management and PR managers being involved to a small extent.

Overall suitability: Looking at the matches between the different intermediate stakeholders in order to reveal the overall suitability of this link, creditors/insurance companies, professional accounting associations, neighbor groups, and environmental NGOs which demonstrate a considerably high match with government goals, whereas, industry associations only show a moderate match. Close matches of information needs with government agencies could only be found in the case of industry associations, neighbor groups and environmental NGOs.

When looking at the relation between the intermediate stakeholders and corporate management, creditors/insurance companies, industry associations and professional accounting associations in particular show a high match of interests. The closeness of industry

associations is further underpinned by a high match of information needs, while all the other stakeholder groups show only moderate matches.

Taken together, from a structural point of view, *industry associations* turn out to be the most promising intermediate stakeholder that could influence corporate EMA use through external physical environmental accounting and reporting. In addition, because of the balanced and rather high match with both focal points *creditors/insurance companies* also provide a potentially useful promotion channel. Even if at present *professional accounting associations* still appear to be waiting for the call to act as a conduit for promoting EMA through their interest in external physical environmental accounting information, from a structural point of view, because of their high knowledge about accounting and reporting methods, they also have to be considered as an attractive intermediate stakeholder group. Though showing only moderate matches on partial link (b), *neighbor groups* have to be considered, too as attractive intermediate stakeholders in the context of external physical environmental accounting and reporting because of their fairly close relationship with government.

Environmental NGOs show lower matches with the corporate focal point and therefore, in spite of their rather close matches with government, this avenue for promoting EMA seems less fruitful. Environmental NGOs and neighbor groups, will be discussed in more detail in the context of national environmental accounting (see Section 5.6.7), where no other, more attractive, stakeholder groups exist.

Together with the rather elevated method proximity of external physical environmental accounting and reporting towards EMA (PEMA in particular) (see Section 4.1.1) the promotion of corporate EMA use through this intermediate element, using industry and professional accounting associations, and creditors/insurance companies, demonstrates a *high level of suitability*.

Operative status: At this point, there are no generally agreed standards for presentation of external physical environmental accounting information. This is especially true for the partial link (a), i.e. no government programs exist to date by which any of the intermediate stakeholders considered are required to promote corporate physical environmental accounting and reporting systems. Partial link (a) for all the three sensitive intermediate stakeholder groups thus remains inoperative.

When looking at partial link (b), surprisingly, and to some extent disappointingly, *professional accounting associations*, led by the FEE and the UN ISAR, have only just begun to develop draft guidelines for physical environmental accounting and reporting (FEE 1999a and 1999b). The early stage in development of standard setting means partial link (b) here can be classified as *forthcoming operative*. *Industry associations* encourage external physical environmental reporting by encouraging or requiring members to sign up to voluntary codes of environmental practice that have an external reporting requirement (e.g. the Australian Minerals Council Code of Environmental Management; The European Chemical Industry Council (CEFIC) Responsible Care - Health, Safety and Environmental reporting guidelines; and the PERI Guidelines (Public Environmental Reporting Initiative)). They may also

encourage members to sign up to voluntary reporting initiatives (e.g. The Coalition for Environmentally Responsible Economies (CERES) formats for an environmental report; CERES has also introduced the Global Reporting Initiative, and is working on global standardization formats for reporting; The Forum on Environmental Reporting (FEEM) Guidelines for preparation of company environmental reports first published in Italy in 1995). Hence, for industry associations, partial link (b) is operative. Creditors/insurance companies in contrast, have not issued any guidelines concerning external physical environmental accounting and reporting, leading to an inoperative link here. All in all, it becomes clear that there still remains considerable potential for government to undertake activities that promote external physical environmental accounting, and through that, EMA. Neighbor groups themselves are not in the position to issue formal guidelines or policies to encourage EMA. However, government agencies have acted on behalf of neighbor interests by implanting information rights (such as the US Right to Know Act). In addition, government agencies have issued guidelines for good external physical environmental accounting and reporting (e.g. the UK Department of the Environment, Transport and the Regions guidelines for green house gas, waste and water reporting; DETR 1999, 2000a and 2000b; Handreiking Validatie milieuverslagen, Ministreie van VROM; Hörst & van Knippenberg 2000). Therefore, both parts of this link are *operative*.

5.6.4 Indirect Link via Financial Management Systems

Financial management systems are used by management to plan and control the corporation's financial profile and activities. There is a relationship between financial management and EMA, because they both have an internal focus; are introduced and implemented in a voluntary manner; and emphasize the future through decisions related to capital structure, management of financial risk using different financial instruments (e.g. derivatives, swaps, options), dividend policy, mergers and takeovers. Finally, both can be important for deriving a competitive advantage. The closest link between financial management and EMA is the financing aspects of MEMA tools, which include cost accounting for costs and benefits, short term budgeting and long term investment appraisal (see Figure 3). Of these the most important short term and long term finance oriented tools are budgeting and investment appraisal (Horngren at al 2000, 883)[18].

The corporation's accounting and finance department is usually responsible for short and long term financial planning and control. Top management oversees the financial management process, and managers in the legal department ensure that legal requirements are met. In spite of the fact that financial management is largely an internal matter for management, a number of stakeholders have an interest in financial management systems employed by organizations to plan and control financial aspects of their corporate activities. These include:

- Shareholders and financial analysts (Section 5.6.4.1);

[18] Capital budgeting is also addressed in conventional management accounting. Here the emphasis is on finance aspects of capital budgeting rather than operational aspects, such as cash inflows and outflows related to operations.

- Creditors/insurance companies (Section 5.6.4.);
- Professional accounting and finance associations (Section 5.6.4.); and
- Employees (Section 5.6.4.).

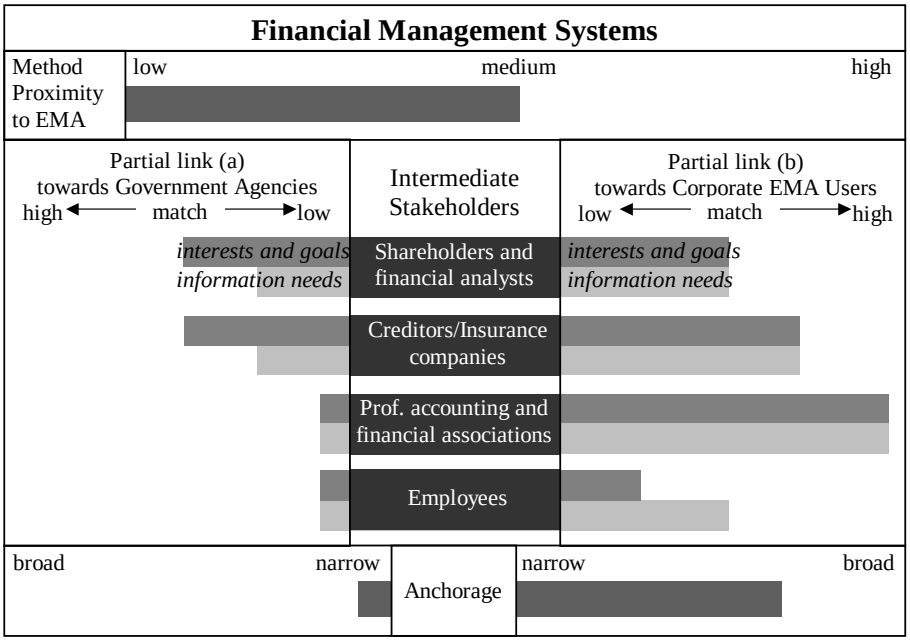

Figure 20. Suitability of the indirect link via financial management systems

Figure 20 summarizes the findings for the suitability of the indirect link via financial management systems. The different intermediate stakeholder groups are discussed in detail in the following subsections.

Shareholders and Financial Analysts

a) Partial Link (a): Government – Shareholders and Financial Analysts

Match of interests and goals: Commerce and tax agencies provide for the development of institutional infrastructure to encourage maintenance of high quality financial decision making, risk reduction, and capital availability to corporations. Partial link (a) between government, shareholders and financial analysts represents the market infrastructure established by government in which corporate financial management is conducted. Governments encourage efficient financial market mechanisms that distribute funds to the most profitable opportunities, given associated risks. Shareholders, on the other hand, are the actors in the market. They are looking for the highest financial return in the form of post-tax dividends and capital gains. Thus, there is a *moderate but rather general match between their goals* – government establishes the structure for market activities and shareholders use the structure for their own trading activities. From an environmental perspective, both look for favorable financial impacts from corporate environmental activities. However, there is no specific match of interests and goals relating to organizational or process aspects of corporate financial management.

Match of information needs: Information needs of government and shareholders and financial analysts in relation to corporate financial management systems show a *rather low match*. *Commerce agencies* and *tax agencies* have an interest in aggregate financial measures of dividend levels, stock market prices, corporate cost of capital, the financial health of large, powerful corporations that have a large impact on the national economy, and the financial success of the SME and export sectors. Government is more concerned about aggregate financial management information because of its interest in regulating the overall financial market structure, rather than being a market player. However, there is no particular need for information about corporate financial management systems. Shareholders, have fairly focused portfolio based profitability interests and are concerned with low overall cost of capital, high after tax dividend and capital gains from their shares. Information about sound financial management practices may contribute to their assessment of the attractiveness of investments in a company's shares but is only one aspect they are concerned about. Hence, there is a *rather low match in information needs* between government and shareholders in the context of financial management systems.

b) Partial Link (b): Management – Shareholders and Financial Analysts

Management departments that are concerned with financial management and EMA, and that deal with shareholders and financial analysts, are mainly financial and top management.

Match of interests and goals: Shareholders and management both aim to secure the best financial returns available from the equity funds invested. Astute financial management processes, procedures, activities and actions will ensure that this is the case and are encouraged by shareholders through their investment decisions. Top and finance management will be particularly mindful of the relationship with shareholders and their analyst advisers. To the extent that environmentally screened funds continue to grow in importance, financial analysts, wish to find out about environmental policy and environmentally-induced financial impacts from environmental managers, but the overall significance of this sector remains very low, in spite of the development of sustainability indexes. Hence, overall, a *medium match of goals* exists.

Match of information needs: A moderately high degree of matching exists between the information needs of managers, shareholders and their analysts. Managers in the accounting and finance department are responsible for providing prospective information about new issues of equity related to top management financial management strategy, and ongoing information about the results of current financial management policy. Apart from the provision of selective information by managers and regulated information in relation to shares, the opportunity for shareholders to obtain prospective information about the outcome of financial management is constrained by the confidentiality of this information. Financial management policies related to the reduction of environmentally-induced financial impacts will be reflected in MEMA based information, or conventional financial accounting and reporting based on EMA data. However, managers will be looking for division, site and product based information whereas shareholders are interested in aggregate information about financial

management practices of the corporations they invest in. On balance, then, because of disaggregating issues there is only a *medium match in information needs*.

Creditors/Insurance Companies

a) Partial Link (a): Government – Creditors/Insurance Companies

Match of interests and goals: Banks and insurance companies seek profitable and stable operations. At the industry level they are closely regulated and supervised by government because unstable banking or insurance sectors interfere with the achievement of government goals for economic growth, employment and monetary control. Government invokes its monetary policy through banks. Banks and insurance companies have a close relationship with commerce agencies because of this tight control and their lobbying of government to secure favorable operating circumstances. Also banks lend to government, or are associated with loans that are sometimes matched by government. In these cases their goals are as one. Tax agencies also keep a close watch over banks because when interest rates are high banks tend to obtain windfall gains which government sometimes tries to encourage into the public purse. Regulation and supervision of individual banks or insurance companies is based on encouraging, or requiring, prudent financial management. Although environmental agencies have not yet figured highly in financial management regulation and supervision systems, they are encouraging focused lending and insurance for long term environmental rehabilitation, rejuvenation of degraded agricultural land, relocation of hazardous facilities, and expanded energy efficiency and waste management (Raven 1992). Hence a *moderate match in goals* exists.

Match of information needs: As discussed for regulatory accounting systems, information needs of banks, insurance companies and government are connected where the close regulatory and supervisory relationship requires detailed information exchange. A close regulatory relationship permits government commerce agencies to have very tight control over the financial management systems applied, but this tight control is not always exercised. For example, in New Zealand, bank regulation and supervision is only conducted through public information sources about financial management, that is through conventional financial accounting and reporting information, without access to confidential internal information (Nicholl 1996, 1). Although the vast majority of commerce agencies still require detailed internal information about financial management practices of banks and insurance companies, they do not exert much influence on the systems to manage financial funds. Furthermore, the financial management policies of banks and insurance companies can decide whether an environmentally poor project will receive finance, or be insured. Environmental screens for loans and insurance policies are being applied by a growing number of financial institutions and client EMA systems provide some assurance about environmental risks. Nonetheless the *match in information needs* between government and creditors/insurance companies *remains rather low*.

b) Partial Link (b): Management – Creditors/Insurance Companies

Here again, financial management and, to some extent, top management, represent the most in important management departments.

Match of interests and goals: Partial link (b) makes it clear that a fairly high overlap exists between the goals of banks/insurance companies and management. Corporations that seek insurance are concerned to limit their exposure to risks, including environmental risks. Their goal is to reduce exposure to uncontrollable risks which can be insured, provided that the premia are not excessive. Corporations looking for new, or extended, loans from banks need to show prudent financial management – e.g. sound working capital management, and acceptable financial leverage. Insurance companies look for high premiums, but are constrained by market forces. Banks look for speedy and secure repayment of loans at as high an interest rate as possible, given the market constraints. Finance and accounting management are the experts in assessing these financial risks, and in building up a corporation's case for funding or insurance. They work in combination with top management to implement corporate strategy designed to lower the cost of corporate capital. Financial management of business risks is frequently conducted at the center, rather at divisional levels in a corporation and so divisional managers are not often involved in long term fund sourcing decisions, except in large corporations, or in overseas subsidiaries and associates. All three stakeholders have specialized expertise in financial risk management, including management of the financial aspects of environmental risk, and an incentive to engage in mutually rewarding contractual relationships. Their interests have a *fairly high match*.

Match of information needs: Information needs of banks/insurance companies and management are *quite highly matched*. Banks and insurance companies need information about the financial management of their corporate clients, including information about possible financial liabilities that may be related to corporate pollution, and which could be passed on to financial institutions under legislation equivalent to Superfund. Top management also wish to be kept aware of these risks related to poor financial management. MEMA and internal audit can provide an alternative, cheaper source of information to financial institutions about corporate environmental credentials.

Professional Accounting and Finance Associations

a) Partial Link (a): Government – Professional Accounting and Finance Associations

Match of interests and goals: There is a *low match between the goals* of accounting and finance associations and government. Economic agencies of government are more concerned about macro aspects of financial management, whereas associations look to the development of specific tools of financial management, something that is usually left to market, rather than government, forces.

Match of information needs: Information needs also have a *poor match* with government economic agencies looking for aggregate information about the outcomes of financial management practices while associations promote educational packages related to individual financial management tools that will provide corporations with a competitive advantage.

b) Partial Link (b): Management – Professional Accounting and Finance Associations

Finance managers and accountants have been identified as the most important management group to be concerned with financial management systems, professional accounting and finance associations, and EMA.

Match of interests and goals: The goals of management and professional accounting and finance associations have a *high match*. The goal of these associations is to meet the needs of their members and an important need is to be kept up to date with developments in financial management best practice, including environmental aspects of financial management.

Match of information needs: A *high match* exists in the information needs of professional accounting and finance associations for financial management information. Basic information is provided by professional accounting and finance associations to members about gaining access to finance, financial management planning, finance for buying businesses and expanding, and financial instruments, including the environmental aspects of each. Members may also specifically be concerned to learn about the growth in, access to and workings of environmental finance instruments designed to address environmental issues, as revealed in MEMA information. The need for professional development of members in these financial management tools is important if associations are to continue to justify their existence. If members do not feel that professional development information is useful then the supply courses will decline, or membership will start to fall.

Employees

a) Partial Link (a): Government – Employees

Match of interests and goals: Goals of government and employees differ from each other. Government, through its economic agencies, is concerned about national financial management, while employees worry about their personal financial management. Economic agencies of government are concerned about macroeconomic issues such as keeping wage pressure on inflation down, whereas employees want security of employment and to receive a fair wage for their work. These differences in perspective mean that the goals of government and employees for successful financial management are *not well matched*.

Match of information needs: Economic agencies of government manage aggregate financial variables and need aggregate information for financial management. Employees

have little personal interest in this information, except for the fact that financial management of macroeconomic variables by government influences the chance of success for their employer and, thereby, their own security of employment. Hence, there is a *low match of information needs*.

b) Partial Link (b): Management – Employees

Human resource as well as financial managers are considered to be the most important management departments in this context.

Match of interests and goals: Employees and management in most organizations have a common interest in ensuring the survival of the corporation, but their interests can conflict because payments to employees are an important cost for many corporations, particularly service organizations, and need to be controlled by top management through human resources departments. Expenditure on environmental protection, as part of sustainable financial management practice, could be viewed as an alternative to increasing the rewards of employees in the short run, unless top management demonstrate their commitment to obtaining cost savings from reduced use of natural resources and demonstrate the long term benefits from investing in environmental opportunities, and protecting aspects of the environment that a company is held responsible for. EMA can help management demonstrate that there are financial gains from a better engagement with environmental issues, gains, which may shared by employees. However, on balance, there is a *fairly low match* between the goals of management and employees.

Match of information needs: Corporations prefer not to provide too much information to employees about their financial management practices. Employees, on the other hand, being concerned about the security of their employment would like information, particularly prospective information about expected future financial conditions. In some countries (e.g. Germany, Poland, Slovakia) employees have direct representation on corporate supervisory boards which encourages ownership of issues such as environmental protection. In these circumstances of co-determination EMA information will be an important input to management – employee understanding of the financial management ramifications of environmental concerns. However, in many countries where employees have a purely contractual relationship with corporations, through management, there is less incentive for employees to seek EMA information in negotiations with management. The *overall match is moderate*.

Further Results and Conclusion

Anchorage: Anchorage of the indirect link through financial management is quite low on the government side because of the narrow focus on economic, and to some extent, tax agencies. On the management side a stronger anchorage exists because all functional areas are responsible for their financial management activities, and top management oversight is also necessary. Thus, because financial management systems establish the overall

framework of corporate activities a rather broad anchorage exists for partial link (b) (see Figure 20).

Overall suitability: When looking at the matches of the different intermediate stakeholders in order to reveal the overall suitability of this indirect link, partial link (a) on the government side, shareholders and financial analysts and creditors/insurance companies show a moderate match of interests and goals. Employees and professional accounting and finance associations remain at a very low level.

The matches of interests and goals and information needs with corporate management show better results. Professional accounting and finance associations have high matches in both interests and information needs. Creditors/insurance companies almost have the same record, tempered slightly by a lower match in information needs. Shareholders and financial analysts as well as employees have only moderate or even lower matches of interests, goals and information needs with corporate management in the context of financial management and EMA.

For financial management, on balance, only *creditors/insurance companies* turn out to be intermediate stakeholder groups that are susceptible to government influence on corporate EMA via financial management systems. However, the influence that can be exerted on EMA users via creditors/insurance companies is quite limited, because they are more concerned about the overall financial condition and future of the organization and this tends to swamp the importance of environmental concerns as part of financial management systems. Thus, in spite of the medium method proximity found between financial management systems and EMA this indirect link is judged as being rather unsuitable for successful government promotion of EMA.

Operative Status: *Both parts* of the indirect link via financial management systems and creditors/insurance companies are *inoperative*. No government policies are in place to encourage creditors or insurance companies to seek environmental information through their corporate client financial management systems. The same gap exists for partial link (b) where no guidelines issued by creditors/insurance companies, that address the integration of environmental aspects and, through the financial management systems, EMA, could be detected.

However, at least there does exist a general level of encouragement for an environmental adjustment to financial management systems, through the promotion of environmental finance instruments as an additional source for financial management decisions. Development of environmental finance, to promote sustainable development, was encouraged at the Earth Summit (UNCED 1992) under Chapter 33 of Agenda 21, through the Global Environment Facility and commitments by developed countries to donate environmentally targeted GDP contributions to developing countries.

5.6.5 Indirect Link via Environmental Management Systems

Environmental management systems (EMS) are concerned with establishing systematic planning, implementation and control activities in order to achieve continual improvement of corporate environmental performance. This includes the design, organization and systematization of enterprise competencies and processes, as well as the choice and coordination of the different measures and tools to achieve improved corporate environmental performance. Contemporary EMS aims to integrate environmental aspects and information into all mainstream business decisions rather than establish a management system cut off from every day business. In many EMS, such as EMAS, there is requirement for public disclosure of environmental information gathered in a systematic way through the EMS. There is a clear link here with external ecological accounting and reporting as discussed above in Section 5.6.4. Some EMS programs do include direct requirements for PEMA. Further information is available in Section 3.2.2 where direct links with EMA components are discussed in detail. Discussion here is largely about the organization and systems aspects of EMS.

As already mentioned above (see Section 4.1.2), health and safety management systems are also included in this discussion.

- Major stakeholders interested in environmental management systems include:
- (International) Standardization organizations (Section 5.6.5);
- Industry associations (Section 5.6.5);
- Employees (Section 5.6.5);
- Creditors/insurance companies (Section 5.6.5); and
- (Environmental) NGOs (Section 5.6.5)

Figure 21 summarizes the findings about the suitability of the indirect link between govern-

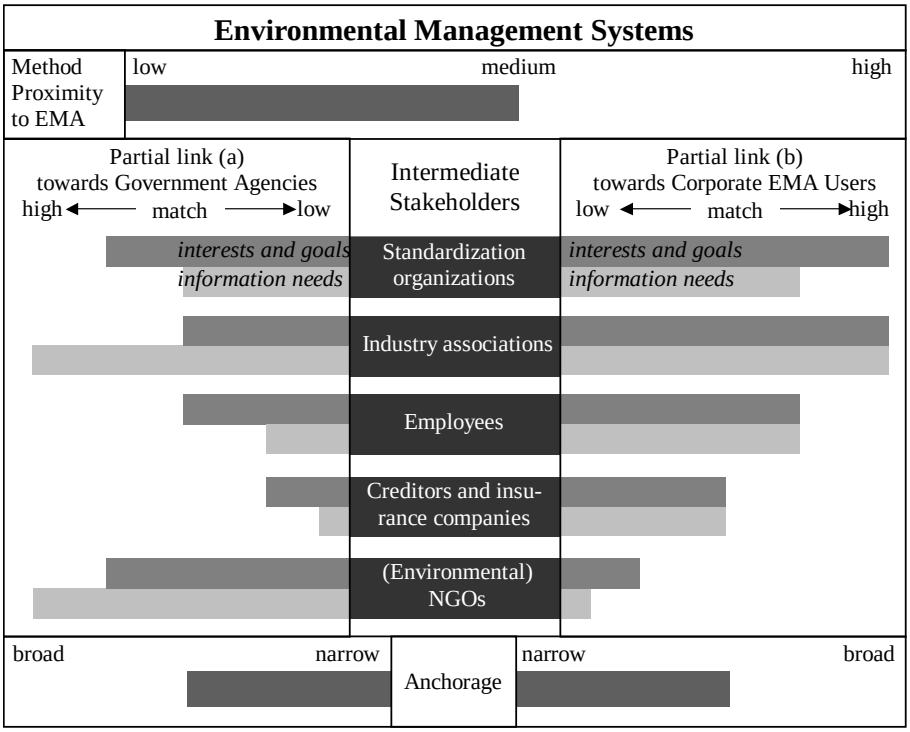

Figure 21. Suitability of the indirect link via environmental management systems

ment and corporate EMA via environmental management systems. The match of interests and goals, and relative information needs of government agencies, the different intermediate stakeholders and corporate management departments, is discussed in the following subsections. In addition, comments are made on anchorage of the link in Section 5.6.5.6.

(International) Standardization Organizations

a) Partial Link (a): Government – (International) Standardization Organizations

Match of interests and goals: Government agencies have an interest in companies following sound environmental management practices. *Environmental agencies* are in favor of corporate EMS because an EMS may contribute towards their goal of reduced industrial pollution. An EMS also helps to integrate environmental issues into mainstream business decision processes, and to encourage corporations to act in the public interest. *Commerce agencies* will view EMS as providing an effective and economically sensible way to handle environmental aspects of business. National and international *standardization organizations*, aim to provide guidance and standards for state of the art approaches to EMS, in a similar manner to the way professional accounting associations set standards for accounting systems. By issuing such guidance and standards they create the basis for benchmarking and auditing environmental management practices of different corporations. In spite of the fact that government agency interests in EMS are much more general than those of international standardization organizations, there is a *rather close match in the interests* of these two stakeholder groups in corporate environmental management systems.

Match of information needs: Government agencies and national and international standardization organizations both monitor the range and extent to which environmental management systems have been implemented by industry. Notwithstanding this, the information related to EMS desired by government agencies is rather general, while standardization organizations want more detailed information about the type of corporate EMS implemented, and how it has been implemented. This leads to the conclusion that a *moderate match of information needs* exists between government agencies and (international) standardization organizations.

b) Partial Link (b): Management – (International) Standardization Organizations

The main corporate management departments concerned with environmental management systems, standardization organizations, and EMA, include environmental management and top management.[19]

[19] Of course, integrated environmental management systems affect many more management departments, such as all the divisions of the operative part of the value chain, or R&D and design management and corporate PR. However, in the context of standardization organizations environmental management and top management are the two management departments mostly concerned with implementing and running EMS.

Match of interests and goals: *Corporate environmental managers* have a strong fundamental interest in EMS. Sound management practices will contribute towards the goals of successfully identifying and realizing opportunities for environmental improvement. Successful environmental protection measures associated with good environmental management systems also help justify the existence of corporate environmental management departments. Bearing this in mind, without doubt, environmental managers should have a personal interest in managing and promoting state of the art EMS. *Top management* have, of necessity, to be involved if EMS is to succeed. Top management interest in EMS is to ensure professional and economic handling of environmental issues so as to promote long term profitability and survival of the company. The desire of *(international) standardization organizations* to promote excellent EMS, and to provide corporations with helpful guidance and standards, conforms with the goals of corporate management departments that implement and operate corporate EMS. Thus, a *close match of interests and goals* can be found here.

Match of information needs: Even when the use of environmental information represents a vital aspect of environmental management systems, corporate managers concerned with implementing and running such systems are often more interested in obtaining methodical information about how and by whom environmental information is generated and distributed. Standardization organizations also have a need for receiving information about the methods behind EMS, and they provide access to some of the information environmental managers need. However, standards and guidance do not always refer to detailed methods of environmental management. Instead, they often concentrate on process and organization issues. Taken together, the need of environmental managers for methodical information is, to a *quite large extent, matched* with the information standardization organizations and certification bodies provide.

Industry Associations

a) Partial Link (a): Government – Industry Associations

Match of interests and goals: As already discussed above in the context of other intermediate elements (see Section 5.6.2 and 5.6.4.), industry associations have a close connection with government agencies in negotiation processes where they represent the interests of their members. Relationships between industry associations and government agencies can differ considerably and range from complementary to conflicting. However, in general, there is at least an *overall moderate match of interests and goals* with EMS. This partial match is related to the fact that industry associations and *commerce agencies*, both want corporations to handle environmental issues in an effective and economic way. A match can also be found with environmental agencies when they seek to establish win-win situations with industry.

Match of information needs: Industry associations and government agencies both look for rather general information about the extent to which EMS is implemented throughout indu-

stry, without looking for more detailed information about specific methods, approaches or procedures. Hence, in spite of the generality of this interest in EMS use, information needs, between industry associations and government agencies, are well matched.

b) Partial Link (b): Management – Industry Associations

The relevant management departments in the context of EMS, industry associations and EMA are those who are concerned with implementing and running EMS: environmental management, and top management.

Match of interests and goals: The fundamental goal of industry associations is to represent the interests of their member corporations. Consequently, there is a *high match of interests and goals* for partial link (b). Industry associations will follow the stand taken by *top management* on EMS no matter whether they favor sound EMS practice, or are noncommittal. On the other hand, industry associations have the same desire as managers to present member companies in a positive light, and will provide EMS implementation support for corporations as soon third party with EMS implementation as soon as it is perceived necessary due to third party requirements are accepted. Industry associations will adopt EMS interests peculiar to *environmental management* departments and represent their views to third party stakeholders.

Match of information needs: The tightly interwoven interests of industry associations and management leads to their information needs being similar as well. In order to represent their interests, industry associations will promote the information needs of corporate managers concerning EMS practices and methods. On the other hand, dissemination of broad and specific information to corporate members is an important part of industry association activities. This includes questions concerning the integration of EMA tools into environmental management systems. Hence, a *high match of information needs* can be found in this context.

Employees

a) Partial Link (a): Government – Employees

Match of interests and goals: Apart from the general interests of *commerce agencies* in high employment levels, in the context of EMS, including health and safety aspects, government agencies (mainly health agencies and *environmental agencies*) have an interest in sound working conditions throughout industry. For individual employees, health and safety issues are only one aspect of their interests as they are concerned about security and equity in their employment, and receiving a mix of financial and other rewards from their jobs. Thus, a *moderate match of interests and goals* appears here.

Match of information needs: Employees and government agencies are both interested to find out the measures corporations adopt in order to ensure safe and sound working conditions. However the information needs of government remain at a rather general level, whereas employees are concerned with information about their individual company. In addition, employees seek information on health and safety measures, but also on a range of other aspects of their employment related to the working conditions in their working places. Thus, only a *rather loose match of information needs* can be identified.

b) Partial Link (b): Management – Employees

In the context of environmental, health and safety management systems, employees, and EMA the main relevant management departments include environmental management, and production and logistics management.

Match of interests and goals: In general, management looks for motivated and satisfied employees, while employees are interested in stable and equitable employment opportunities. Safe and sound working conditions match both of these interests. Thus, *production and logistics managers*, being responsible for processes dealing with harmful substances or dangerous processes, and *environmental management,* have an interest in providing appropriate working conditions. However, there will only be a limited willingness to pay for work safety issues, as expenditure does not directly contribution to profitability (although there are indirect advantages associated with a safe and healthy workforce). One other issue, related to EMS in general, is that employees are closely involved in EMS practice throughout the corporation and have an interest in there being clear EMS processes and tasks. This coincides with the interests of environmental managers in implementing an effective and efficient environmental management system. Overall, this leads to a *rather high match of interests and goals*.

Match of information needs: Employees are keen to receive information about actual work place conditions e.g. in terms of air quality. In addition, they may wish to find out about the measures undertaken to avoid incidents that could harm to employee health and safety. PEMA tools have a considerable potential to provide such data. These are similar information needs to those of managers concerned with implementing and running environmental, health and safety management systems. However, production and logistic managers will not always be willing to communicate such information to employees. Nonetheless, there is a *rather high match of information needs* between management and employees.

Creditors/Insurance Companies

a) Partial Link (a): Government – Creditors/Insurance Companies

Match of interests and goals: For EMS, government agencies and creditors/insurance companies do not show a strong overlap in their interests. This is in line with previous observations about other intermediate elements (see e.g. Section 5.6.1). Both sides may have a general interest in sound environmental management practices that are, however, supported by different motivations. While *environmental agencies* would like to see environmental aspects integrated into mainstream business decision processes, and *commerce agencies* would welcome approaches to environment related aspects of business that improve the financial bottom line, the interest of creditors and insurance companies in corporate EMS lies in the efficient management of environmentally-induced risks. Thus, there is a *rather low match of interests and goals* in this context.

Match of information needs: This rather low match of interests is also reflected in the match of information needs. Creditors and insurance companies look for information about the results and methods of particular EMS aspects of environmental risk management. Government agencies are interested in more general and comprehensive information concerning the quality and methods of corporate EMS throughout industry. This leads to a *low match of information needs*.

b) Partial Link (b): Management – Creditors/Insurance Companies

The main management departments involved in EMS and EMA, and concerned with creditors/insurance companies, are financial management, environmental management, and top management.

Match of interests and goals: Banks and insurance companies are external stakeholders in corporate environmental management systems (Schrama & Verstegen 1995). The major goal of banks/insurance companies, in relation to EMS, is to encourage corporations to address environmental risks in an efficient way, in order to avoid credit failure or insurance losses. This interest is matched by the interests of *top management* and *financial management* who want to secure capital flows and profitable operations. However, there may be some conflict over the relevance of environmental risks for calculating premia and interest rates on loans. *Environmental management* also need to reduce corporate environmental risks but their interests in EMS extend beyond this special aspect of environmental management. Thus, taken together, there is a *moderate match of interests and goals*.

Match of information needs: Creditors/insurance companies would like information about how environmental issues and risks are dealt with in the client company. *Top managers* are keen to receive this kind of information. *Environmental managers* need much more detailed and comprehensive information related to EMS. All things considered, a *moderate match of information needs* in relation to EMS can be found between creditors/insurance companies,

and corporate management. It is worth noting that EMA tools, when integrated with a comprehensive EMS, do help to fulfill the information needs for risk assessments.

(Environmental) NGOs

a) Partial Link (a): Government – (Environmental) NGOs

Match of interests and goals: Both *environmental agencies* and environmental NGOs have a critical interest in seeing corporate environmental performance improved through EMS. Environmental NGOs may look at corporate environmental performance from a different angle and make demands for pollution reduction in excess of those that are economically viable. This can lead to conflict with *commerce agencies* because they only encourage environmental protection if it improves the corporate financial bottom line. Hence, NGOs and government agencies have a fundamental interest in sound corporate environmental management practice. The rather close match of interests and goals identified here, is, however, moderated by conflicts because of different views of the role of corporate environmental management.

Match of information needs: Environmental NGOs and government agencies seek information about how, and the extent to which, corporate EMS are implemented and integrated into mainstream business decision making. Environmental NGOs are even keener than environmental agencies to obtain information about the effectiveness of EMS in terms of improved corporate environmental performance. Taken together there is a *high match of information needs* between these two stakeholder groups.

b) Partial Link (b): Management – (Environmental) NGOs

The most important management departments, in the context of EMS, environmental NGOs, and EMA, are top management, environmental management, and corporate marketing and PR.

Match of interests and goals: The relationship between environmental NGOs and management is traditionally one of conflict. Although both sides may have a general interest in good EMS practice, environmental NGOs aggressively challenge companies to improve their environmental performance. Conflict is often over what is considered “good” EMS practice. With environmental NGOs often using public pressure to support their views there is considerable potential for conflict with the *top management* aims of ensuring corporate profitability and survival, as well as with *environmental and PR managers* that wish to build up a green image by showing that their EMS practice and environmental performance are acceptable, or excellent. Thus, in spite of the tendency towards cooperation between corporations and environmental NGOs in the recent years, the overall *match of interests and goals* remains *rather low*.

Match of information needs: Environmental NGOs are not so much interested in obtaining information referring to the detailed processes and EMS tools implemented within a given

corporation. Instead, they want information about the effects of EMS on corporate environmental performance, which points them in the direction of external ecological accounting and reporting. This difference leads to *a low match of information needs* with management departments charged with the task of implementing and running environmental management systems, in particular the environmental department.

Further Results and Conclusion

Anchorage: As already depicted in Figure 21, anchorage is found to be at a medium level both within government agencies and amongst management departments. Looking at partial link (a), it is mainly the environmental agencies that are concerned with EMS. However, with the growing importance of environmental issues, commerce agencies are also becoming concerned to promote economically sound corporate environmental management practice. On the corporate side, environmental management departments have the greatest involvement in EMS. However, even where there is no partial relationship with the relevant intermediate stakeholders, contemporary environmental management systems engage all vital management departments in the value chain. This fact underpins the anchorage of partial link (b) via EMS.

Overall suitability: When looking at the different intermediate stakeholders there is considerable variation in the match of interests and information needs towards government. The stakeholder groups showing a rather high match of interests with government agencies are (international) standardization organizations and environmental NGOs, while industry associations and employees reveal only moderate matches. Creditors/insurance companies exhibit an even lower match. In addition to their rather high match of interests, (environmental) NGOs have a high match between their information needs and those of government agencies. The same high match is found with industry associations. Standardization organizations turned out to have a moderate match, whereas the match of information needs with creditors/ insurance companies and employees remains poor. As a result, looking at partial link (a) from a government perspective (environmental) NGOs, industry associations, and standardization organizations turn out to be the most suitable stakeholder groups.

Looking at the stakeholders involved in partial link (b) with management, it becomes clear that because of the poor match between interests and goals and information needs found between NGOs and management, this intermediate stakeholder group is not attractive for EMA promotion via EMS. The remaining two potentially suitable stakeholder groups, standardization organizations and industry associations, do have high matches with the interests and goals and with the information needs of management. For employees the reverse of the findings for NGOs is true, demonstrating good suitability on partial link (b) but low matches on partial link (a). Creditors/insurance companies remain somewhat in no man’s land.

As the result of the structural analysis of the indirect link via EMS standardization organizations, and industry associations appear to be the two crucial intermediate stakeholder groups for government to address corporate EMA indirectly via EMS. The *overall suitability* of this

indirect link, however, can only be judged as *moderate*. This is mainly because of two reasons. Firstly, as already discussed above (see Section 4.1.2.), environmental management systems have only a medium level of method proximity with EMA, because they are more concerned with organization and process related issues than with specific EMA tools. Secondly, one of the crucial intermediate stakeholder groups, industry associations, has often adopted reactive positions in relation to environmental aspects of business, by trying to defend status quo. Nonetheless, in spite of this limited suitability importance of the indirect link via EMS should not be underestimated. Environmental management systems can play an important role in EMA implementation by acting as a kind of organizational framework or carrier for EMA tools. Taking this important aspect into account, the indirect link via EMS can be judged as necessary but not sufficient for effective promotion of EMA by government.

Operative status: Looking at the current operative status of this link, the paths via the two suitable intermediate stakeholder groups, industry associations and standardization organizations, which have been found suitable show rather different results.

Partial link (a) between government agencies and standardization organizations is not covered by government programs or guidelines encouraging standardization organizations to integrate EMA into EMS standard setting. However, governments have acted in close cooperation with standard setters when issuing their own standards. For example the EU, as a supranational government agency, when issuing the EMAS framework cooperated closely with standardization organizations, such as the British Standards Institute which had already issued an EMS standard (BS 7750). Therefore, this partial link remains in limbo between an operative and an inoperative status.

Partial link (b), between standardization organizations and management, is clearly covered by existing EMS standards with EMA connections. The most outstanding example for this partial link being operative is the ISO 14.000ff. series.

When the operative status of the path via industry associations and EMS related to partial link (a) is considered, no evidence of cooperation between government agencies and industry associations could be detected for specific programs bringing EMS and EMA together. Industry association concern with lobbying governments does not, by itself, make this partial link operative. Neither is partial link (b), between industry associations and their corporate members, covered by guidelines issued by industry associations about EMS and addressing EMA.

5.6.6 Indirect Links via Quality Management Systems

Quality management systems accept that the customer of a product is the final judge of a corporation's performance and that quality products are the hallmark of customer satisfaction (Welford 1996, 37). Corporations that pollute the least for a given level of customer satisfaction have the highest quality products and services (McInerny & White 1995, 4). Total quality management (TQM) systems and total quality environmental management (TQEM) systems

have been introduced to encourage quality improvement in corporate products, operations and management. If a corporation accepts the principles behind TQM, improvements in environmental quality would automatically be integrated into products, because waste and pollution (non marketable products) represent poor quality and mismanagement.

The adoption of stringent quality standards is a means to the end of better relations with stakeholders, higher market share, and increased profitability. Many corporations have therefore recognized the importance of managing technical quality and the costs of quality. The advantages of high quality work themselves out through market stakeholders, such as consumers, suppliers and financiers, rather than through government agencies. International standards for quality management such as the ISO 9000 ff. series are adopted by management on a voluntary, not a regulated basis. Corporations wish to retain the support of their market stakeholders, including those who take environmental considerations into account and encourage employees to adopt the quality management philosophy through appropriate education and training. Independent third party certification of corporate quality management systems adds another veneer of credibility to the favorable perception of quality corporations.

Figure 22 provides a summary of the analytical results for stakeholders with an interest in quality management systems that might also be concerned about EMA, including:

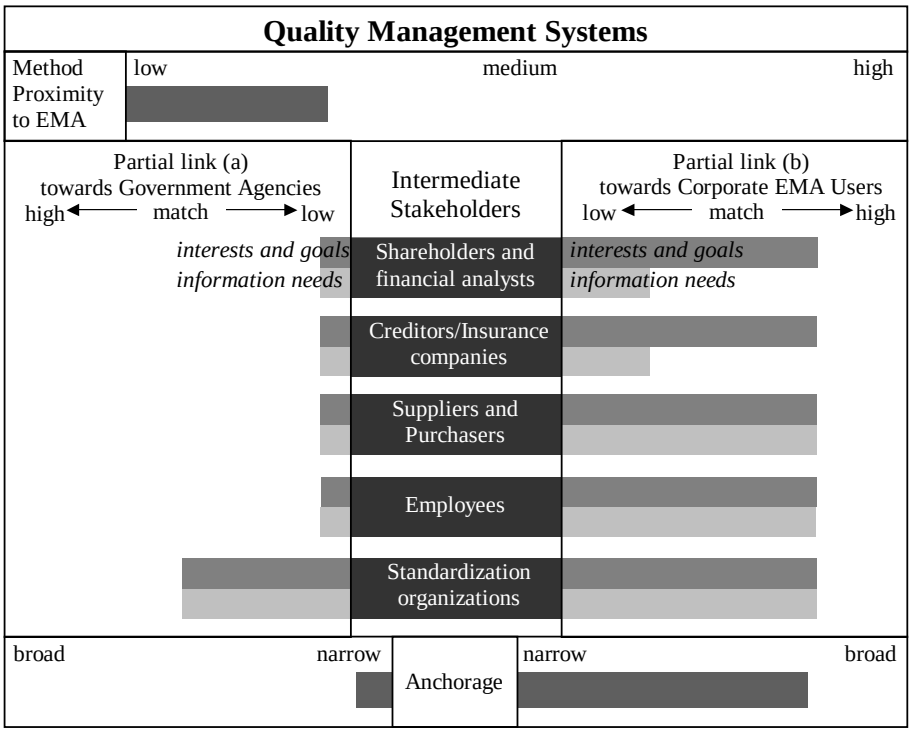

Figure 22. Suitability of the indirect link via quality management systems

- Shareholders and financial analysts (Section 5.6.6);
- Creditors/insurance companies (5.6.6);
- Suppliers and purchasers (5.6.6);
- Employees (5.6.6); and
- Standardization organizations (5.6.6).

Shareholders and Financial Analysts

a) Partial Link (a): Government – Shareholders and Financial Analysts

Match of interests and goals: Shareholders act as market agents who supply funds to corporations, and look for a financial return in exchange. Their interests in corporate quality management systems are motivated by the need to obtain an indication about the degree to which product quality related opportunities and risks are addressed and controlled by management. In this context, there is only a *very general loose match* with the interests of *commerce agencies* in corporate growth and competitiveness.

Match of information needs: The low overlap of interests and goals is also reflected in a *poor match of information needs* between shareholders and financial analysts, and government agencies. This is mainly because of the fact that government agencies are not overly concerned with quality management issues and thus will restrict themselves to very general information on the topic.

b) Partial Link (b): Management – Shareholders and Financial Analysts

Relevant management departments that deal with shareholders and financial analysts and are concerned with quality management systems and EMA mainly include finance and top management.

Match of interests and goals: *Top and finance management* wish to secure equity funds at the best rate for the corporation. The goals of management, shareholders and financial analysts are *rather well matched* on this issue. Shareholders and their advisers consider the reputation for quality of the corporations they invest in. Poor environmental quality represented by high levels of corporate waste and pollution and a low level of eco-efficiency will direct the attention of financial analysts and institutional investors towards the potential for financial losses from inefficient, uncompetitive practices, as well as from regulatory penalties and potential clean-up settlements. Implementation of QMSs can act as an indicator of the fact that these financial risks are at worst being addressed and at best being controlled. Environmental quality issues act as one consideration in this context.

Match of information needs: QMSs organize and structure management of the quality of processes and products, possibly including environmental quality. The method for information collection is, however, very different from EMA (e.g. Walton 1986, Schaltegger & Burritt 2000). Although the existence of a quality management system may indicate that

costs of poor quality are being reduced to the potential advantage of investors, shareholders and financial analysts are mostly interested in information at a higher level of aggregation than management. The information needs are therefore *not well matched.*

Creditors and Insurance Companies

a) Partial Link (a): Government – Creditors and Insurance Companies

Match of interests and goals: The *low match of interests and goals* between government agencies and creditors and insurance companies for environmental management systems (see Section 5.6.7.) is also valid in the context of quality management systems. The match is even lower because there is no corresponding government agency related to quality issues in the way that there are environmental agencies for environmental protection.

Match of information needs: Government agencies have little access to and influence on product quality issues within the contractual relationship between creditors and insurance companies. Thus, there is a *very low match of information needs* related to quality management systems, even if commerce agencies may wish to receive information about the extent of which sound quality management practice is conducted throughout industry.

b) Partial Link (b): Management – Creditors/Insurance Companies

Accounting and finance and top managers are they main company internal stakeholders concerned with QMS.

Match of interests and goals: Creditors supply finance and insurance companies protect corporations against loss of capital through the coverage of insurable risks. Both conduct their business with a view to profitable relationships with their corporate customers. The presence of QMSs provides banks and insurance companies with some indication that corporate managers will be made aware of, and will then take steps to eliminate, risks associated with low quality processes and products. Where these risks relate to environmental quality, banks and insurance companies might consider reducing the risk premium or giving up the demand for environmental audits. EMA represents a form of environmental quality information system that will be considered in the light of relative costs and benefits. In this context there is a *medium to good match of goals* between these financial institutions, the corporate accounting and finance department and QMS.

Match of information needs: Financial institutions will seek information about the thoroughness with which QMS is conducted in their client companies. In addition they will like to receive figures about the financial effectiveness of QMSs. Top and financial management have similar interests and are interested in the impact of quality management on the financial bottom line.

Banks and insurance companies have encouraged the introduction of QMS standards, particularly ISO 9000 and ISO 10000, as a means of confirming corporate system or product

compliance with a set of quality management procedures. A relationship of EMA with quality management systems is possible through, e.g., measurement of the financial effectiveness of the quality system (ISO 9004). Financial effectiveness is assessed either by examining the costs of quality associated with precautionary and reactionary expenditures, the costs of processes that are required to meet the needs of customers, or the cost of poor quality (tangible - e.g. rework, repair - and intangible - e.g. lost opportunities, lost demand). These assessment measures of financial effectiveness could be developed to act as pro forma information sources for environmental quality where environmentally-induced financial impacts are significant.

In spite of some similarities the *match of information needs* between creditors and insurance companies and management, through QMS links with EMA is, at present, *quite low*. QMSs mainly structure processes, and QMS related information systems are mostly not linked with EMA.

Suppliers and Purchasers

a) Partial Link (a): Government – Suppliers and Purchasers

Match of interests and goals: Suppliers and purchasers have contractual relationships with each other. These private business relationships are not subject to influence from government agencies as far as QMS is concerned. *Commerce agencies* are keen to ensure that competitive relationships are maintained, and economic growth is encouraged. Suppliers and purchasers, on the other hand, have little direct involvement with government but they have to operate within the legal framework that government establishes. They seek stability and certainty in this framework. Thus there is a *very low match of interests and goals* in this context.

Match of information needs: As a logical consequence of this low match of interests, there are *no remarkable mutual information needs* between government agencies, suppliers and purchasers, that would exceed any very general level.

b) Partial Link (b): Management – Suppliers and Purchasers

Corporate management divisions involved in QMS and EMA, and concerned with suppliers and purchasers mainly include R&D and design departments, marketing and sales management, production management, and logistics.

Match of interests and goals: QMS tends to be driven by demand pressures from customers. If retail customers demand high quality final products then corporations must produce these products if they are to retain a competitive edge in the market. In turn, corporations may demand high quality intermediate goods from their suppliers. Thus, suppliers and purchasers represent two sides of the market and both have a strong interest in the quality of goods bought and sold and related QMSs. Consequently, their goals and

those of suppliers and purchasers may be *rather highly matched* in relation to QMS. However, here again environmental quality issues represent only one consideration amongst others.

Match of information needs: How suppliers can demonstrate that they provide high quality products to purchasers is the essence of quality management standards such as ISO 9000. These international standards identify various functions in corporations (e.g. design, purchasing, production) that need quality to be controlled. They also include a set of requirements as to how control should be exercised in each of these functional areas, including personnel, procedural, record keeping and resource requirements. Hence, the structure behind information needs (e.g. documentation, records and data) of quality management systems, for which independent certification is sought, is prescribed by the international standard. In their contracting processes suppliers and purchasers can specify the need for certain quality environmental outcomes and the need for monitoring of information about these environmental aspects of quailty (e.g. waste reduction) as an integral part of the quality management system. This means that for the management supplier relationship the *information needs are highly related* and there is a potential strong correlation with the information provided by an EMA system.

Employees

a) Partial Link (a): Government – Employees

Match of interests and goals: As for the other intermediate stakeholders there is no particular interest of any government agency related to employees *and* quality management issues combined. Thus, *no unexpected match of interests and goals* could be found.

Match of information needs: Analysis of the *match of information needs* produces the same *poor* results. As both, human resource management and quality management issues are more or less internal company matters, no overlap of information needs with government agencies could be detected for EMA.

b) Partial Link (b): Management – Employees

Managers concerned with quality management, employees, and EMA include all the management departments along the operative part of the value chain, as well as R&D managers, quality managers, and human resource managers.

Match of interests and goals: QMS requires that quality is the responsibility of everyone within the corporation and that there is continual measurement, analysis and improvement of performance (Welford 1996, 37). The interest of employees in QMS is partly related to the education and training they need to undertake if they are to promote and maintain quality products and systems within their corporations. Quality training is just one aspect of an effective QMS program such as that required under the ISO 9000 standard. Corporate

management may require new employees to be familiar with quality management requirements, or they may provide training programs for current employees. Goals of employees and management are expected to be identical for quality products, processes and management systems. QMS embodies a management philosophy that stresses the importance of motivating employees through a sense of higher purpose by providing customers with better quality products (Bennett & James 1999, 32). Corporations with a reputation for high quality can therefore also increase the intrinsic satisfaction of employees with their job and this can increase productivity through better motivation. The *goal match* is thus *quite high*.

Match of information needs: QMS deals with the organization and structuring of quality improvement processes and addresses the need for information about environmental impacts. The match of information needs between employees and management depends on the management group addressed. It furthermore depends on the particular aspect of quality that an employee is responsible for and this in turn depends on the corporate function being considered (e.g. design, production). Environmental quality will therefore mainly be of interest to employees dealing with environmentally relevant issues. A general cross-connection exists with EMA as it can act as a source of verification that high quality environmental outcomes are occurring and that environmental concerns are being supported through continual improvement in quality management. The *match of information needs* between employees and management, concerning quality management and EMA, can be assessed as *medium to high* depending on the function. However, the match is lower than with EMS because environmental issues are only one issue that is indirectly addressed as part of QMS.

Standardization Organizations

a) Partial Link (a): Government – Standardization Organizations

Match of interests and goals: Standardization organizations are often established by industry to reduce costs of securing comparable information for market actors. Their interest in QMSs is in supporting the exchange of information between suppliers and customers concerning the quality of products, production processes, and organizational procedures. From an EMA perspective the match of goals affects the reduction of transaction costs and the regulation of processes through standardization in general, and environmental information management in particular, as one partial aspect of QMS. Therefore, a *medium match* exists with the interests of *commerce agencies* in facilitating transactions and supporting economic development as well as with the interests of *environmental agencies* in enhancing environmental quality.

Match of information needs: The mediocre overlap of interests and goals is also reflected in a *medium match of information needs* between standardization organizations and government agencies. In spite of some contextual overlap with commerce and environmental agencies government is not overly concerned with quality management issues and thus will restrict itself to general information on that topic.

b) Partial Link (b): Management – Standardization Organizations

Relevant internal departments concerned with QMS and EMA and involved with standardization organizations are mainly represented by production, human relations, accounting, and quality management.

Match of interests and goals: *In relation to QMS and EMA the production, human relations, and accounting departments* are concerned with organization and communication of the quality of the output and the associated financial effects of quality variation. Quality standards provide a framework for the introduction, auditing, and common understanding of quality management. Thus the goals of management and standardization institutions are *relatively well matched*, even if environmental aspects do not play a key role in this context.

Match of information needs: In order to achieve a widespread application of their standards, standardization organizations need a good understanding of the environmental concerns and information needs of management in relation to quality issues. The information needs of management are in turn addressed and structured through quality management standards. However, whether environmental aspects are included within the information flows of quality management systems depends on the individual corporate implementation plan and policy. Overall, the QMS–EMA related information needs are *rather closely matched* for standardization organizations and management.

Further Results and Conclusion

Anchorage: With the exception of the medium match between goals and information needs with standardization organizations the anchorage at the focal point of government is nonexistent, whereas quality management systems are fairly well embodied in the management departments dealing with purchase, production and sales.

Overall suitability: With the single exception of standardization organizations, quality management systems show a low potential for linking government policies with EMA. The match of goals and information needs is mostly very low between government and the stakeholders concerned with the intermediate element quality management systems.

On the management side, all market stakeholders, including standardization organizations, exhibit a high correlation between their goals and the goals set down by management for QMS. The match of information needs is very high between management and standardization organizations, employees, suppliers and purchasers. However, bearing in mind the desire to promote EMA, it is important to note that environmental issues do not represent a core concern in any of the QMS related interests and information needs. In summary, the only stakeholder that can be assessed as being suitable for establishing an indirect link between government and management via quality management are standardization organizations.

Any attempt by government to promote environmental protection and improvement through the QMS–EMA link, needs to be mindful of several potential problems. Firstly, there is no government agency that deals directly with quality and so the question arises as to who would have to deal with the promotion of EMA via quality management systems. Secondly, under the established international standards, corporations can set their own target levels for improvement in quality performance and can adopt the time horizon that suits their own needs. This management discretion means that government would need to ensure that improvements were targeted, monitored and seen to have been achieved. Finally, government needs to be aware of the more direct approach for addressing environmental quality, through accounting systems and environmental management systems. In the absence of EMS, government could be advised to promote improvement in environmental quality through QMS. Given the vastly higher number of certified quality management systems in place throughout the world this could be a useful strategy for promoting environmental protection in general. However, to establish a link with EMA would require a significant change in the contents of quality management standards. This indirect link therefore is assessed with a *low overall suitability.*

Operative status: Referring to partial link (a) no government EMA promotion programs involving quality management systems could be found. The partial link is therefore *not operative.* In contrast, standardization organizations have issued standards (such as the ISO 9000 series) for corporate quality management systems that address environmental issues as well. Thus, partial link (b) is *operative*.

5.6.7 Indirect Link via National Environmental Accounting and Reporting

National environmental accounting systems have a wide geographical (or spatial) focus and usually classify and record dated physical information about a nation, a supra-national organization (such as the EU) or a region. In contrast with *statistical reports* (such as State of Environment Reports: SOERs), where data are collected centrally by a statistical office, macro-ecological accounting systems aggregate information submitted by corporations that report to a government agency. National *environmental statistics* are *not considered* in this section as the UN expert group has excluded them from the investigation. Instead, a central statistical office at a macro level collects the data. Macro-environmental accounting systems, whether supra-national or regional, are examined here using the term “national environmental accounting”. They provide the data base for the communication of environmental impacts in reports commonly referred to as Pollutant Release and Transfer Registers (PRTRs), and sometimes they deal with information about the state of the environment. This section addresses PRTRs because their main focus is on the aggregation of corporate information.

“A Pollutant Release and Transfer Register (PRTR) is defined as a national environmental database of harmful releases to air, water, land and waste. These databases contain information on releases (emission data) of polluting substances, reported annually by individual facilities. However, they may also contain information on releases from sources

other than large industrial establishments (http://www.europa.eu.int/comm/-environment/ippc/eper.htm). A PRTR, or Pollutant Emission Register (PER), as referred to in the IPPC Directive (see http://www.europa.eu.int/comm/environment/ippc/index.htm), is a comprehensive national emission inventory.

The information is either collected by a government agency, usually the environmental or statistical office, or the information is reported by the corporations themselves direct to a government agency, or via an interactive government internet site. Apart from internal government stakeholders, such as government agencies, users include:

- NGOs (section 5.6.7);
- neighbors (section 5.6.7);
- industry associations (section 5.6.7); and
- international organizations (section 5.6.7).

The *media,* as another interested stakeholder group, is not specifically discussed here as they mainly act as intermediaries between the general public (represented by neighbors), NGOs and industry associations, rather than as an intermediate between government and corporations. Users of external corporate physical environmental accounting and reporting, such as *employees,* have already been analyzed in the relevant section (5.6.3). *Other national governments* interested in benchmarking have similar goals and information needs to international organizations and are not, therefore, analyzed in a separate section either.

Figure 23 summarizes the match between basic goals and information needs of the relevant stakeholders concerned with national environmental accounting, and the goals and information needs of government and management.

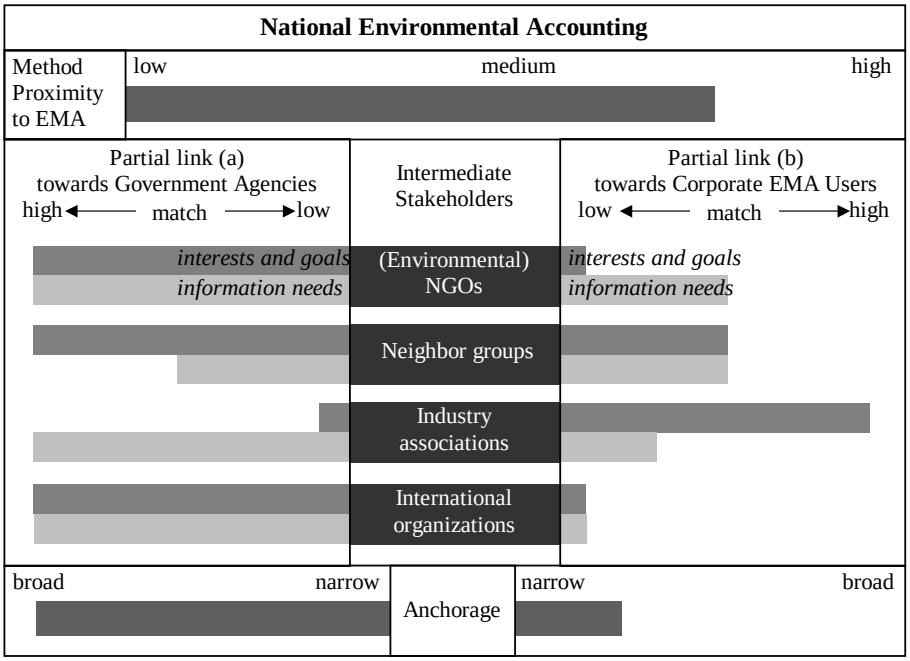

Figure 23. Suitability of the indirect link via national environmental accounting.

The links between government, national environmental accounting and EMA are examined for each relevant stakeholder group in the following sections.

(Environmental) Non Governmental Organizations (NGOs)

a) Partial Link (a): Government – NGOs

Match of interests and goals: Government environmental agencies have the strongest interest in national environmental accounting. To monitor the environmental situation in the regulated area *environmental agencies* need good information about environmental impacts and the state of the environment. National environmental accounts provide the best information framework for such an overview. Also environmental NGOs are highly interested in documentation of, and communication about, the state of the environment and corporate environmental impacts. The overlap of interests and goals is therefore very high. This is also documented in the operative status of this link.

Match of information needs: The information needs of environmental agencies are mainly concerned with compliance issues. NGOs are more interested in information on the state of the environment and the development of pollution release registers. However, documentation of the effectiveness of existing policies and activities is also a core aspect of information gathering for the environmental agency, and the information is used as a basis for new policies. The match of information needs is therefore assessed as high.

b) Partial Link (b): Management – NGOs

Match of interests and goals: For partial relationship (b) between the interests and goals of NGOs and management a low to medium degree of matching exists. Apart from some progressive corporations, management is often not particularly interested in the publication of environmental impacts and its use for PRTRs as this allows for identification of 'laggards' and 'leaders' and for public assessment of legal compliance. Furthermore, management is often reluctant to make these disclosures as the information can be regarded as commercially sensitive. Progressive companies, however, may be more interested in the public disclosure of their performance in official documents and databases.

Match of information needs: The match of information needs between NGOs and management is moderate as management is interested in detailed information whereas the focus of NGOs is usually on aggregated company information and its comparison over time and with other polluters. Also, NGOs require comparable, standardized data as well as information about the releases of predefined pollutants, whereas management prefers to retain its discretion over the kind of information it publishes, preferring disclosure on a case by case basis.

Neighbors

a) Partial Link (a): Government – Neighbors

Match of interests and goals: The match of interests and goals between neighbors of production sites and local environmental agencies is high as it is up to the latter to support healthy living conditions for citizens and to publicize non-compliance with environmental legislation. Federal agencies may, however, be dealing with national rather than local environmental problems that tend to be the main concern of neighbors.

Match of information needs: The match of information needs between government and neighbors is quite high although national environmental accounting is mainly a topic for federal government agencies which are interested in a higher level of aggregated information than neighbors. However, in contrast to aggregate statistical approaches PRTRs allow sufficient disaggregating to site level information to serve the information needs of neighbors.

b) Partial Link (b): Management – Neighbors

Match of interests and goals: At first glance management may not be so much concerned about physical environmental data published at a national level. However, the current PRTRs in Australia, Denmark, USA, and the UK also include disaggregated data on a site level. Therefore, as with NGOs, the match of interests and goals between neighbors and management is low. Most corporations will prefer little public transparency about local environmental impacts in the neighborhood of their production sites. Progressive companies, however, may be interested in disclosure to establish good neighborhood relationships.

Match of information needs: For national environmental accounting the match of information needs between neighbors and management is moderate as most management departments, with the exception of site management, are interested in detailed information on products and specific production activities whereas the focus of neighbors is usually on aggregate corporate information and its comparison over time and with other polluters.

Industry Associations

a) Partial Link (a): Government – Industry Associations

Match of interests and goals: The match of the interests and goals of industry associations and government agencies is low. *Commerce agencies* share an interest in supporting the competitiveness of the economy but national environmental data will mostly not play a significant role in achieving this goal. Environmental agencies and industry associations share an interest in having a reliable basis for negotiations about the acceptable level of environmental impacts, the effectiveness of policies and the necessity of new governmental activities. However, the interests of both parties are generally in opposition to each other.

Match of information needs: Industry associations representing corporations in political lobbying processes are interested in similar data to government agencies. Firstly, they want to understand the arguments of government and, secondly, they want to have a reliable basis to develop their own proposals for industry based environmental policies. Environmental agencies prioritize geographical data, whereas industry associations may be more interested in sectoral data. In summary, however, the match of information needs is high.

b) Partial Link (b): Management – Industry Associations

Match of interests and goals: Industry associations representing the whole industry and not just one company have a stronger interest in physical environmental data aggregated at a national level than data for individual companies. The match of interests and goals is nevertheless very close - firstly, because PRTR data is also published (e.g. the Toxic Release Inventory in the US) or at least available (e.g. Pollution Inventory in the UK) in a disaggregated form and, secondly, because the match of interests and goals between management and industry associations is generally very high as the latter are formed to lobby on behalf of corporate interests.

Match of information needs: The match of EMA related information needs of management with the more policy oriented information needs of industry associations is medium to low because of very different levels of aggregation required.

International Organizations

a) Partial Link (a): Government – International Organizations

Match of interests and goals: Looking at partial link (a) the goals of international organizations and government are closely aligned for national environmental accounting. Their general concern is with improving the standard of living in economic, environmental and social terms. National environmental accounting systems provide a core data basis for policy design and communication.

Match of information needs: Also the information needs of government agencies and of international organizations are closely matched. Some differences may exist concerning compliance related data or the specific geographical focus.

b) Partial Link (b): Management – International Organizations

Match of interests and goals: For national environmental accounting the relation between welfare oriented international organizations and the EMA interests of management is similar to the relation between government and management or, in other words, between the regulator and the regulated party. This match is therefore low.

Match of information needs: The match of information needs between EMA users and national environmental data in physical terms is *very low* for international organizations because of very different aggregation levels and contrasting goals.

Further Results and Conclusion

Anchorage: Anchorage of the indirect link via national environmental accounting is *very good on the government side* and *moderate on the management side* as it mainly addresses the environmental department. The anchorage can, however, be improved if the data is also available in a form useful to site management for benchmarking purposes. Furthermore, if single pollutants are published, product and R&D and design management may also find EMA information and the existence of the national environmental accounting system to be of use.

Overall suitability: For national environmental accounting the match of interests and information needs between government and intermediate stakeholders is very good. On the other hand, the match between EMA users and intermediate stakeholders is medium. In cases where national environmental accounts also provide publicly available data about production sites, corporate environmental management departments and site management may want to use it for benchmarking purposes.

Given the rather high method proximity to EMA, the excellent anchorage on the government side, and the potential to improve the medium anchorage and match of interests on the management side, the indirect link via national environmental accounting is *medium to high* and promises further progress in the promotion of EMA. The *most attractive stakeholders* to involve in the promotion of EMA by government are *NGOs and neighbors*.

Operative Status: This indirect link with government and management is *operative* for NGOs. Although examples establishing the link between neighbors and management exist, no government has issued direct guidelines involving neighbors in the promotion of EMA. However, for example with the Community Right to Know Act and the Toxic Release Inventory in the US, government serves as an advocate of neighbors to establish the link between neighbors and management.

Furthermore, a few of international organization initiatives involving governments have helped to establish the operative status of this indirect link. Since 1993, as a follow-up to the UN conference on Environment and Development (UNCED) in Rio de Janeiro (1992) the OECD and UNEP have been encouraging national governments to establish PRTRs and have provided guidance on their implementation (see, OECD 1996, OECD 2000, http://irptc.unep.ch/prtr/, http://www.europa.eu.int/comm/ environment/ippc/eper.htm).

Furthermore, the Parties to the Aarhus Convention agreed in 1998 to the establishment of national PRTRs with publicly accessible emissions data (http://www.mem.dk/aarhus-conference/). Currently information on pollution releases of corporate activities is required in:

- Australia: National Pollutant Inventory – (NPI, see e.g., http://www.environment.gov.au/ epg/npi/index.html)
- Denmark: Green Accounting Law (see e.g., http://www.mst.dk/actici/11000000.htm)
- the United Kingdom: Pollution Inventory (PI, former Chemical Release Inventory CRI, see e.g., http://146.101.4.38/wiyby/html/introduction.htm).
- the United States: Toxic Release Inventory (TRI, see e.g., http://www.epa.gov/tri/)

With the decision of the Commission of 17 July 2000 the EU has introduced the European Pollutant Emission Register (EPER, see e.g., http://www.europa.eu.int/comm/ environment/ ippc/eper.htm). The underlying EMA-relevant policies will be discussed in workbook 3.

5.6.8 Indirect Link via National Economic Accounting Systems

National economic accounts represent an attempt to measure in money terms the total amount of economic production in a country and to provide measures of income and expenditure. National economic accounting systems classify, measure, collect and disclose aggregate information which is predominantly used by government and which may be of interest to other stakeholders. National economic accounting statistics are gathered using the United Nations System of National Accounts (UN SNA) (UN 1993).

There are many difficult measurement issues in the production of national economic accounting information (e.g. how to adjust figures for a decline in the purchasing power of money over time; whether and how seasonal adjustments should be made; the application of smoo-

thing techniques through the application of weighted moving averages; and the exclusion of interest received and paid as affecting income or expenses when calculating gross domestic product). These problems apply equally when the figures are broken down by region or by sector.

Stakeholders with a particular interest in aggregate statistics are those most likely to be concerned about national economic accounting statistics and possible links with corporate EMA. They include:

- Industry associations (Section 5.6.8);
- (Environmental) NGOs (Section 5.6.8); and
- International organizations (5.6.8).

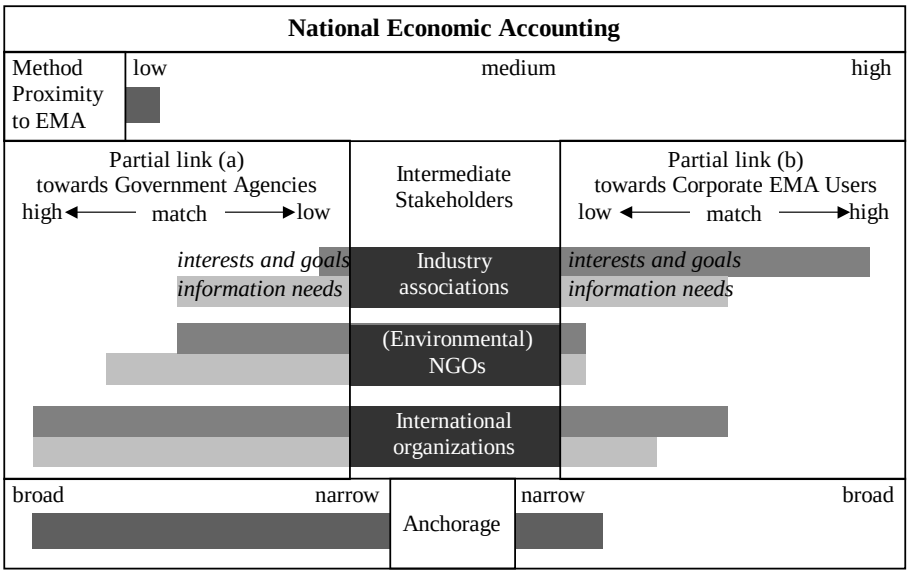

Figure 24. Suitability of the indirect link via national economic accounting.

Figure 24 shows the findings for the suitability of the indirect link via national economic accounting for government EMA promotion. The following subsections provide the discussion of the different intermediate stakeholders. The anchorage of the link will be addressed in Section 5.6.8.4.

Industry Associations

a) Partial Link (a): Government – Industry Associations

Match of interests and goals: Industry associations are largely passive recipients of national economic accounting information that has been developed based on the UN SNA. There is little interaction between government and industry associations over the national economic information structure, except at the times that SNA is thoroughly revised – 1968 and 1993 being the most recent occasions – when outside opinion is sought. As government agencies, in particular *commerce agencies*, are more interested and involved in national accounting issues, there is only a *low match of interests and goals* with industry associations.

Match of information needs: Industry associations use national economic accounting information to protect the interests of their members through negotiations with government. Commerce agencies have a high need for aggregated information concerning the economic activities in their administrated areas. There may be considerable differences in interpretation of the figures by government agencies and industry associations, because information needed by the two groups from national economic accounting information is based on different motivations. Thus there is a *moderate match of information needs*.

b) Partial Link (b): Management – Industry Associations

On the corporate side mainly top and accounting and finance management are concerned with national economic accounting, industry associations and EMA.

Match of interests and goals: One important goal of industry associations, which assists their members, is to lobby government on behalf of their members. Clearly, the goals of industry associations and their corporate members should be identical. If the representation process is working well there will be a *high match between their interests and goals*.

Match of information needs: Industry associations use national economic accounting information to protect the interests of their members through negotiations with government. *Top management* may seek national economic accounting information in order to obtain the basis for discussions about economic matters of concern to industry or their members. At the corporate level, however, expression of monetary figures in real terms is rare except in capital budgeting, seasonal adjustments and smoothing are usually frowned upon because they would lead to figures that may mislead users of the information and interest received and paid is classed as income and expenses. This is also presents a problem when considering the type of information that a corporate MEMA system should produce. It is clear, that for representing the interests of their member companies, in negotiations about aggregate sector and national economic trends, industry associations need to rely on the same information basis as corporate management. However, national economic accounting information is only of limited use for corporate management. Therefore, only a *moderate match of information needs* can be found here.

Environmental NGOs

a) Partial Link (a): Government – Environmental NGOs

Match of interests and goals: At the national level environmental NGOs petition for the modification of national economic accounts to include environmental factors. Gross National Product (GNP) has been heavily criticized by many stakeholders, including environmental NGOs, for not taking environmental impacts of economic activity into account. Environmental NGOs have suggested adjustments to national economic measures, such as GDP, to make the monetary measures more sensitive to environmental issues. However, where these

adjustments have been made there is little evidence that the figures have been used (Hecht 2000) In addition, environmental NGOs have shown an interest in getting their members to understand national economic accounting and its consequences for the environment (e.g. the WWF provides a training program focusing on macroeconomics, poverty and the environment using an economist from the World Bank, see http://www.panda.org/ resources/ publications/ sustainability/mpo/training/ on 26.9.00). For *commerce agencies* there is no particular interest in environmental adjustments to national economic accounts. *Environmental agencies*, may be in favor of having environmental issues better integrated in national economic accounts. However, for both, environmental agencies and environmental NGOs these activities are at best marginal to their main interests and goals. Therefore, only a *moderate match of interests and goals* exist here.

Match of information needs: Environmental NGOs are known for their enthusiasm in seeking out physical information about corporate environmental impacts. At the national level this information need is translated into the desire to see more environmentally related aggregated figures in national economic accounts. However, this information is not needed for their own purposes. Environmental agencies and commerce agencies may like to receive environment related income and expenditure figures referring to the national level for their decision and policy making. Taken together, there is a *rather high match of information needs* in this context.

b) Partial Link (b): Management – Environmental NGOs

Managers concerned with national economic accounts, environmental NGOs and EMA may be found at the level of top management.

Match of interests and goals: Economic development at the national level measured by national economic accounts may influence the long term profitability of private companies and is therefore of some interest to top management. However, there is no particular management interest in the integration of environmental figure into these accounts, as environmental issues only represent one aspect amongst many that make up these aggregate figures. Thus there is a *low match in interests and goals* with management and environmental NGOs working towards a “green” adjustment to national economic accounts.

Match of information needs: In line with the gap in the interests and goals between environmental NGOs and corporate management, there is also a *low match between desired information* in the context of national economic accounting and its possible adjustment for environmental issues. In addition, there is very low connection between national economic accounting information and the disaggregated information contained in corporate EMA systems.

International Organizations

a) Partial Link (a): Government – International Organizations

Match of interests and goals: International organizations (such as UN and the OECD) are concerned with national, regional and global economic conditions and factors that affect these conditions such as: finance and investment, competition, governance, enterprise and industry, employment, energy, transport and sustainable development (see http://www.oecd.org/ activities/ on 27.9.00). These concerns are not divorced from concerns over the need to integrate economic and environmental issues, the OECD being particularly active in the area of integration (see http://www.oecd.org/env/policies/index.htm on 27.9.00). Governments, in particular commerce agencies, are also highly interested in national economic accounting systems delivering information on national, regional and global economic conditions in order to help with their decision making. *Tax agencies* are also interested in such assessments of the economic situation for estimation of aggregate tax receipts. For *environmental agencies* economic conditions represent an important variable which limits or enhances potential environmental protection measures. This reveals a *high match of interests and goals* between government agencies and international organizations for national economic accounts.

Match of information needs: National economic accounting systems are designed to provide aggregate information about relative economic growth between nations and overall economic growth in sectors, regions and the global level. Where possible, the factors that affect national economic conditions, for example costs of environmental protection, are monitored and can be integrated into the national economic accounts. Such information will be wanted by both government agencies and international organizations. Hence, there is a *high match of information needs* as well.

b) Partial Link (b): Management – International Organizations

Management departments concerned with national economic accounts, international organizations, and at the same time with EMA mainly include top management and to some extent accounting and finance management.

Match of interests and goals: Managers are concerned about economic conditions in their home and market countries and regions, however, they are more concerned about the relevance of figures at the corporate level. Interests and goals of international organizations such as the OECD and UN are, thus, at best *moderately matched* with those of corporate management.

Match of information needs: Managers too seek economic information about their corporations, including environmentally-induced financial information available through MEMA systems. There is an obvious potential overlap with the information needs of international organizations. Useful input from corporations assists in the preparation of national and regional accounts. Consequently, EMA (especially MEMA) information could act as a disaggregated source of corporate information that can be aggregated into national economic

accounting statistics. However, there are differences between economic valuation needs for future aggregate estimates (e.g. estimated costs of future environmental pollution) and accounting requirements for historical information based on historical data. Indeed, evidence suggests that whereas corporate MEMA information has a specific function in decision making and corporate accountability within a sustainability context, aggregate environmental accounting information expressed in national economic terms is not widely used even when it is available (Hecht 2000). This is mainly because managers need specific site, product, process or corporate level accounting information and international organizations require aggregate information based on economic valuations. Thus the *overlap in information needs* between management and international organizations remains *rather low*.

Further Results and Conclusion

Anchorage: The anchorage of this indirect link is ambiguous. Anchorage is rather low on partial link (b) where mainly top management and to some extent accounting and finance management are concerned. The number and variety of the relevant intermediate stakeholders is quite low. No stakeholders included stand in a close contractual relationship to the corporations. On the other side, the anchorage within government is excellent, especially in commerce agencies, but also in tax and environmental agencies designated to benefit from national economic accounts. Government agencies represent the targeted users of national economic accounting information.

Overall suitability: Looking at the structural findings for the different intermediate stakeholders on partial link (a), only international organizations show a high match of interests in the context of national economic accounts. Environmental NGOs remain at a moderate level, whereas for industry associations, no particular match could be found. Information needs are better matched: starting with a moderate overlap with industry associations there is an increased match of information needs with environmental NGOs and finally a high match with international organizations.

While showing quite considerable suitability on partial link (a) environmental NGOs achieve no match with corporate management in either interests and goals or information needs. Industry associations show a high match with corporate management interests and goals and a moderate match with their information needs in the context of national economic accounts. However, their overall suitability is moderated considerably by the poor findings for partial link (a). There only remains international organizations which reveal a moderate match of interests with management and a rather low match of information needs. However from the structural point of view, these organizations seem to be the most suitable intermediate stakeholders for EMA promotion via national economic accounts, even though this level of suitability is not overwhelming.

The low method proximity of national economic accounting systems with corporate EMA does hinder improvement in the suitability of this intermediate element. Even though disaggregated information, such as EMA information, has to be fed into these aggregate

accounting systems by corporations, there are considerable technical gaps and differences in method between national economic accounting and EMA. This is mainly because of problems associated with economic estimation, accounting conventions and the fallacies of aggregation in the context of integrating corporate EMA and national economic accounting information. The aggregate nature of these national economic statistics, which use different conventions from those used by preparers of internal accounts, means that drawing a relationship between, or trying to draw inferences from national income accounts and MEMA information in combination could be very unproductive. *Thus overall, this indirect link has to be judged fairly unsuitable for government promotion of corporate EMA*.

Operative status: Looking at currently existing policies based on the path via national economic accounting systems and international organizations, for partial link (a) there is considerable cooperation between governments and these organizations. Thus, although there are no policies regulating or referring to the work of international organizations, this partial link is *operative* because government representatives are members of the expert working groups of the international organizations. However, there is no clear reference to corporate EMA in this situation.

Through the work of the international organizations, national economic accounting has been supplemented in recent years with satellite accounting designed to include environmental information in national accounting systems. For example a typical national accounting system infrastructure is presented by the UN SNA, with UN SEEA (UNSTAT 1993) providing satellite accounts that integrate environmentally-induced financial information with physical information about the environment. The OECD has also undertaken efforts to integrate economic and environmental issues through national economic accounts (see http://www.oecd.org/env/policies/index.htm on 27.9.00). Even if these environmental adjustments of national economic accounts do not necessarily contain any specific EMA related aspects, there is an implicit connection as in the end national accounts have to be fed by information derived from the corporate level. Thus to some extent this partial link is operative, too.

In the last few years, environmental NGOs (e.g. the WWF Macroeconomics for Sustainable Development Program Office or the Wuppertal Institute, see van Dieren 1995) have also been advocating changes in the current national economic accounting system with a view to integrating the values of natural resources and environmental services into product and income calculations. These efforts culminated in two WWF-initiated international conferences in 1995. "Taking Nature into Account" was co-sponsored by the European Parliament, the European Commission, and the Club of Rome. "Accounting for the Future" was co-sponsored by the World Bank, World Conservation Union (IUCN), National Wildlife Federation (NWF), and the Bank Information Center (BIC). A WWF publication, "Real Value for Nature - An Overview of Global Efforts to Achieve True Measures of Economic Progress", served as the basic document for these conferences. Currently, the MPO is developing projects to apply green accounting to specific sectors: forests, fisheries, minerals, and energy.

5.7 Summary of the Analysis of Indirect Links

In this chapter ten accounting and management systems, defined as intermediate elements that could indirectly link government with corporate EMA, have been investigated. The structural suitability of these different indirect links for government promotion of EMA has been extensively analyzed on the basis of the following criteria:

- *Method proximity*: How much have the methods (intermediate elements) in common with EMA?
- *Match of interests and goals*: How well do the interests and goals of stakeholders, having an interest in an intermediate element, match those of people at the government and management focal points who use EMA?
- *Match of information needs*: How well matched are the information needs of the various stakeholders involved in government, intermediate elements and management?
- *Anchorage*: How many government agencies, management departments, and other stakeholders are linked by the intermediate element?

Examination of the indirect links has also revealed the *most promising stakeholders* whose interests suggest that they could be involved with the promotion of EMA. Finally, the *current operative status* of the different indirect links has been identified, based on whether governments or intermediate stakeholders have already used the identified path to promote EMA.

Table 15 summarizes the analytical findings for all indirect links in relation to their overall suitability, their most attractive intermediate stakeholders and their operative status.

Only two intermediate elements, namely *conventional financial accounting and reporting* and *external physical environmental accounting and reporting* demonstrate a high suitability for linking government with EMA. At the first glance, the results of the analysis seem surprising. However, this does lead to three important observations. *Firstly*, the strength of method proximity between the EMA and the intermediate elements shows that conventional financial accounting and reporting is strongly connected with monetary environmental management accounting (MEMA), whereas external physical environmental accounting and reporting is strongly linked with physical environmental management accounting (PEMA).

Intermediate Element	Overall Suitability	Most attractive intermediate stakeholders for indirect EMA promotion	Operative Status* partial link a	partial link b
Conventional Management Accounting	medium	• Professional accounting associations	inoperative	inoperative
Conventional Financial Accounting and Reporting	high	• Shareholders / financial analysts • Industry associations • Professional accounting associations	inoperative inoperative operative	operative inoperative operative
External Physical Environmental Accounting and Reporting	high	• Industry associations • Creditors / insurance companies • Professional accounting associations • Neighbor groups	inoperative inoperative inoperative operative	operative inoperative operative operative
Financial Management Systems	low	• Creditors / insurance companies	inoperative	inoperative
Environmental Management Systems	medium	• Standardization organizations • Industry associations	operative inoperative	operative inoperative
Quality Management Systems	low	• Standardization organizations	inoperative	operative
National Environmental Accounting	medium to high	• NGOs • Neighbors	operative inoperative	operative operative
National Economic Accounting	low	• International organizations	operative	operative

* the operative status is given if at least one example could be found, the partial link may not be operative in all countries

Table 15. Summary of the results of the structural analysis of indirect links

Secondly, promotion of EMA is likely to be more fruitful where there is a high match between interests and goals and information needs. The relatively high match between interests and goals, and the moderate to high match between information needs of the different stakeholders involved with the two intermediate elements identified as being highly suitable, gives added support to this result about the strong method proximity of the two intermediate elements.

Thirdly, promotion of EMA through an intermediate element seems most promising for government if a broad anchorage is given. The effect of an initiative or policy is weakened if government has to rely on only one stakeholder, or on a few stakeholders who have to work together in order to be successful. The broad anchorage between *conventional financial accounting and reporting* and *external physical environmental accounting and reporting* and government departments, intermediate stakeholders and management departments has the advantage that multi-interest multi-stakeholder promotion is more likely to succeed if one stakeholder is unable, or does not choose, to collaborate.

External accounting and reporting methods show a broad anchorage as many external and internal corporate stakeholders are involved in this accounting process that has close similarities with EMA. According to this analysis the most suitable indirect links are therefore via

- *Conventional financial accounting and reporting* by involving shareholders, financial analysts, industry associations and professional accounting associations. The partial link between government and shareholders/financial analysts and the indirect links between government and industry associations and management have not been used for EMA promotion so far.

- *External physical environmental accounting and reporting* by involving industry associations, creditors, insurance companies, and professional accounting associations. Except for neighbor groups, all links between government and the most attractive intermediate stakeholders as well as the partial link between creditors / insurance companies and management are inoperative so far.

Taking the analysis of the indirect links of both of these intermediate elements together, industry associations and professional accounting associations seem to be the intermediate stakeholder that it would be most worthwhile for governments to engage in the promotion of EMA.

With its strong similarities to external physical environmental accounting the *indirect link with national environmental accounting* has been assessed as having *medium to high overall suitability*.

Medium suitability is identified for the *indirect links* with conventional management accounting and for environmental management systems.

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