1st Session

Environmental Accounting :
Trends of Each Country

Environmental Accounting Practices of Listed Companies in Japan

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1. Introduction

The number of Japanese corporations which publish environmental reports has been increasing very rapidly. According to the " A Survey of Environmentally Corporate Behavior " [Ministry of the Environment (2001a)], the proportion of listed corporations surveyed[1)] which disclosed environmental information showed a rising trend from 35.7 per cent (1998) to 40.9 per cent (1999) to 51.0 per cent (2000).Out of these companies the proportion of those which published environmental reports also increased from 30.9 per cent (1998) to 37.3 per cent (1999) to 45.9 per cent (2000). This sort of trend is likely to increase further, judging from the publication of " Environmental Reports Guidelines (Fiscal 2000) " by the Ministry of the Environment (MOE) in February 2001 and the " Environmental Reporting Guideline for Stakeholders "by the Ministry of Economy, Trade and Industry (METI) in June 2001.

The number of companies which disclose environmental accounting information in their environmental reports is also on the increase. During the first half of the 1990s when the word " environmental accounting " was not in general use, only a handful of corporations measured environmental costs. However, according to the MOE ṡ survey (2001a), out of the above-mentioned listed corporations which replied that they disclosed environmental information, the proportion which disclosed environmental accounting information showed a steeply-rising trend from 10.4 per cent (1998) to 20.9 per cent (1999) to 27.0 per cent (2000). Concerning the question on the introduction of environmental accounting, 17.3 per cent replied that they had already introduced it, while 34.2 per cent replied that they were considering its introduction. These trends were obviously influenced by the environmental accounting guideline published by the Environmental Agency (now the Ministry of Environment : MOE) in May 2000. The draft guideline was published in 1999. Furthermore, both of the MOE ṡ and the METI ṡ environmental reporting guidelines recommended environmental accounting information disclosures in the environmental reports. Therefore, more and more companies are expected to introduce and publish environmental accounting.

Although such guidelines are likely to have a considerable influence on environmental accounting and reporting practice, they are not mandatory rules, but voluntary. The methods

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1)The number of listed companies which gave valid answers was 1,051 in 1998, 1,147 in 1999 and 1,170 in 2000.

and procedures for environmental accounting in the MOE's guideline are quite flexible and even ambiguous. The guideline leaves much discretion to companies. This means that how and to what extent the guideline influence environmental accounting practice becomes an important research issue. The object of this study is twofold : to clarify the special characteristics of Japanese environmental accounting practice by examining the environmental accounting information disclosure by Japanese corporations; and to analyze the influence on Japanese corporations by the MOE environmental accounting guideline. Before examining these issues, some main governmental initiatives on environmental accounting and previous studies on Japanese environmental accounting practices are briefly studied.

2. Environmental Accounting Initiatives in Japan

Environmental accounting practice is voluntary for companies in Japan. However, a number of efforts are being made to support and encourage companies' endeavors. Some of important initiatives from governments and professional bodies will be examined.

2.1. Initiatives of the Ministry of Environment (MOE)

The MOE published "Developing an Environmental accounting System (2000 Report)" in May, 2000. The most part of this report consists of "Guideline for Introducing an Environmental Accounting System (2000 version)" (referred to as the "guideline" henceforth). This is a final document for the guideline draft published in the previous year as mentioned above. However, MOE adds such words as "2000 report" as the title of the report. This is because "considering the current situation where research of environmental accounting and installation conditions are progressing steadily, we considered necessary the future reinforcement of the contents of the report as required"(MOE, 2000, p.3). Therefore, the guideline is expected to be revised in the future as required, however, the timing of the review is not indicated clearly.

The key contents of the guideline can be summarized in the following three points :

- Environmental accounting system
- Environmental conservation cost
- Environmental conservation effects and economical effects

Environmental accounting system

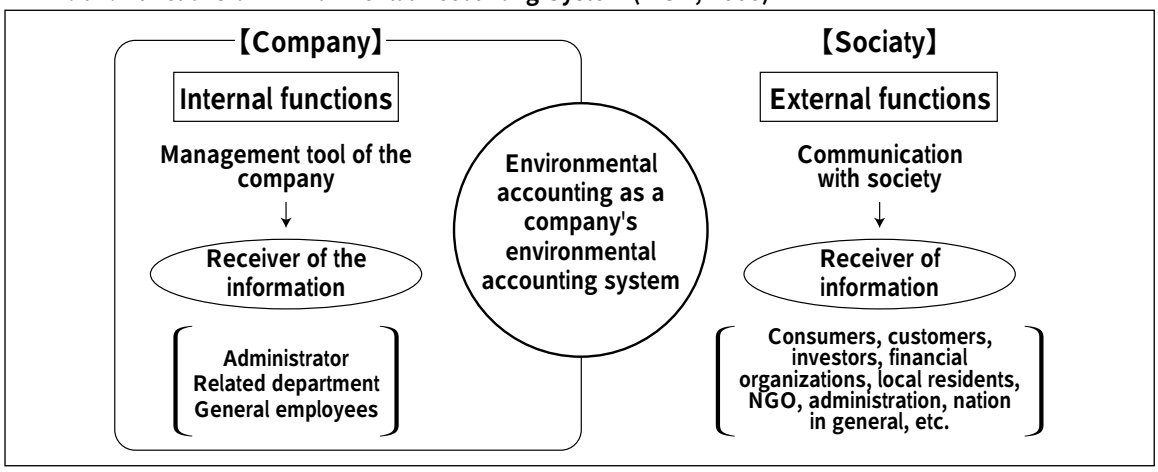
The guideline indicates two different functions of environmental accounting :an internal function for management and an external function for communication with various stakeholders (see Exhibit 1). However, the actual contents of the guideline are considered to be more oriented to external reporting, rather than internal management. This is not clearly indicated by the

guideline itself, but the following paragraph suggests its emphasized point.

This report is intended to enable comparison of information by environmental accounting as much as possible since the report summarizes the coherent concept regarding environmental accounting. Currently, only the framework of environmental accounting is incomplete and some limitation cannot be avoided due to the characteristics of the guideline that respect the independence of enterprises and diversity of individual business categories. However, in the future, we hope to develop a system that enables comparison of basic sections not only sequentially but also among enterprises. (MOE, 2000, p.5)

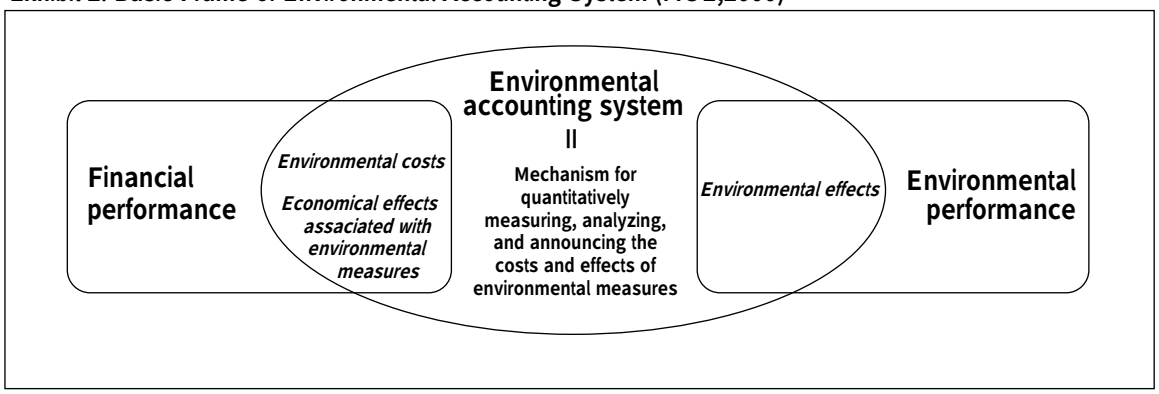
The media to be used for environmental accounting information disclosure in the guideline is an environmental report, not a financial report. The environmental accounting is supposed to be completely independent from any corporate financial accounting.

Exhibit 1. Functions of Environmental Accounting System (MOE, 2000)



The basic frame of environmental accounting system is indicated by Exhibit 2. Environmental accounting is defined as a system that integrates financial performance and environmental performance. In fact these performances are integrated by correlating the environmental conservation effects and economical effects associated with environmental measures. At the stage of the guideline draft, environmental accounting is more likely restricted to calculation of environmental conservation cost, however, in the guideline, the range of an environmental accounting system is expanded in order to be a fundamental tool for environmental conservation as well as corporate management.

Exhibit 2. Basic Frame of Environmental Accounting System (MOE,2000)



Environmental conservation cost

The guideline expands the scope of environmental accounting, however, it still emphasizes calculation of the environmental conservation cost in the same way as for the guideline draft. The guideline defines environmental cost as the "investment and cost for environmental conservation". For the definition of the investment and the cost, in principle, the definition of financial accounting is employed. The purpose of expenditure is adopted as criteria to identify what is environmental conservation cost or investment. If the purpose is considered to be environmental conservation, those costs and investments should be environmental. Concerning environmental conservation, three major activities, including pollution prevention, global environmental conservation, and resource circulation are indicated by the guideline.

Concerning measurement of environmental cost, a differential calculation is recommended as a basic method when environmental cost incurred as a composite one. This method requires excluding the cost incurred not for environmental conservation from the total amount of each environmental cost item. If this method is difficult, company can employ some simple calculations. For example they are allowed to adopt some predetermined allocation ratio such as 25%, 50% or 75% in order to distinguish the amount for environmental conservation from amount for the other purposes. This often happens when companies buy some facilities that have not only environmental protection function but also some other functions.

The guideline classifies environmental cost into the following six categories.

(1) Environmental conservation cost for controlling the environmental impacts that are caused within a business area by production and service activities (Abbreviated as business area cost)

(2) Environmental cost for controlling environmental impacts that are caused in the upstream or downstream as a result of production and service activities (Abbreviated as Upstream/Downstream cost)

(3) Environmental cost in management activities (Abbreviated as management activity

cost)

(4) Environmental cost in research and development activities (Abbreviated research and development cost)

(5) Environmental cost in social activities (Abbreviated as social activity cost)

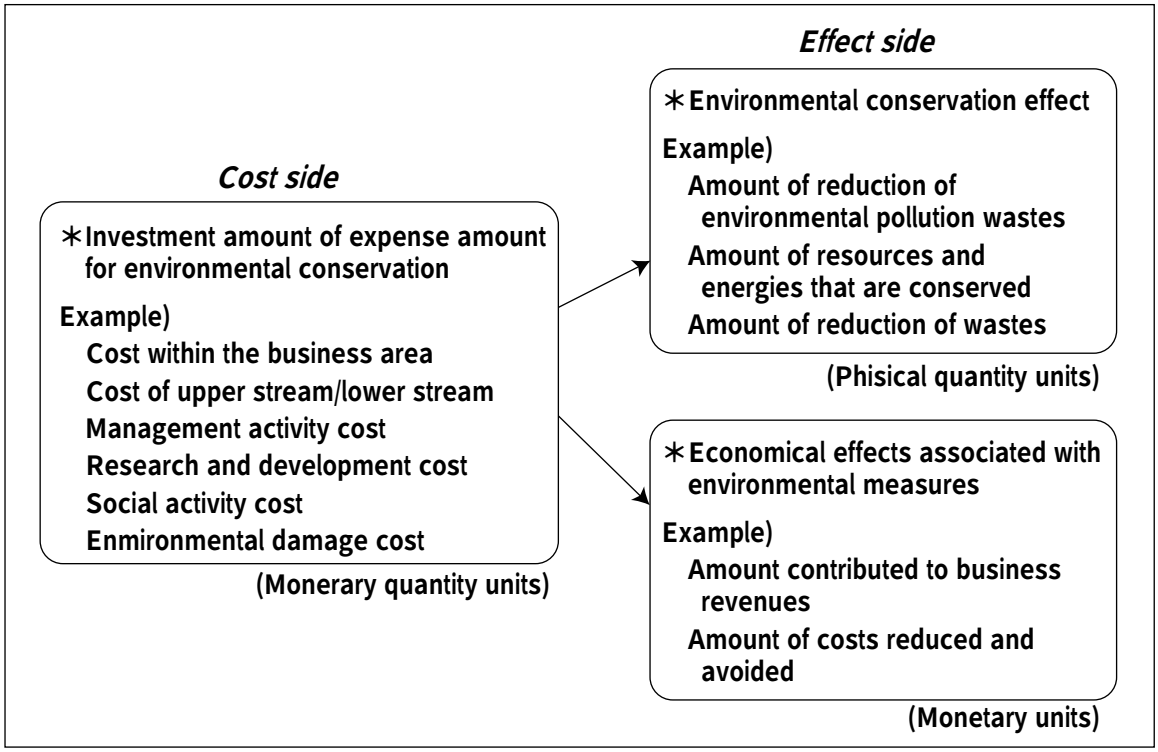
(6) Environmental costs corresponding to environmental damages (Abbreviated as environmental damage costs)

The scope of the guideline is very comprehensive. However, companies do not have to calculate all cost categories in the first stage, but can choose relevant cost categories for them. Another feature of the classification is that lifecycle thinking is introduced to the classification between category (1) and (2).

Environmental conservation effects and economical effects

The most significant features of the guideline compared with the former guideline draft are environmental conservation effects (benefits) and economical effects (benefits) introduced in the environmental accounting system. This revision is to overcome the limitation of the guideline draft, which is unable to clarify how efficiently or effectively environmental conservation activities are implemented. The guideline shows the relationship between costs and effects (benefits) by Exhibit 3.

Exhibit 3. Environmental Costs and Effects (MOE, 2000)



Effects of environmental conservation measures are classified into an environmental conservation effect that indicates improvement of environmental performance and an economical effect that contributes to financial performance. Basically, the former is measured by the physical unit and the latter is measured by monetary units. Among these effects, the environmental conservation effect is to be checked first as a higher priority because environmental conservation cost should be spent mainly for environmental conservation not for economical effects.

For environmental conservation effects, the guideline classifies them into three categories, (1) environmental conservation effect occurring within the business area, (2) environmental conservation effect occurring in the up/down stream, and (3) other effects. The guideline provides some examples of actual index for each category. This category of environmental conservation effects is, in principle, associated with the category of the environmental conservation cost that was described before. However, since environmental conservation effects corresponded to the environmental conservation cost other than the cost within the business area and the up/down stream cost often cannot be measured easily, these effects are summarized as " other effects ". Measurement methods of environmental conservation effects should be standardized so that the information can be compared when the effects are reported externally. However, the guideline does not provide for the measurement methods in detail.

Corporate environmental protection activities should mainly pursue reduction of environmental impact, that is, improvement of environmental performance. However, companies should simultaneously pursue economical benefits as well. For instance, in the introduction of an environmental management system, the emphasis was rather placed on the economical benefits such as cost saving by energy saving or waste reduction. The economical benefits specified by the guideline are classified into " economical effects calculated based on credible basis " and " economical effects based on hypothetical calculation ". Only the former is expected to be disclosed externally and the latter is not requested to be disclosed. When the latter is reported publicly, however, the effects are to be distinguished from the " effects based on credible basis " and the calculation ground and/or method are to be disclosed. As the " economical effects calculated based on credible basis, " substantive effects such as recycle income and cost saving by energy saving are indicated, and the " economical effects based on hypothetical calculation " include effects by avoidance of contingent risks and profit contribution assumption effects.

Disclosure Format

The guideline provides three types of formats as an environmental accounting statement to be disclosed.

Format A : environmental cost only

Format B : environmental cost and environmental conservation effects

Format C : environmental cost, environmental conservation effects and economical effects (Exhibit 3)

Exhibit 4. Environmental Accounting Disclosure Format C

Aggregation scope: ( )
Target period: from to
Unit: ( ) yen

Environmental cost				
Category		Details of main implementation and the effects	Investment amount	Expense amount
(1) Environmental costs for controlling environmental impacts occurring within a business area as a result of production and service activities (business area costs)				
Breakdown	1) Pollution prevention cost			
	2) Global environmental cost			
	3) Resource circulation cost			
(2) Costs for controlling environmental impacts occurring in the upper stream or lower stream associated with production and service activities (upper/lower stream costs)				
(3) Environmental costs in management activities (management activity costs)				
(4) Environmental costs in research and development activities (research and development costs)				
(5) Environmental costs in social activities (social activity costs)				
(6) Costs corresponding to environmental damages (environmental damage costs)				

Environmental effects		Comparative index
Contents of effects	Index of environmental impact	
(1) Environmental effects occurring within business area (business area effects)		
(2) Environmental effects occurring in the upper/lower stream (upper/lower stream effects)		
(3) Other environmental effects		

○ When there are environmental costs that are not applicable to any of the categories from (1) to (6) and the costs are described as (7) other environmental costs (other costs), disclose the contents and the reason in order to clarify the scope.

Item	Contents	Amount
Total amount of investments for the period		
Total amount of research and development costs for the period		

Economical effects associated with environmental measures	
Contents of effects	Amount
Revenue obtained by recycling	
Reduction of costs achieved by energy conservation	
Reduction of waste processing costs achieved by recycling	

source: MOE(2000)

Format C is the most comprehensive one. When a company discloses environmental accounting information in their environmental reports, Format C is highly recommended if they can fulfill it.

Although there are some points to be improved in the future such as calculation methods of effects, the basic frame suggests a new framework of environmental accounting that integrates the environmental accounting in monetary units and environmental accounting in physical units. The environmental accounting statement such as Format C provided by the guideline must be regarded as a settlement document in an environmental report likewise the financial statement in a financial report.

2.2. Initiatives of the Ministry of Economy-Trade and Industry(METI)

It is also becoming an important issue for Japanese companies that introduce environmental accounting how to integrate the guideline to corporate decision-making. When management accounting is undeveloped, financial accounting is utilized for internal management as well. However, since decision-making in companies has its own specific purpose such as investment decision, price setting and performance evaluation, the integrated environmental conservation cost calculation system provided by the guideline cannot sufficiently meet such individual purposes.

In order to solve this problem, it is necessary to develop various environmental management accounting tools. While in Japan environmental management accounting practices have been slowly developed, Japanese companies started to recognize the importance of those tools for internal use. The project of METI described at the beginning of this paper targets the development of tools of environmental management accounting. In this sense, the MOE's project and the METI's projects should be complementary to each other.

The METI's project started in 1999 and has been working on a three year research plan. In the first year it held discussion from various perspectives including financial accounting, quality costing, life-cycle assessment and costing. It also conducted a research on related programs/tools of the world mainly in the US/Canada and Europe. The research results were published annually report by JEMAI(1999, 2000), which was entrusted with the research by the METI.

Based on the outcome of the first year research, four working groups (WG) were established in the second year to develop tools for specific management purposes. WG1 is developing for environmental capital investment decision-making. WG2 is investigating tools for environmental cost management. WG3 is going to develop tools for environmental and financial performance evaluation. WG4 is examining material flow cost accounting and conducting pilot testing with a Japanese company. Some of these tools will be developed in 2001 and the project will be concluded by March 2002.

As we have mentioned before, since the Japanese environmental practices are much inclined to external disclosure, the METI project should be important to develop the other aspect, internal use, of environmental accounting.

2.3. Initiatives of the Japanese Institute of Certified Public Accountants(JICPA)

JICPA has supported some MOE's projects on environmental accounting. They contributed to the environmental accounting guideline and guidebook, and sended advisors to the MOE's Corporate Environmental Accounting Practice Study Group. JICPA has conducted its original research projects. One of its main projects is a literature survey and case studies relating to

linkage between financial accounting and environmental accounting. As the first stage, the Management Research and Investigation Society Report No. 11 was published by JICPA on May 14th 2001, under the title "International Research Trends and Japanese Issues in relation to 'Environmental Accounting within the Framework of Financial Accounting' - Accounting Procedures and Disclosure for Environmental Costs and Environmental impact."[2)]

JICPA is also carrying out research on the credibility of environmental information disclosure and in July 2000 it published "Environmental Report Assurance Guidelines (draft)" to ask for public comments.[3)] Much is expected in future of this research from the point of view of assuring the credibility of environmental accounting statementts.

3. A Review of Previous Studies on Corporate Environmental Accounting in Japan

Previous studies on environmental accounting information disclosure by Japanese corporations include those by the Japan Accounting Association (2000) and Matsuo (2001).

The report by the Japan Accounting Association (2000) mainly outlines the establishment of micro and macro environmental accounting. The second chapter about micro environmental accounting written by H. Yagi investigates Japanese corporate environmental accounting. In March 2000 they asked 1,433 companies listed on the First Section of the Tokyo, Osaka and Nagoya Stock Exchanges to send copies of their environmental reports. 218 companies responded by the end of June 2000 and 194 companies 'reports were recognized as an environmental report to be investigated. The items investigated were : disclosure of environmental conservation costs (environmental investment and environmental expense); disclosure of economic effects and environmental conservation effects of such costs; and environmental accounting guidelines and environmental reporting guidelines to which these reports conformed.

The results of the survey showed that 99 companies disclosed both expense and investment or one of the two for environmental costs, and 29 companies out of these disclosed some kind of information about effects (environmental conservations effects, economic effects.) Furthermore, in the survey relating to environmental accounting guideline, 15 companies based their accounting on the 1999 guideline draft, while 5 companies based theirs on the 2000 version of the guidelines. Since there was no specific mention of effects in the 1999 guideline draft it is not surprising that so few companies disclosed some kind of information about effects.

Looking only at these results, it is easy to receive the impression that companies do not regard the Fiscal 2000 MOE s guidelines in 2000 as important, but this has to do with the period

2) JICPA Journal, August 2001
3) JICA Journal, October 2000

of the survey. The MOE's guideline was actually published in May 2000. Since the publication date for many companies' environmental reports is generally from the end of June till around September, it is likely that during the period of the Japanese Accounting Association's survey from March to June 2000, many companies were in the process of compiling their environmental reports, and then, most of those did not have enough time to reflect the guideline in 2000 in these reports.

This present study, bearing this point about the period in mind, made the deadline the end of December 2000. As a result the number of environmental reports which the survey looked at increased to 257 while the number of those who disclosed environmental accounting information had approximately doubled to 184. There was also an increase, to 106, in the number of companies which based their reports on the MOE's guideline, and the number of companies which based their reports on the 2000 version (87) greatly exceeded the number which based theirs on the guideline draft in 1999(19). A detailed examination is given in the next section.

Matsuo (2001) investigates whether or not the disclosure of environmental accounting information is influenced by industrial sector, company size and the MOE's guideline. Matsuo asked the 872 companies listed in the Fiscal 1999 Nikkei Environmentally Friendly Corporation Survey to send their environmental reports. Out of the 219 companies which replied, 142 companies published environmental reports. 98 companies disclosed environmental accounting information in their reports. Details about the period of the survey are not known. The survey investigated the company size, the industrial sector and the purpose of disclosure of those companies disclosing environmental accounting information. Company size was determined on the basis of sales, and as a result it was confirmed that the larger the size of a company is, the higher the environmental accounting information disclosure level is.

Industrial sector was also found to be an important factor influencing the disclosure of environmental accounting information. Approximately 90 per cent of companies disclosing environmental accounting information are occupied by such industries as chemicals, steel and metal, machinery and electric. This suggested that environmental practices depended on industrial sector. However, Matsuo(2001) does not employ any statistical analyses.

There is another study on the disclosure of environmental accounting information by Kokubu, Nashioka and Daikuara (2001). The study became the groundwork survey for the present study. The survey categorizes environmental accounting information disclosure in environmental reports by companies listed on the First Section of the Tokyo Stock Exchange as of November 2000 according to such aspects as purpose of environmental accounting, disclosure of environmental costs and effects. It also gives case studies of corporations which make the most advanced efforts especially with regard to effects. On the other hand, this present study investigates a broader range of categories and cotents more deeply.

4. An Analysis of Environmental Accounting Information Disclosure of Japanese Companies

This study collected and analyzed environmental reports published during 2000[4] on companies listed on the First Section of the Tokyo Stock Exchange as of September 7, 2000 (1430 companies). 257 of the companies surveyed published environmental reports and 184 companies (71.6 per cent) disclosed some environmental accounting information.

4.1. Characteristics of Corporations which Disclose Environmental Accounting Information

Among corporations which publish environmental reports, is there some difference in financial characteristics between companies which disclose environmental accounting information and those which do not? In order to examine whether there is any difference in sales, total assets, operating profits and return on total asset (ROA), Mann-Whitney U test (a median test) was conducted.[5] The financial industry were excluded because they have a different accounting standard. The result is shown in Exhibit 5. No significant results were obtained for any variable. This suggests that the trend to disclose environmental accounting information among companies which publish environmental reports is unrelated to these companies ' financial characteristics.

The quality of environmental accounting information disclosure varies widely from a simple mention of the total costs to detailed reports conforming to the MOE ṡ guideline. Mann-Whitney U test was conducted for sales, total assets, operating profits and ROA, to find if there was any difference between companies which conformed to the MOE ṡ guideline or their own independent standards in disclosing environmental accounting information and those which did not (with the exception of the financial industry).[6] The results, shown in Exhibit 6, were

Exhibit 5. A Test of Median Between Company disclosing Environmental Accounting Disclosure and Non Disclosure(Mann-Whitney U test)

		Sales Amount		Total Assets		Operating Profit		ROA	
		Disclosure	non-Disclosure	Disclosure	non-Disclosure	Disclosure	non-Disclosure	Disclosure	non-Disclosure
Statistical Date	Number of Samples	181	69	181	69	181	69	181	69
	Average (million yen)	1329190.81	932103.64	1559256.82	1091003.19	53103.92	40511.75	0.0397	0.0427
A Test of Median	U	6847.50		6950.50		6760.50		5639.50	
	Z	1.18		1.38		1.01		-1.18	
	P (two tails)	0.24		0.17		0.31		0.24	

4) For companies which issued environmental reports twice during 2000, their later reports were surveyed

5) Since the normality of the sample data could not be assumed, the Mann-Whitney U test was adopted (for analyses as mentioned later, non-parametric analyses were conducted in case that the normality of data could not be confirmed)

6) This study ṡ definition of conformity with the MOE ṡ guidelines refers to cases where the account titles of environmental costs substantially follow the guidelines.

significant at the 1 per cent level for sales, total assets and operating profits. This shows that there are significant difference between companies which publish advanced environmental accounting reports based on some sort of guidelines in terms of the median of sales, total assets and operating profits.[7] Nevertheless, there was no significant difference in terms of profitability as shown in ROA.

Exhibit 6. A Test of the Median Between Companies Based on any Guideline and no Guideline (Mann-Whitney U test)

		Sales Amount		Total Assets		Operating Profit		ROA	
		guidelines	no guidelines	guidelines	no guidelines	guidelines	no guidelines	guidelines	no guidelines
Statistical Date	Number of Samples	135	46	135	46	135	46	135	46
	Average (million yen)	1614690.44	491311.48	1847917.33	712100.98	62282.59	26166.52	0.0400	0.0387
A Test of Median	U	4242.00		4073.00		4042.00		3215.00	
	Z	3.70		3.15		3.05		0.36	
	P (two tails)	0.0002		0.0016		0.0023		0.72	

We analyze whether or not there is a difference in the disclosure of environmental accounting information among industrial sectors. Industries were divided into twelve categories (1 construction 2 food 3 textiles, paper/pulp, 4 chemicals, pharmaceuticals, petroleum and coal, rubber products 5 glass, cement, concrete, ceramic products, iron and steel 6 non-ferrous metals, machinery 7 transportation equipment, precision instruments 8 electric equipment 9 manufacture of other products 10 retail, wholesale, real estate, finance 11 land, marine and air transportation , communications 12 electricity, gas). Chi-square for independence test was conducted. As the results, in Exhibit 7, show the null hypothesis that there is no difference between specific industries was rejected at the 1 per cent level. However it must be remembered that this analysis was carried out on corporations which had published environmental reports and does not investigate the whole of the industry.

Exhibit 7. Environmental Accounting Disclosure and Industry Sector : Chi Square Independence Test

	construction	food	textiles	chemistry/ medicine	glass/ pottery	non-ferros metals/ machine	trasport/ precision machine	electronic equipement	other manufactures	retail trade	traffic service	electric power/gas	total
Disclosure	6	6	12	9	38	15	17	20	31	15	5	10	184
Non-Disclosure	0	11	6	3	11	2	7	2	10	14	4	3	73
Total	6	17	18	12	49	17	24	22	41	29	9	13	257
percentage of company (%)	100.00	35.29	66.67	75.00	77.55	88.24	70.83	90.91	75.61	51.72	55.56	76.92	71.60

a test of independence $\chi 2 = 28.12$ d.f.=11 p=0.0031

7) The study by Kokubu, Noda, Onishi and Shinabe (2001) obtained the result of logit analysis as to publication/non-publication of environmental reports that the proxy variable for the corporate size as represented by the number of employees has a significant influence on the publication of environmental reports.

4.2. Environmental Cost Disclosure : Influence of the MOE's Guideline

Among the 257 companies which published environmental reports, 184 companies disclosed some kind of environmental accounting information. 106 of companies (57.6 per cent) conformed to the MOE's guideline. A breakdown of the 184 companies reveals that 87 companies conformed to the 2000 version of the MOE's guideline, 19 companies to the 1999 guideline draft, 31 companies had established their own independent standards, and 47 companies came under the "other" category where standards were unclear or still being drawn up or examined. It is clear that the MOE's guideline have a considerable influence.

As previously mentioned, while the MOE's guideline focuses on environmental costs, they also include some reference to environmental conservation effects and economic effects. Exhibit 8 shows an analysis of the ways in which the guideline influences disclosures of environmental costs and effects.

The MOE's guideline provides that the amount of "cost" and the amount of "investment" should be stated separately and not added together. This method, which is shown in Exhibit 8 as "cost disclosure type a"[8] (hereinafter called "type a"), was adopted by 60 per cent of all companies.

Nearly all of these companies are ones which conform to the MOE's guideline or which have established their own independent guidelines. On the other hand, most of the companies which disclosed only the amount of investment, "cost disclosure type d" ("type d"), had not yet prepared guidelines or were in the process of preparing or considering guidelines

Only 10 companies (5.4 per cent) added together the amount of expense and the amount of investment, "cost disclosure type b" ("type b"). "Type b" environmental accounting tries basically to deal with environmental outlay in terms of cash flow and is different in intent from the MOE's guideline which aims at clarifying the relationship between cost and effects (including physical quantities) of environmental conservation activities. Since it is likely that the MOE's guideline will be used more widely from now on, there will probably be no increase in this type, which will tend rather to decline.

"Cost disclosure type c" ("type c") denotes cases where only the amount of cost is disclosed. 26 companies (14.1 per cent) were of this type and among these were companies such as Fujitsu and NEC Corporation, so-called environmentally -advanced corporations which had developed their own environmental accounting systems before the publication of the MOE's guideline.

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8) Type a includes cases where cost and investment are calculated separately, and added together in the total column only.

Exhibit 8. Environmental Accounting and the MOE's Guideline

(number of company)

Guideline		Cost Disclosure Type (*)		Environmental Conservation Effects		Economical Effects			Index
				Physical Units	Monetary Units	Substantive Effects	Risk Avoidance	Profit Contribution	
Based on the MOE's 2000 Guideline	87	a	73	49	5	56	4	10	5
		b	3	0	0	2	1	0	0
		c	10	8	0	8	1	1	0
		d	1	0	0	0	0	0	0
Based on the MOE's 1999 Guideline Draft	19	a	11	4	0	9	1	4	0
		b	2	1	0	2	0	0	0
		c	6	2	0	3	0	1	0
		d	0	0	0	0	0	0	0
Companies Original Guideline	31	a	22	10	0	14	1	2	0
		b	2	2	1	1	0	0	1
		c	7	3	1	2	1	1	1
		d	0	0	0	0	0	0	0
Based on no Guidelines	47	a	3	0	0	0	0	0	0
		b	3	0	0	0	0	0	0
		c	3	1	0	1	0	0	0
		d	37	0	0	1	0	0	0
		exception	1	0	0	0	0	0	0
None Environmental Accounting	73		—	—	—	—	—	—	—
Total	257		184	80	7	99	9	19	7

(*) Cost Disclosure Type

Cost	Disclosure type	Number of company	(%)	Notes
a	Cost and Investment Added Up Together	109	59.3%	Conformity to the MOE1s Guideline(84) +Original(22)=106 (57.6%)
b	Cost and Investment Separately	10	5.4%	
c	Cost only	26	14.1%	
d	Investment only	38	20.7%	Based on no guideline 37(20.1%)
exception	Others	1	0.5%	Indicate only specific project values
Total		184	100%	

4.3. Relationship Between Environmental Costs and Companies 'Financial Data

The relationship between the amount of environmental costs and companies ' financial figures is investigated. At present even companies conforming to the MOE s guideline leaves a lot of discretion for companies for recognizing and measuring environmental costs. Therefore, the comparability of environmental cost information is not so high. However, even with this limitation, a comparison in terms of environmental costs and financial figures such as sales is probably helpful in seeing trends in companies ' environmental conservation activities.

Out of the environmental cost information disclosed by companies conforming to the MOE s guideline, we examine the relationship between the total of the three costs of " business area cost ", " upstream/downstream cost " and " management activity cost " and sales, total assets and operating profits. The reason for limiting the environmental costs to these items was that the provision of the other cost such as " R&D cost ", " social activity cost " and " environmental damage cost " were more ambiguous and to then offer much lower comparability.

For correlative analysis of environmental costs and those financial figures, environmental accounting information was divided into two groups : non-consolidated and consolidated[9]. However, where it was not stated clearly whether the data were non-consolidated or consolidated, it was assumed that non-consolidated data was meant [10].

Exhibit 9-1. Spearman Ranking Correlationion Between Environmental Cost and Corporate size (non-consolidated date)

	Number of Companies	Correlation Coefficient	Z	P
Sales	91	0.60	5.69	0.0000
Total Assets	91	0.66	6.22	0.0000
Operating Profit	91	0.60	5.66	0.0000

Exhibit 9-2. Spearman Ranking Correlationion Between Environmental Cost and Corporate Size (consolidated date)

	Number of Companies	Correlation Coefficient	Z	P
Sales	16	0.90	3.50	0.0005
Total Assets	16	0.92	3.58	0.0003
Operating Profit	16	0.85	3.30	0.0010

Analysis was performed using the Spearman s rank correlation coefficient analysis. As the results set out in Exhibit 9 show, the correlation coefficient was positive in the case of non-consolidated data (approximately 0.6) and strongly positive in the case of consolidated data (between 0.85 and 0.9 or above).

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9) However, the extent consolidation of environmental accounting is not always same as of financial accounting.

10) The average environmental costs (for 106 companies surveyed) were 5 billion yen, which represents, on the average, 0.5% of sales, 17.0% of operating profits and 0.4% of total assets. The environmental costs here include " costs within business area cost ", " upstream/downstream cost " and " management activity cost. "

4.4. Disclosure of Environmental Conservation Effects and Economic Effects

The MOE's guideline requires that environmental conservation effects be disclosed in terms of physical units. There were 80 companies which disclosed physical quantity figures for environmental conservation effects and 64 companies out of these conformed to the guideline. There are also attempts to provide monetary valuation of environmental conservation effects as expressed in physical units, while this is not provided by the guideline. Since the costs are indicated by a monetary units, this method, by expressing the corresponding effects by monetary units, makes it easier to analyse cost-effectiveness. This is put in the category "environmental conservation effects in monetary units" in Exhibit 8.

Among the economic effects accompanying environmental conservation activities, what the MOE's guideline requires companies to disclose are only "substantial effects," such as the sales of valuables though recycling activities and energy savings, where the calculation basis is assured. Disclosure Format C is suggested by the MOE as the most comprehensive environmental accounting format since it discloses not only environmental costs but also conservation effects and economic effects. 49 companies (26.6 per cent) employ to disclosure Format C in the guidelines.

Have the MOE's guideline influenced on these sorts of disclosure of effects? The chi-square independence test was conducted on companies which conformed to the MOE's guideline and those which did not, in order to find whether there was any difference between their disclosure patterns of the environmental conservation effects and economic effects (substantial effects). The results have been shown in Exhibit 10 and 11. Test results in both cases were significant at the 1 per cent level, and it was clear that according to whether or not companies conformed to the guideline there was also a difference in their method of disclosing effects. In other words, it may be understood that the guideline has a strong influence on the disclosure of such effects in environmental accounting.

Exhibit 10. Influence of the MOE's Guideline on the Disclosure of Environmental Conservation Effects : Chi Square Independence test

	Disclosure of Environmental Effects	Non-Disclose of Encironmental Effects	Total
Based on MOE's guideline	62	16	78
Not Based on MoE's guideline	42	64	106
Total	104	80	184

a test of independence $\chi 2=29.06$ degree of allowance=1 P=0.0000

Exhibit 11. Influence of the MOE's Guideline on the Disclosureof Substantive Economic Effects : Chi Square Independence test

	Disclosure of Economical Effects	Non-Disclosure of Economical Effects	Total
Based on MOE's guideline	59	19	78
Not Based on MoE's guideline	26	80	106
Total	85	99	184

$\chi 2=47.23$ d.f.=1 P=0.0000

Correlative analysis was also conducted for the relationship between environmental costs and economic effects (substantial effects). Environmental costs were limited to the three items previously mentioned and the companies surveyed were divided into two groups by the environmental cost calculation coverage : a non-consolidated group (including cases where it is not clear whether costs are non-consolidated or consolidated) and a consolidated group. Spearman s rank correlation coefficient analysis was then conducted and a positive correlation was shown in both cases, which is indicated in Exhibit 12.

Exhibit 12. Spearman Ranking Correlationi Coefficient Between Environmental Cost and Substance Eeconomical Effects

	number of companies	correlation coefficient	Z	P
Non-Consolidation	66	0.68	5.46	0.0000
Consolidation	14	0.91	3.29	0.0010

4.5. Original Standards and Advanced Efforts in Environmental Accounting

There are also companies which adopt their own original environmental accounting standards. Companies such as Toyota and Takara Shuzo are among those which publish independent guidelines. Some of these companies had been making efforts to promote environmental accounting in-house, prior to the publication of the MOE s guideline. In general, the companies in this group have drawn up guidelines which are even more specific and advanced in content than those of the MOE.

On the other hand, among the corporations which employ Disclosure Format C and fully conform to the MOE s guideline, there are a fair number which have been making advanced attempts such as development of new environmental accounting index, segment environmental accounting and go on.

We can find the following two types of advanced environmental accounting trials. These companies are either ones which fully conform to the MOE s guideline or ones which have their ownoriginal environmental guidelines.

- Companies which evaluate environmental conservation effects in monetary units, and expressing cost-effectiveness by the unified indicator of " money " (Toshiba, Taiheiyo Cement, Kikkoman Shoyu, etc.).
- Companies which integrate environmental conservation effects by physical units and calcurate eco-efficiency rations. (Ricoh, Takara Shuzo, Asahi Breweries, etc.).

5. Conclusion

This paper has reviewed some governmental initiatives, including the MOE s projects and previous studies, and then examined environmental accounting practices of companies listed on

the First Section of the Tokyo Stock Exchange. As a conclusion, the following points were brought to light.

There is no significant difference in corporate size (sales, total assets, operating profits) between companies which disclose environmental accounting information in their environmental reports and those which do not. There is, however, a significant difference between companies which implement advanced environmental accounting based on some kind of standards and those which do not. There is also a significant difference according to industrial sector among companies which disclose environmental accounting information in their environmental reports.

The MOE's guideline has a strong influence on the methods of disclosing environmental costs. The guideline also influences the disclosure of environmental conservation effects and economic effects. Corporations which carry out advanced attempts at environmental accounting are either ones which fully conform to the MOE's guidelines or ones which have their own original environmental accounting guidelines.

Environmental costs have a signifsicant positive correlation with companies' sales, total assets and operating profits. There is also a significant positive correlation between environmental costs and economic effects (substantial effects).

This study has demonstrated that while the MOE's guideline has a strong influence on environmental accounting practice in Japanese corporations, differences according to company size and industrial sector also emerged. The MOE's guideline is likely to become more widely used, but at the same time there are some companies which are trying to expand the contents of their environmental accounting beyond guideline. Environmental accounting in Japanese companies exhibits complicated features since standardization is progressing in the midst of much diversity.

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Environmental Accounting of Listed Companies in Japan

日本企業の環境会計

－東証一部上場企業の実態調査－

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Purpose of Analysis
分析の目的

- To clarify the following points of environmental accounting information disclosure in Japanese corporations:
- **日本企業における環境会計情報の開示の実態について、次のことを明らかにする**

An analysis of some financial characteristics of corporate environmental accounting disclosure companies

① 環境会計情報開示企業の財務的特徴の分析

An analysis of the influence of the Ministry for the Environment's guideline on environmental accounting practices

② 環境会計実務に対する環境省ガイドラインの影響の分析

An analysis of the relationship between environmental costs and sales, and effects

③ 環境コストの額と売上高および効果等との関係の分析

Environmental Accounting Initiatives in Japan
日本をめぐる環境会計の現状

Major Governmental Initiatives

- **主要な政府機関のイニシャティブ**

"Environmental Accounting Guideline Draft", Ministry for the Environment, March 1999

- **1999年3月：環境庁「環境会計ガイドライン中間取りまとめ」**

"Environmental Accounting Guideline 2000", Ministry of Environment, May 2000

- **2000年5月：環境庁「環境会計ガイドライン2000年版」**

Study on the Development of Environmental Management Accounting → Ministry of Economy, Trade and Industry 1999-2001

- **1999-2001年：経済産業省→環境管理会計手法の開発のための調査**

Previous Research on Japanese Corporate Environmental Accounting
日本企業の環境会計に関する先行研究

- Japan Accounting Association 2000
- **日本会計研究学会(2000)**
  Subject for Study: First Section Market of Tokyo Stock Exchange and Osaka Securities Exchange
- **調査対象：東証・大証・名証一部上場**
  Time of Study: June 2000
- **調査時点：2000年6月**
  Number of Companies which disclosed environmental accounting information: 99
- **環境会計情報開示企業数：99社**
- Matsuo (2001)
- **松尾(2001)**
- Subject for Study: Companies for the Nikkei Environmental Management Study
- **調査対象：日経環境経営度調査対象企業**
  Time of Study: Unknown
- **調査時点：不明**
  Number of Companies who disclosed environmental accounting information: 98
- **環境会計情報開示企業数：98社**

Research Frame
本研究の分析フレーム

- Subject for Analysis: Companies listed on the First Section of the Tokyo Stock Exchange: 1430 Companies
- **分析対象：東証１部上場企業：1430社**
- Time of Analysis: At the end December 2000, when investigating whether to publish environmental reports
- **分析時点：2000年12月末時点で環境報告書の発行の有無を調査**
- Number of companies who published environmental reports 257 Companies (18.0%)
- **環境報告書発行企業数：257社（18.0%）**
- Number of companies who disclosed environmental accounting information : 184 Companies (71.6%)
- **環境会計情報開示企業数：184社（71.6%）**

Characteristics of Companies Disclosing Environmental Accounting Information
環境会計情報開示企業の特徴

- A test of the medium for environmental accounting disclosure and nondisclosure companies
- **環境会計情報開示企業と非開示企業の中位数の検定**
  No significant differences in sales, total assets and ROA
- **売上高、総資産、営業利益、営業利益率に関して有意な相違なし**
- A test of the medium for companies with and without environmental accounting compliance standards
- **環境会計の準拠基準がある企業と準拠基準のない企業の中位数の検定**
  A significant difference of 1% sales, total assets in operating profit
- **売上高、総資産、営業利益について１%水準で有意な差あり**

Environmental Accounting Disclosures and Types of Industries
環境会計情報開示に関する業種間での開示

- An analysis of whether the number of environmental accounting disclosure and non-disclosure differs by the type of industry
- **環境会計情報の開示・非開示の頻度が業種ごとで異なるかどうかの分析**
  Type classifications: construction, food products,textiles,paper pulp, chemical, transport equipment, electrical equipment, other manufacturing, commerce, other transport, electric power gas
- **業種区分：建設、食品、繊維・紙パルプ、化学他、輸送機器他、電気機器、その他製造、商業他、運輸他、電力ガス**
- Chi-Square independence analysis
- **カイ二乗分析による独立性の分析**
  Rejection of the null hypothesis that there is no difference in the type of industry by 1%
- **１%水準で業種間に差異はないという帰無仮説は棄却**

Influences of the Ministry of Environment (MOE) Guideline
環境省ガイドラインの影響

- Companies conform to the MOE's Guideline: 106 companies **(56.7%)**
- **環境省ガイドライン準拠企業（環境コストの表示方法）：106社（57.6%）**
- Companies employ Disclosure Format C: 49 companies (26.6%)
- **公表用フォーマットＣ表準拠企業：49社（26.6%）**
- Disclosure ratios of environmental conservation effects/economical effects being significantly different between corporations which conform and do not conform to the MOE's Guideline (Chi-Square test, level of 1%)
- **環境会計ガイドライン準拠企業と非準拠企業の間で、環境保全効果・経済効果の開示比率は有意に相違（カイ二乗検定、１%水準）**

Relationship between Environmental Costs and Some Financial Indicators
環境コストと財務指標の関係

- Correlation analysis of environmental costs, sales, total assets,operating income→correlation of 0.6 for non-consolidated information, a strong correlation of a minimum of 0.85 for consolidated information
- **環境コストと売上高、総資産、営業利益の相関分析→単体の場合は0.6程度の相関、連結の場合は0.85以上の強い相関**
  Correlation analysis of the environmental costs and economical effects (substantial effects)→0.7 correlation for non-consolidated information, 0.9 correlation for consolidated information
- **環境コストと経済効果（実質的効果）の相関分析→単体で0.7、連結で0.9の相関**

Conclusion
結論

- Characteristics of corporations who disclose environmental information
- **環境情報を開示する企業特性について**
- Influences of the MOE's Guideline
- **環境省ガイドラインの影響について**
- The Relationship between environmental costs, financial indicators and economic effects
- **環境コストと財務指標および効果額との関係について**

ENVIRONMENTAL ACCOUNTING IN KOREA:CASES AND POLICY OPTIONS

Dr. Byung-Wook Lee*

ABSTRACT

Environmental accounting is now rapidly coming-of-age, and many leading companies in advanced countries have responded proactively to the challenge. Compared with these companies, however, most companies in developing countries are still far behind in understanding, developing, or implementing environmental accounting.

In Korea, because a wide range of stakeholders such as shareholders, financial institutions, governments, and local communities have been interested in corporate environmental performance and its disclosure, some leading Korean companies have, since the mid-1990s, started to introduce environmental accounting. Also, a substantial increase in environmental costs has forced Korean companies to begin to integrate such costs into management decisions at different levels. However, the practice of corporate environmental accounting and performance reporting is still at an early stage in Korea.

In this context, this paper reviews the overall status of environmental accounting in Korea and presents some case studies of outstanding Korean companies. These case studies are a part of the outcome from a special project carried out by the POSCO Research Institute in consultation with the Korea-World Bank Environmental Cooperation Committee (KWECC).

Through the case studies, this paper examines current issues in environmental accounting and discusses some of the problems that need to be solved in the development of environmental accounting in Korea. Further, it proposes policy options for the introduction and promotion of environmental accounting in Korea and other developing countries.

1. INTRODUCTION

Recently, people have been much concerned about environmental problems such as exhaustion of resources, global warming, ozone depletion, acid rain, desertification, species decimation, and marine pollution. To solve these problems, many countries have established or reinforced environmental laws, provisions and international agreements. These environmental measures are sometimes closely connected with international trade. Therefore the environment becomes one of important factors in international business. This context has an important effect

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upon corporate business activities. Accordingly, the relationship between the environment and business management is of great and growing importance.

In line with this trend, the rapid increase in environmental costs has now caused companies to begin to integrate environmental aspects into managerial decisions at all levels. However, measuring and reporting corporate environmental performance are still at an infant stage in spite of the development of a number of methodologies and practices. In this context, environmental accounting has recently been considered as one of the most significant tools in promoting successful environmental management. This reflects the view that conventional accounting, which ignores most environmental externalities, is not appropriate for encouraging companies to manage their activities in an environmentally benign way.

Consequently, environmental degradation is almost inevitable, given current accounting practice. Conversely, many companies have now come to recognize that environmental accounting can play an important role in the prevention and restriction of negative environmental responses and in the facilitation of positive and proactive responses.

Under these circumstances, environmental accounting has been introduced or implemented in many leading companies, especially in Europe, North America and Japan. Compared with these advanced companies, however, most companies in developing countries are still well behind in understanding, developing or implementing environmental accounting in their business practices.

2. OVERVIEW OF ENVIRONMENTAL ACCOUNTING IN KOREA

As a wide range of stakeholders such as shareholders, financial institutions, government, and local communities have been interested in corporate environmental performance and its disclosure, since the mid-1990s some Korean companies have begun to examine the introduction of environmental accounting.

Environmental investment and costs of pollution prevention have increased in Korea, as shown in Table 1. This is in line with the emergence of green-consumerism, non-governmental organizations (NGOs)' environmental activities, and international trade barriers related to the environment. Some leading companies in Korea, such as POSCO, Samsung Electronics and LG Chemicals, have begun to consider environmental costs at in management decisions, because environmental costs have continually increased against total production costs.

Table 1. Corporate Pollution Abatement and Control Expense in Korea (million Won)

Field \ Year	1993	1994	1995	1996	1997	1998	1999
Air	700,789	797,651	916,888	957,276	1,284,333	46,034	1,140,798
Water & Soil	684,537	805,863	1,030,374	1,162,034	1,040,543	18,498	939,515
Waste	625,837	744,300	833,827	1,024,743	1,050,808	901,423	975,759
Noise & Vibration	68,502	92,583	74,599	79,849	62,830	50,054	69,785
Others	73,643	115,583	122,550	117,302	99,666	84,492	80,002
Byproduct sales in waste treatment (-)	7,801	9,363	11,659	12,164	16,297	17,152	20,793
Sum Annual Growth Rate (%)	2,145,507 (12.8)	2,546,617 (18.7)	2,966,579 (16.5)	3,329,040 (12.2)	3,521,883 (5.8)	2,883,349* (-18.1)	3,185,066 (10.5)

Note: * In 1998, the Korean economy went through an abrupt recession because of a monetary crisis in the region.
Source : Bank of Korea, Pollution Abatement and Control Expense in 1999, 2000

Furthermore, financial institutions such as banks and insurance companies have nowadays begun to be interested in appraising corporate environmental risk and performance when they lend or invest money. These changes pressured Korean companies into finding cost-effective ways to enhance their environmental performance.

As it continues, many companies are beginning to realize the importance of proactive environmental management strategy and environmental performance reporting. But, these changes are still at an early stage. The leading companies like POSCO, Samsung, LG and Hanhwa experience many difficulties with the introduction or implementation of environmental accounting. On the other hand, many other Korean companies do not recognize the concept of environmental accounting or understand how to implement it.

Meanwhile, in order to promote the environmental accounting practice in Korea and Asian developing countries, the Korean Ministry of Environment (KMOE) introduced a special project on " environmental accounting systems and environmental performance indicators " funded by the World Bank. In January 2000, the Korea-World Bank Environmental Cooperation Committee (KWECC) was organized to promote environmental management in Asia and launched three related projects including " environmental accounting and environmental performance indicators ".

Among these, the project on environmental accounting has been carried out by the POSCO Research Institute (POSRI) under the sponsorship and supervision of the KWECC from March 2000 to February 2001. This project aimed to develop a useful toolkit for assessing a company ' s environmental costs and performance more precisely and aimed to suggest a comprehensive methodological framework for the introduction of environmental accounting and performance evaluation schemes at the corporate level.

The project also considered a guideline for environmental accounting, which can be utilized in developing countries, and recommended some policy options that can facilitate the introduction

of these toolkits into business practice.

In line with the project, the Environmental Management Accounting Network - Asia Pacific (EMAN-AP) was initiated, in February 2001, during the World Bank Environmental Forum held in Korea. EMAN-AP plans to link the various efforts of organizations and individuals in the region towards developing and promoting environmental management accounting. EMAN-AP will be launched as a regional network for corporate environmental management accounting and independently operated in close relationship with EMAN-Europe and other regional networks.

The Network will be run with fourteen initial member countries including Korea, Japan, the Philippines, China, Indonesia, Taiwan, Thailand, Malaysia, Singapore, Hong Kong, Vietnam, India, Australia, and New Zealand.

At the same time, KMOE is developing a scheme for companies to include environmental accounting information in their environmental reports. Through this regulatory change, KMOE is trying to encourage Korean companies to implement environmental management in the whole range of their business processes.

In 2001, the Korea Accounting Institute (KAI) also published a report on an " Accounting Standard for Environmental Costs and Liabilities ", which covers a wide range of issues on environmental financial accounting. The report aimed to provide theoretical reviews and to propose relevant ways to introduce environmental financial accounting in Korea.

The report mainly covers definition and fields of environmental accounting, the conceptual framework for environmental financial accounting, practices of environmental accounting in Korea and a draft environmental accounting standard.

3. CASES ON ENVIRONMENTAL ACCOUNTING IN KOREA

As mentioned above, Korean companies have a growing interest in environmental accounting and a few companies actually have accumulated a little experience in environmental accounting. Three case studies are presented in this paper. These include the cases of POSCO, Samsung Electronics and LG Chemicals, which have had some practice with environmental accounting and have produced information on environmental costs.

3.1. POSCO

3.1.1. Profile of the Company

Founded in 1968 as a public corporation, Pohang Iron and Steel Corporation (POSCO) is one of the world ' s largest steel-makers with an annual production capacity of 28 million tons, and operates two steel works in Pohang and Kwangyang. The company produces hot rolled sheet, cold rolled sheet, wire rod, electrical steel, and stainless steel. In 1999, POSCO employed around 20,000 people and had a turnover of 10,696 billion won (US$9.5 billion).

Since commencing its business, the company has recognized that environmental preservation is one of the most important aspects of doing business. Therefore, it enacted the ' POSCO Environmental Policy ' in 1995 and adopted an environmental management system based on ISO 14001 standards in 1996.

Furthermore, POSCO has recently switched its environmental policy from the conventional passive monitoring activities to a proactive effort aimed at preventing environmental accidents and constantly enhancing environmental performance in cooperation with the local community.

The company has invested nearly 10 percent of its total investment in environmental protection for this purpose, and is gradually planning to increase the scale of its investment. As a result of its proactive effort and investment, POSCO has achieved cleanliness ratings that are four to five times higher than a level stipulated by relevant laws.

3.1.2. Environmental Accounting Practices of the Company

POSCO has produced information on environmental costs since the 1990s, but the information did not satisfy company management. So, the company launched a special project to develop its new environmental accounting scheme in December 1999.

For the project, a research team was organized with the staff of the company s Environment & Energy Team and experts of the Environmental Management Center in the POSCO Research Institute (POSRI). Before beginning the research in earnest, the research team established the following four stages for the work.

- First stage: identifying environmental costs which are hidden in overhead costs
- Second stage: allocating environmental costs to each cost center which causes the costs
- Third stage: calculating and reporting environmental benefits and liabilities
- Fourth stage: integrating information on environmental accounting in management decision-making

However, POSCO recognized that it is difficult to calculate environmental benefits and liabilities because they are calculated in arbitrary ways, and the Institute decided to tackle the first and second stages among the four stages as this first trial. The company thinks, however, that environmental benefits and liabilities will have to be calculated in the near future.

Based on the scope of this project, the company defined environmental costs as follows:

- Environmental costs are direct or indirect costs related to the operation of environmental equipment used to remove or reduce air and water pollutants. Moreover, they also

include costs for disposing or recycling waste and for other environmental activities.

Under the definition, the company divided its environmental costs into costs for preserving air quality and water quality, costs for disposing and recycling wastes and other costs. The detailed cost items are shown in Table 2.

Table 2. Classification of Environmental Costs in POSCO

Level 1	Level 2	Level 3
Air Quality Management	Depreciation Costs	
	Electricity Costs	
	Material Costs	• Costs for chemicals
	Repair or Maintenance Costs	• Material costs • Costs for external service • Labour costs
	Labour Costs	• Labour factory costs • Labour office costs
	R&D Costs	
	Costs for Energy Substitution	
	Emission Charge on Air Pollution	
	Others	• Test or measurement fees of equipment discharging air pollutants • Measurement costs of dust collectors • Test costs for Tele-metering System • General expenses
Water Quality Management	Depreciation Costs	
	Electricity Costs	
	Material Costs	• Costs for chemicals
	Repair or Maintenance Costs	• Material costs • Costs for external service • Labour costs
	Labour Costs	• Labour factory costs • Labour office costs
	R&D Costs	
	Emission Charge on Water Pollution	
	Others	• Test or measurement fees of equipment discharging water pollutants • Costs for preventing sea pollution • Costs for external service • General expenses
Waste Management	Transportation Costs	
	Incineration Costs	
	Reclamation Costs	
	Costs for By-Product Processing	
	Recycling Promotion Costs	
	Costs for Wastes Processing	
	Costs for Disposing Wastes on Commission	
	Labour Costs	• Labour factory costs • Labour office costs
	R& D Costs	
	Others	• General expenses
Others	Education Costs	
	Costs for Operating EMS	• Post-audit costs • Costs for publishing environmental report
	Costs for External Cooperation	
	Costs for Afforestation	• Labor office costs
	Labour Costs	

Because the above-mentioned environmental costs are mostly incurred through operating environmental protection equipment or facilities, it is necessary to define conceptual characteristics and scope of environmental assets before calculating environmental costs. It was, however, difficult to find any general definition or scope of the environmental assets. Therefore, POSCO defined environmental assets as follows:

· Environmental assets are all equipment and facilities operated for preventing environmental pollution.

Under this definition, when certain equipment or facilities are purchased mainly for the purpose of environmental protection, the company recognizes them as environmental assets. In general, however, much of the equipment or facilities is multi-purpose or multi-functional. In such cases, it is normally very difficult to decide whether certain equipment is an environmental asset. The same situation exists in POSCO.

To solve the issue, when certain equipment or facilities are used for environmental protection over 50 percent of the time, the company determined to recognize them as environmental assets. The judgment to determine a figure of 50 percent is made by the person working for environmental preservation in factories. This is a somewhat arbitrary figure, but it can be a useful method in practice.

After defining environmental assets, POSCO re-arranged the coding structure of all the company's assets to recognize environmental costs incurred from operating environmental assets in its computerized costing process. Even though it has some difficulties in adopting a new coding system, it is a different case in POSCO because the company is in process of re-arranging its assets coding structure prior to the launch of an 'enterprise resources planning' (ERP) system in mid-2001.

Further, POSCO plans to measure and allocate environmental costs more accurately through an Activity-Based Costing (ABC) method to be introduced in mid-2001.

3.2. Samsung Electronics

3.2.1. Profile of the Company

Founded in 1938, Samsung Electronics is the world-leading manufacturer of memory devices, and also leads the world semiconductor industry in development after designing a 256-megabit DRAM (dynamic random access memory), a one-gigabit DRAM, and the entire production process technology for 4-gigabit DRAM. The company accomplished net sales of US$22.8 billion with 43,000 employees in 1999.

Samsung Electronics has recently positioned itself in four main business units: Digital Media, Semiconductors, Information & Communications, and Home Appliances, producing the world's most innovative digital components with the intention that everyone will recognize them as being the best in the world.

On the other hand, Samsung Electronics has tried to improve the quality of life by engaging in business activities that respect both people and nature. For the purpose, the company first announced its 'Environmental Policy' in June 1992, and declared the 'Samsung Green

Management Charter ' in May 1996. Now the company s philosophy focuses on minimizing environmental impacts created by its business activities.

3.2.2. Environmental Accounting Practices in Onyang Plant

Onyang Plant of Samsung Electronics was established in 1990 as a Semiconductor Assembly & Testing Plant. In 1998, the plant was very interested in calculating environmental costs, but did not have a company-wide guideline for calculating environmental costs. In consequence, in 1998, the plant developed its own guideline and calculated its first specific environmental costs using this guideline.

In the company, environmental costs include the following:

- Costs related to environmental facilities including both pollution-prevention and damage rectification facilities;
- Costs related to waste disposal; and
- Costs for improving the efficiency of pollution prevention facilities.

Under this definition, its environmental costs are divided into 4 categories: air, water, waste and others. The costs are classified into direct costs and indirect costs. The former are directly traceable to each category while the latter cannot be directly traceable to a specific category and need to be allocated. Detailed environmental costs of the plant are classified as shown in Table 3.

Environmental costs that are calculated are not allocated to each cost center using a sophisticated allocation basis. However, the company recognizes that a sophisticated allocation basis is required to calculate environmental costs of products.

On the other hand, there is no specific evidence that the available information on environmental costs has been used for decision-making in the company, however the information is reported to the most senior executives.

3.3. LG Chemicals

3.3.1. Profile of the Company

Founded in 1947, LG Chemicals is the largest chemical company in Korea. Its major business fields are life science, information & electronic materials, petrochemicals, health care and household goods. Its sales were US$3,969 million and its asset were US$4,911 million with around 11,000 employees in 1999. Now, the company has eight manufacturing sites in Korea.

LG Chemicals considers environmental protection as its utmost importance in order to become an enterprise of practicing environment-focused management. To realize the

Table 3. Classification of Environmental Costs in Samsung Electronics

Category	Cost Items	
	Direct Cost	Indirect Costs
Air	Depreciation costs	• Indirect supporting costs: Authority and permission, information collection, others • TMS: Depreciation costs, Labour cots, Repair costs • Laboratory: Labour costs, Chemical costs, Equipment depreciation costs, Repair costs, Costs for measuring pollution around plant, External test costs, U/T indirect labor costs • Operating & Maintenance labor cost
	Labour costs	
	Electricity costs	
	Repair costs	
	Material costs	
	Chemical costs	
Water	Depreciation costs	
	Labour costs	
	Electricity costs	
	Repair costs	
	Material costs	
	Chemical costs	
Waste	Costs for waste water treatment	• Indirect supporting costs: Authority and permission, information collection, others • Indirect labour costs • Lift depreciation costs
	Depreciation costs of weighing machine	
	Warehouse for waste: Depreciation costs, Labour costs, Repair costs	
	Attached facilities depreciation costs	
	Waste crusher: Depreciation costs,	
	Repair costs	
	Waste acid: Depreciation costs of waste acid treatment site, Labour costs, External service costs, Repair costs, Energy costs	
	Costs for analysis of waste acid sludge	
Others	Education costs, Association fee, External relation costs, Costs for publication, Other labor costs, General expense, External service costs for night soil treatment	

consideration, the company declared ' Environmental Policy ' in 1997 and set up ' Environmental Safety Committee '. Especially, its eight plants have had practices on environmental accounting.

This study focuses on the case of its Cheongju plant which is a large facility for producing many kinds of chemical products such as cosmetics, household goods, flooring, and information & electronic materials. Even though it is one of the biggest chemical works in Korea, it doesn 't discharge a drop of wastewater.

3.3.2. Environmental Accounting Practices in Cheongju Plant

Environment and Safety Team in LG Chemicals initiated the environmental costing project to standardize measurement process of environmental costs in 1996. The project focused on classification of environmental costs, segregation of environmental costs from non-environmental costs, calculation and systematic management of environmental costs.

LG Chemicals classified its environmental costs into proactive environmental costs and ex-post environmental costs. The specific classification is shown in Table 4.

In Table 4, proactive environmental costs are incurred in pollution prevention activities, and consist of costs for pollution prevention at source, pollution treatment/ disposal costs and

stakeholder costs. Ex-post environmental costs are incurred to remedy or restore the environmental damage that have already occurred. The Ex-post costs include fines and penalties incurred from non-compliance with environmental regulations and compensation to third parties for loss or injury caused by environmental pollution and damage in the past.

After classifying the environmental costs, the company examined which cost accounts in the

Table 4. Classification of environmental Costs in LG Chemicals

Cost Items	Level 1	Level 2
Proactive Costs	Pollution Prevention Costs	R&D
		Facility Replacement Costs for Clean Process
		Utility Replacement Costs
		EMS Costs
	Pollution Treatment	Acquisition & Installation of Environmental Facilities
		Measurement Costs
		Maintenance & Operating Costs of Environmental Facilities
		Environmental Utility Costs
		Treatment or Disposal Costs
		Environmental Related to Operation & Administration Costs
	Stakeholder Costs	Law Compliance Costs
		Public Relation Costs
		Advertising Costs
Ex-post Costs	Taxes &Charge	Taxes
		Environmental Charges
		Environmental Deposits
	Fines & Penalties	
	Compensation to the Third Parties	
	Opportunity Costs	

conventional accounting system match with items of environmental costs. However, the examination did not provide any objective criteria about the distinction between environmental and non-environmental costs. This situation makes the cost information collected unreliable. Therefore, information on environmental costs generated is now not sufficiently utilized in the company.

3.4. Implications

The three companies were concerned about, and introduced, environmental accounting for the following common reasons in the 1990s:

- To identify precisely environmental costs hidden in indirect cost;
- To establish and implement comprehensive environmental management system;
- To evaluate performance of their environmental management;
- To invest in environmental projects more efficiently; and
- To consider information on environmental costs in product price decisions.

Practices of environmental accounting in the three companies are now primarily focused on management accounting. They are only measuring environmental costs. Measurement of environmental benefits is in an early stage. Moreover, the three companies mainly manage environmental costs related to end-of-pipe environmental facilities and equipment and still do not include social or global environmental costs such as ozone depletion, or climate change.

The three companies do not disclose information about environmental costs in their annual environmental reports. However, they are trying to produce credible information on environmental costs and, after the trial, they are going to disclose environmental accounting information.

Three issues found through these case studies are summarized below:

· Need to develop a specific guideline for calculation and allocation of environmental costs.

Practices measuring and allocating environmental costs are now mainly based not on a theoretical framework or specific guideline but on the environmental department's intuition or experience. Moreover, two of the companies (the exception being POSCO) have no specific guidelines for the allocation of environmental costs to each cost center. This is a crucial problem because incorrect cost allocation can distort corporate decision-making.

Accordingly, first it is necessary to accomplish a specific field survey and then the three companies can build a better guideline for measuring and allocating environmental costs.

It may be appropriate for ABC to be adopted as in the process it could turn many manufacturing overhead costs related to the environment into direct costs. Hence, appropriate selection of environmental activities and cost drivers through ABC allows companies to trace many environmental overhead costs to cost objects and may give management of the company a better overview of environmental costs.

· More understanding about utilizing environmental accounting information.

To utilize information produced about environmental costs successfully, it is necessary for a company's management to have an understanding about its general and specific uses.

· Needs close cooperation with the accounting department.

It was found in all three cases that the information on environmental costs has only been produced by the environmental departments, and these have no professional knowledge about accounting practices. This is a common situation in Korean companies because accounting staff

are normally not familiar with environmental accounting and most accounting managers are conservative about changing their practices.

However, to measure effectively and allocate environmental costs, it is necessary for the environmental department to cooperate closely with the accounting department. Accordingly, companies have to encourage accounting staff to participate actively in environmental accounting projects.

4. DISCUSSIONS ON POLICY OPTIONS

To promote introduction and implementation of environmental accounting in Korean companies, first of all, it is necessary for the government to provide an environmental accounting guideline, and then stimulate various stakeholders in their demands for information derived from corporate environmental accounting systems. To this end, government needs to develop appropriate policy options for corporate environmental accounting. In this context, it is recommended that a step-wise approach be adopted as follows:

- First stage: establish infrastructure by organizing a working group and benchmarking best practices on environmental accounting in advanced companies;
- Second stage: develop and provide an environmental accounting guideline and run pilot programs; and
- Third stage: activate environmental accounting through environmental reporting and auditing.

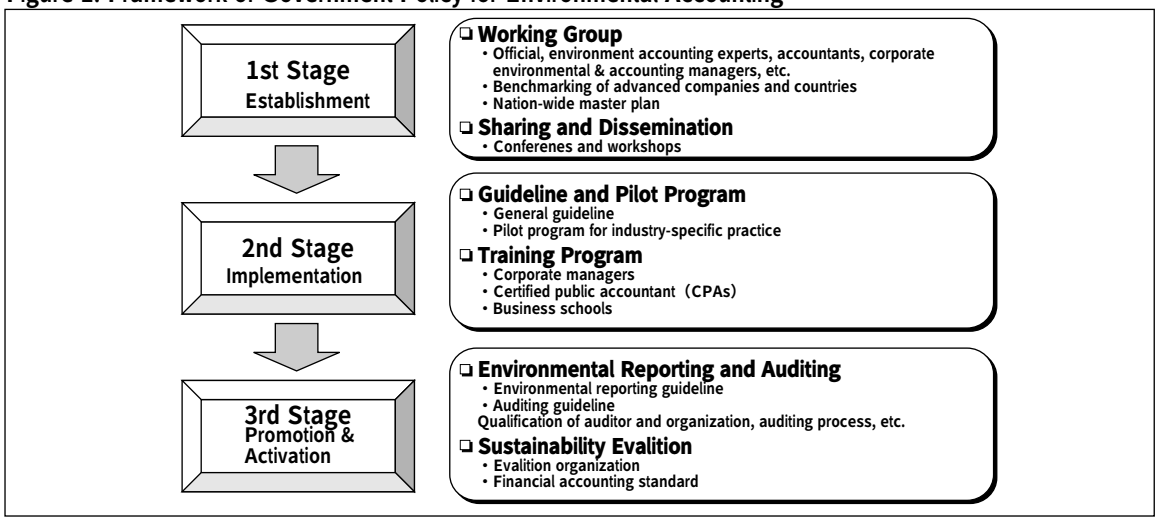
4.1. Establishment of Infrastructure: 1st Stage

As an initial measure in the introduction of environmental accounting, it is necessary to organize a working group composed of government officers, environmental accounting experts, and corporate accounting and environmental managers. Cooperation and common understanding between these participants are crucial factors for establishing the infrastructure for promoting environmental accounting. Main roles of the working group are as follows:

- To survey international and domestic studies on environmental accounting;
- To analyze various guidelines and best practices;
- To build up a network with international expert groups such as EMAN-AP;
- To develop an environmental accounting guideline considered the country-specific business practices;
- To establish a nation-wide program to introduce and implement environmental accounting; and

· To assign roles and tasks to related government bodies such as Environment, Industry, Finance & Economy, Financial Supervisory Service, etc.

Figure 1. Framework of Government Policy for Environmental Accounting



Meanwhile, the working group holds seminars to disseminate international trends and the state of the art on environmental accounting, and to share its importance with corporate managers. Through these efforts, it may be possible to expand recognition of environmental accounting issues amongst managers and to gain acknowledgement of the importance of environmental accounting from top corporate management.

4.2. Implementation: 2nd Stage

In addition to the first stage, it is necessary that the government plays an important role in implementing environmental accounting in corporate practice. This is the second stage. It has two components. One is to provide a country-specific guideline on environmental management accounting, which can be developed by the working group. The second is to run a pilot program for applying the guideline to several leading companies.

Based on the results of the pilot program, it is then necessary to review and revise the guidelines. In the process of setting the guidelines it is necessary to examine and reflect upon the substance of international guidelines. The guidelines may cover definition, scope and classification of environmental cost, and measuring methods. As these guidelines will show a general way of implementing environmental management accounting, it is necessary that more sophisticated guidance for each industry be developed.

In addition, the government can offer training opportunities to company staff in the practical application of environmental accounting. Certified public accountants (CPAs) also need to take

part in this training program in relation to their role in environmental accounting.

In the United States, accountants attend training programs managed by the BEAC (the Board of Environmental Auditor Certifications). After completing the training course, they are qualified to audit environmental reports. Likewise, the KICPA (the Korea Institute of CPA) can provide CPAs with training programs on environmental accounting. Finally, it is also recommended that business schools add environmental accounting to their curricula.

4. 3. Promotion & Activation: 3rd Stage

At the third stage, the government needs to establish a regulatory framework for corporate environmental reporting and auditing. Environmental reporting is a useful tool for evaluating environmental performance which can be closely related to corporate value, and to deliver corporate environmental accounting information to stakeholders.

Government can raise a wide range of stakeholders ' concerns about environmental accounting information and performance evaluation by promoting published environmental reports. To propose an international standard on environmental reporting, the Global Reporting Initiative (GRI) has developed the Sustainability Reporting Guidelines. With some adjustment, companies can utilize this guideline for publishing their environmental reports.

In addition, some issues on the qualification of auditors and auditing processes of environmental reports should be carefully examined. To audit environmental reports fairly and transparently, the government should prepare some measures regarding the qualification of auditing organizations and auditors, and auditing standards and processes.

On the other hand, many financial institutions are nowadays becoming more interested in corporate environmental performance. Therefore, the government can utilize the financial sector as a driving force to transform companies into being greener (see, for example, see efforts of the UNEP Finance Initiatives). To this end, it is necessary, for the government to support the finance sector to develop useful tools for environmental risk assessment.

When the finance sector actively assesses corporate environmental risks and performance, and also demands environmental accounting information, it becomes common practice for companies to introduce and implement environmental accounting. At this stage, the establishment of an organization that appraises corporate sustainability in a professional way can be considered. The roles of such an organization are:

- To rate corporate sustainability by assessing environmental, social, and economic performance and risk; and
- To provide the information to financial institutions.

5. CONCLUSION

Even though Korean companies are still at the early stage in environmental accounting they have a great potential for introducing and implementing environmental accounting. External pressures from the government, international standards, and NGOs also play an important role for companies to increase their interest in environmental accounting.

The policy options recommended in this paper can be one of the possible ways for applying environmental accounting to other countries as well as Korea. However, this paper does not cover the area of environmental financial accounting which is another equally important area. In the near future, therefore, it will be necessary to examine how to include environmental aspects in financial accounting standards.

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Environmental Accounting in Korea
:cases and policy recommendations

September , 2001

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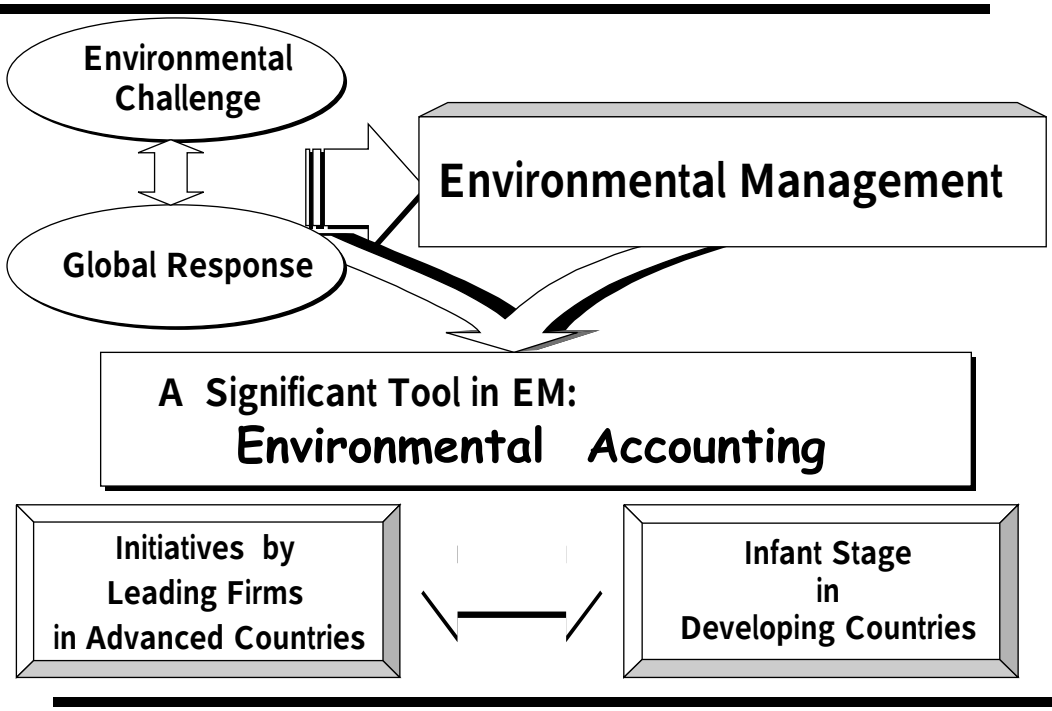
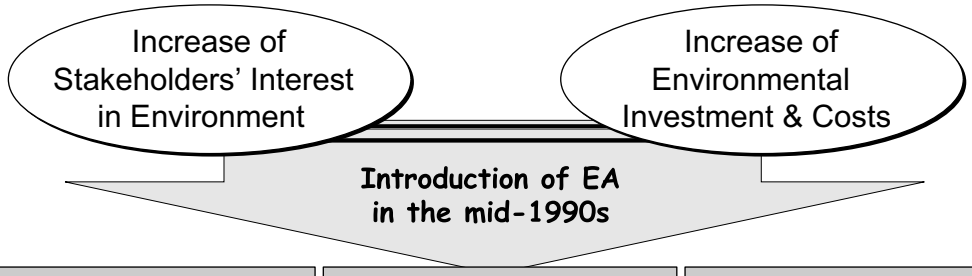
Introduction



Overview of EA in Korea (I)



Some Leading Companies	Many Other Companies	Financial Institutions
• Realizing the Importance of Proactive Environmental Management Strategy • Beginning to Consider Environmental Costs in Management Decisions • Still Early Stage	• Not Recognizing and Understanding the Concept of EA	• Increasing Interest in Corporate Environmental Risk and Performance

Overview of EA in Korea (II)

■ To Promote EA:

♣ KMOE (Korean Ministry of Environment)

- Organizing the Korea-World Bank Environmental Cooperation Committee(KWECC)
- Launching Three Environmental Projects Funded by the World Bank
- Holding World Bank Environmental Forum(2001.2)
  - Initiating Environmental Management Accounting Network-Asia Pacific (EMAN-AP)

♣ POSRI(POSCO Research Institute)

- Carrying out one of the Three Projects Launched by KMOE/WB: 'Environmental Accounting Systems and Environmental Performance Indicators'(2000.3 ~ 2001.2)
- Purpose of the Project
  - To Develop Useful Toolkits for Assessing a Company's Environmental Costs and Performance
  - To Suggest a Comprehensive Methodological Framework for Introduction of Environmental Accounting

♣ Korea Accounting Institute(KAI)

- Publishing a Report of 'Accounting Standard for Environmental Costs and Liabilities'

Case Ⅰ - POSCO

PROFILE

- Founded in 1968
- World Largest Steel - Makers
- Production Capacity: 28 Million tons, Sales: $9.5 Billion(1999)
- ISO 14001 Certification(1996)

■ EA Practices:

♣ Start a Special Project to Develop New EA Scheme in 1999

- Scope of the Project:
  - ➢ Identifying and Allocating Environmental Costs
  - ➢ Identifying Environmental Assets

♣ Classification of Environmental Costs

- Four Categories: Air, Water, Waste, and Others

♣ Definition of Environmental Assets `

- All Equipment and Facilities Operated to Prevent Environmental Pollution
- Judgment by 50% Rule

♣ Future Plan: Measuring Environmental Benefits

Case Ⅱ – Samsung Electronics

PROFILE

- Founded in 1938
- World Leading Manufactures of Memory Devices
- Sales: $22.8 Billion(1999)
- Environmental Policy(1992), 'Samsung Green Management Charter' (1996)

■ EA Practices:

♣ Start a Project to Develop Guidelines on Environmental Cost in 1998

- Scope of the Project:
  - ➢ Identifying Environmental Costs
  - ➢ Identifying Environmental Assets

♣ Classification of Environmental Costs

- 4 Categories: Air, Water, Waste, Others / 2 Categories: Direct and Indirect Costs

♣ Definition of Environmental Assets

- Environmental Facilities Including both Pollution - Prevention & Damage Rectification Facilities

♣ Future Plan: Allocating Environmental Costs to Each Cost Center

Case III –LG Chemicals

PROFILE

- Founded in 1962
- The Largest Chemical Company in Korea
- Sales: $4.0 Billion(1999)
- Organizing the 'Environmental Safety Committee'(1997)

■ EA Practices:

♣ Start a Special Project to Standardize Measuring Process of Environmental Costs in 1996

- Scope of the Project:
  - ➢ Classifying Environmental Costs
  - ➢ Segregating Environmental Costs from Non-environmental Costs

♣ Classification of Environmental Costs

- Two Categories: Proactive Costs & Ex-Post Costs
- Main Cost Items: Pollution Prevention Costs, Pollution Treatment, Stakeholder Costs, Taxes, Fines, Compensation to the Third Parties, Opportunity Costs

♣ Future Plan: Integrating Environmental Costs Information in Management Decision-Making Process

Implication from Cases (I)

■ Common Reasons to Introduce EA:

♣ To Precisely Identify Environmental Costs Hidden in Indirect Cost

♣ To Establish & Implement Comprehensive Environmental Management System

♣ To Evaluate Performance of Environmental Management

♣ To Invest in Environmental Projects More Efficiently

♣ To Consider Information on Environmental Costs in Product Price Decisions

■ Common Aspects on EA Practices:

♣ Focusing on Management Accounting

♣ Measuring only Environmental Costs

♣ Managing mainly Environmental Costs related to End-of-pipe Environmental Equipment & Facilities

♣ Not Disclosing the Information on Environmental Costs in Annual Environmental Reports

♣ Producing the Information by only Environmental Department

Implication from Cases (II)

■ Remained Issues:

♣ Need to Develop Specific Guidelines for Calculation and Allocation of Environmental Costs

- Measurement of Environmental Costs Based not on a Theoretical Framework or Specific Guideline but on the Intuition or Experience of Environmental Department
  - ➢ Need to Accomplish Specific Field Studies
  - ➢ Need to Adopt ABC(Activity - Based Costing) to Turn Environmental Costs into Direct Costs

♣ Need to Understand How to Utilize the Information on Environmental Accounting

♣ Need Close Cooperation with the Accounting Department

Policy Recommendations (I)

■ First Stage: Establishment of Infrastructure on EA

♣ To Organize Working Group Composed of Government Officers, EA Experts, Corporate Accounting and Environmental Managers

♣ Main Roles of the Working Group

- To Survey International and Domestic Studies on EA
- To Analyze Various Guidelines and Best Practices
- To Build up a Network with International Expert Groups such as EMAN-AP
- To Develop an EA Guideline Considered the Country - specific Business Practices
- To Establish a Nation - wide Program to Introduce and Implement EA
- To Assign Roles and Tasks to Government Bodies such as Environment, Industry, Finance & Economy, Financial Supervisory Service, etc.
- To Share and Disseminate Information on EA by Holding Seminars, Conference or Workshops

Policy Recommendations (II)

■ Second Stage: Implementation of EA

♣ Role of Government

- To Provide Companies with a Country - specific Guideline on Environmental Management Accounting
- To Run a Pilot Program for Applying the Guideline to Several Leading Companies
- To Offer Training Program : Especially, for Corporate Staff & Certified Public Accountants(CPAs)

♣ Role of the Working Group

- To Review & Revise the Guidelines based on the Results of the Pilot Program
- To Develop the More Sophisticated Guidance for Each Industry

♣ Others

- To Launch Environmental Accounting on the Curricula of Business Schools

Policy Recommendations (III)

■ Third Stage: Promotion & Activation of EA

♣ Role of Government

- To Establish a Regulatory Framework for Corporate Environmental Reporting & Auditing
- To Raise Stakeholders' Concerns on EA
- To Prepare Some Measures Regarding the Qualification of Auditing Organizations & Auditors, and Auditing Process of Environmental Report
- To Utilize the Financial Sector as a Driving Force to Transform Companies into being Greener
- To Support the Financial Sector to Develop Useful Tools for Environmental Risk Assessment and Credit Evaluation
- To Establish an Organization that Appraises Corporate Sustainability in a Professional Way

Remarks

- Increase of the External Pressure to Introduce EA
  - NGOs, International Standard, Governments, Financial Sector, Customers, etc.
- Still Early Stage in Introducing EA
- A Project for EMA Pilot Program: MOCIE (Oct. 2001~)
- Need to Consider Environmental Aspects in Financial Accounting Scheme

CONTEMPORARY ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) DEVELOPMENTS IN AUSTRALIA.

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Summary of presentation:

This presentation has been developed in two parts. First, a framework, based on decision making and that will be of use to managers at different levels in organizations, is developed and tools of EMA which might be of interest are linked to the different management functions. Second, an examination of how contemporary developments in EMA in Australia map onto the framework is presented. The conclusion is that there are a number of gaps where no developments are taking place, but that Australia is focussed on many of the key issues in EMA development and promotion.

CONTEMPORARY ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) IN AUSTRALIA.

1. A Framework for Analysis

Lack of a comprehensive framework to map existing EMA-tools hinders more widespread use and adoption of EMA-tools in business as no clear guidance is provided on which tools are pertinent for which business decision contexts. Therefore, the aim of this paper is, first, to develop a comprehensive framework to map all the different EMA-tools. Such a framework facilitates the appropriate application of EMA and shows which EMA tools meet the requirements of, and could be useful for, different business actors in different decision contexts.

Second, the framework is examined in the context of recent EMA developments in Australia.

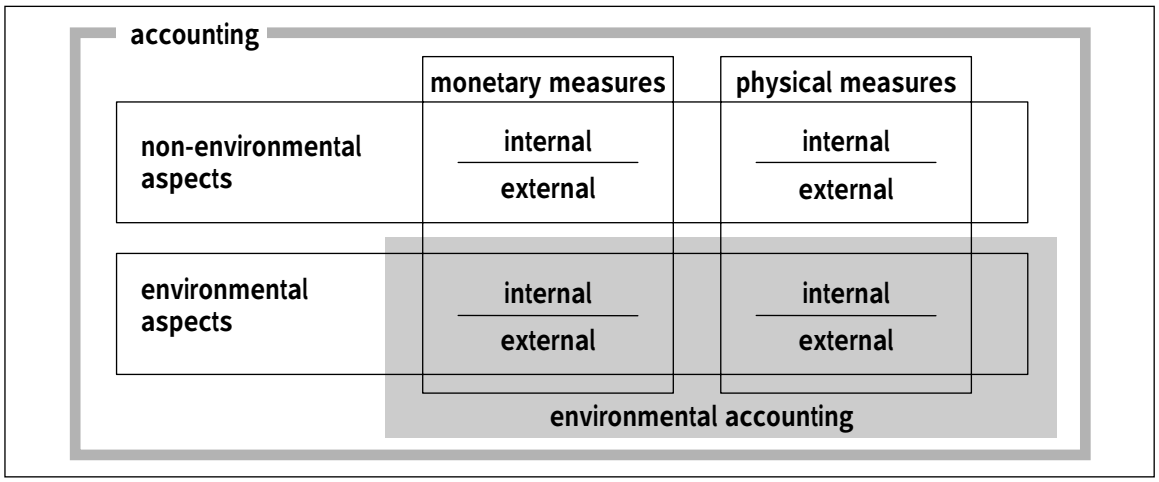

Figure 1. Scope and delineation of environmental accounting (Source: Burritt et al.2001).

Environmental Accounting, as seen in Figure 1, is taken to be the aspects of accounting, both internal and external, that examine environmental impacts of a business in monetary and physical terms.[1] Environmental impacts, in accordance with ISO 14001, are defined as " any change to the environment, whether adverse or beneficial, wholly or partially resulting from activities, products and services of the organization "(para. 3).

Environmental Management Accounting (EMA) is seen as the internal aspect of environmental accounting, but it also provides an important foundation for external environmental accounting. ISO 14001 has a strict definition of an environmental aspect as being a component of an organization ṡ activities, products and services which are likely to interact with the environment (para.3). However, in this paper, internal aspects relate to information about environmental impacts and aspects that are used internally by management. In Figure 2, attention is drawn to two particular components of internal environmental accounting systems (see the grey shaded area) - monetary, represented as Monetary Environmental Management Accounting (MEMA), and physical, which is represented as Physical Environmental Management Accounting (PEMA).

1) The basic framework has been developed in Burritt, Hahn and Schaltegger (2001) forthcoming.

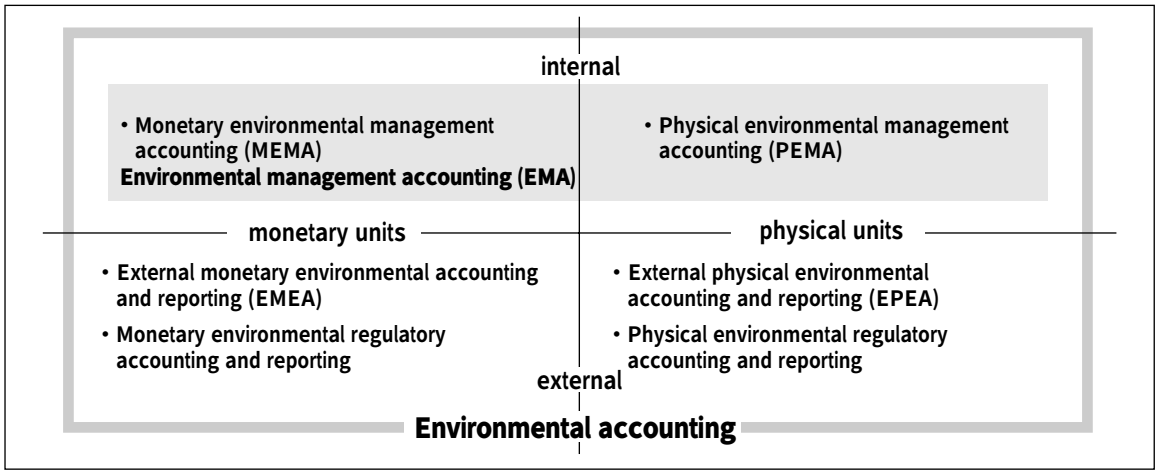

Figure 2. Environmental accounting systems (Source: Burritt et al. 2001 modified from Bartolomeo et al. 2000, 33)

Extending this framework further, the components of EMA can be divided into a number of bi-polar classes that represent particular needs of management, for example:

- The need for regular or ad hoc information;
- The need for information related to short term or long term situations; and
- The need for information about the past and present, or information about the future.

All three classes are needed to help with management planning, control, decision making, motivation, measurement of income and assets as a basis for external reporting, and cost justification or reimbursement (Horngren et al 2000, 498).

		Environmental Management Accounting (EMA)			
		Monetary Environmental Management Accounting (MEMA)		Physical Environmental Management Accounting (PEMA)	
		Short Term Focus	Long Term Focus	Short Term Focus	Long Term Focus
Past Oriented	Routinely generated information	1. Environmental cost accounting (e.g. variable costing, absorption costing, and activity based costing)	2. Environmentally induced capital expenditure and revenues	9. Material and energy flow accounting (short term impacts on the environment-product, site, division and company levels). Ecological footprint analysis.	10. Environmental (or natural) capital impact accounting
	Ad hoc information	3. Ex post assessment of relevant environmental costing decisions	4. Environmental life cycle (and target) costing Post investment assessment of individual projects	11. Ex post assessment of short term environmental impacts (e.g. of a site or product)	12. Life cycle inventories Post investment assessment of physical environmental investment appraisal
Future Oriented	Routinely generated information	5. Monetary environmental operational budgeting (flows) Monetary environmental capital budge-ting (stocks)	6. Environmental long term financial planning	13. Physical environmental budgeting (flows and stocks) (e.g. material and energy flow activity based budgeting)	14. Long term physical environmental planning
	Ad hoc information	7. Relevant environmental costing (e.g. special orders, product mix with capacity constraint)	8. Monetary environmental project investment appraisal Environmental life cycle budgeting and target pricing	15. Relevant environmental impacts (e.g. given short run constraints on activities)	16. Physical environmental investment appraisal Life cycle analysis of specific project

Figure 3, provides a summary of these needs and draws attention to a set of EMA tools that can be used by managers to address each of these needs. Although this set of tools is still being extended as EMA develops, the tools do not provide the main focus of this presentation. Instead, developments in Australia are the main focus.

Figure 3, provides a summary of these needs and draws attention to a set of EMA tools that can be used by managers to address each of these needs. Although this set of tools is still being extended as EMA develops, the tools do not provide the main focus of this presentation. Instead, developments in Australia are the main focus.

One other element in the framework is required before examining contemporary EMA in Australia. It is necessary to break down the black box of management - what managers do and what types of information and EMA tools are of particular interest to them. A simple, but effective, way to address this issue is to base the classification upon the work of Porter (1985) because he recognizes all functions in the value chain. Figure 4 identifies the various functions. Each function has a manager in charge. Some managers have an overview of a number of

functions (eg top management), while others are responsible for their own specific function (eg production).

Figure 4. Value chain and internal corporate EMA users (based on Porter 1985, p. 37)

Given this overall framework, it is possible to locate the different types of manager in a matrix that is linked with their main information needs - short or long term, regular or ad hoc, etc.

2. Contemporary developments in EMA in Australia.

Using the framework introduced above it is possible to map recent developments in EMA in Australia based on public and industry initiatives (rather than consideration of conceptual issues). Some of these are captured and further discussed below.

Before examining these developments it is worth pointing out that there are a number of reasons why EMA in Australia is not as advanced as it is in the USA or Europe:

- public disclosure - the voluntary disclosure of environmental information is less developed than in North America and Europe, although Australia is moving forward;
- legislation - the enforcement of environmental legislation and the disclosure requirements for companies and superannuation trustees in relation to environmental issues is less onerous than North American and European systems, but recent changes to Company Law remain in place;
- market size - the supply of products and services that incorporate environmental principles is restricted by small market size, except where international markets are involved; and
- awareness - despite a high level of concern about environmental issues in the community, this has not been translated into a significant investment in " green " products or active

campaigning to promote sustainable corporate practices.

However, several initiatives are taking place, a selection of which follows. These are separated in to direct influences over EMA and indirect influences over EMA (see Schaltegger et al. 2000b).

- direct influences over EMA
  - a) Self Assessment for Corporations
  - b) EMA project

- indirect influences over EMA
  - c) Public Environmental Reporting
  - d) Financial Sector Projects Team
  - e) Mandatory Disclosure
  - f) National Pollutant Inventory
  - g) Greening Local Government
  - h) Carbon Accounting
  - i) AASB 1037
  - j) Petroleum Refining Capacity

Direct Influences:

a) Total Environment Centre, Sydney - Environmental Sustainability Self-Assessment for Corporations.

The Total Environment Centre is a not-for-profit, non-government organisation funded mainly by public donations. The Centre campaigns for environmental improvement. It sought to produce a practical self-assessment tool, based on the Commonwealth ṡ Public Environmental Reporting, to help encourage continual improvement in corporate environmental performance through partnerships with companies to develop a six step process: compliance with regulations; awareness of environmental sustainability; environmental reporting; community engagement; commitment to continual improvement in performance; and to move beyond compliance with legislation. The tool was published in May 2001.[2)]

Classification: This self-assessment tool developed by an NGO for internal use by top and environmental management emphasizes physical performance measures that can reflect past

2) Available at http://tec.nccnsw.org.au/member/tec/projects/upload/esarep.pdf

		Environmental Management Accounting (EMA)			
		Monetary Environmental Management Accounting (MEMA)		Physical Environmental Management Accounting (PEMA)	
		Short Term Focus	Long Term Focus	Short Term Focus	Long Term Focus
Past Oriented	Routinely generated information	2. Accounting and Finance 4. Divisional Management 5. Human Resources 6. Legal 7. Product Manager 8. Purchasing	1. Top Management 2. Accounting and Finance 3. Corporate Marketing	9. Environment 10. Health and Safety 11. Quality 5. Human Resources 6. Legal 12. Production 7. Purchasing 13. Logistics 8. Product Manager 14. Disposal/Recycle	1. Top Management 9. Environment 10. Health and Safety 11. Quality 15. Corporate Marketing 13. Logistics 14. Disposal/Recycle
	Ad hoc information	2. Accounting and Finance 4. Divisional Management 5. Human Resources 6. Legal 7. Product Manager 8. Purchasing	1. Top Management 2. Accounting and Finance 3. Corporate Marketing	9. Environment 10. Health and Safety 11. Quality 5. Human Resources 6. Legal 12. Production 7. Purchasing 13. Logistics 8. Product Manager 14. Disposal/Recycle	1. Top management 9. Environment 10. Health and Safety 11. Quality 15. Corporate Marketing 13. Logistics 14. Disposal/Recycle
Future Oriented	Routinely generated information	2. Accounting and Finance 4. Divisional Management 5. Human Resources 6. Legal 7. Product Manager 8. Purchasing	1. Top Management 2. Accounting and Finance 3. Corporate Marketing	9. Environment 10. Health and Safety 11. Quality 5. Human Resources 6. Legal 12. Production 7. Purchasing 13. Logistics 8. Product manager 14. Disposal/Recycle	1. Top management 9. Environment 10. Health and Safety 11. Quality 15. Corporate Marketing 12. Logistics 14. Disposal/Recycle
	Ad hoc information	2. Accounting and Finance 4. Divisional Management 5. Human Resources 6. Legal 7. Product Manager 8. Purchasing	1. Top Management 2. Accounting and Finance 3. Corporate Marketing	9. Environment 10. Health and Safety 11. Quality 5. Human Resources 6. Legal 12. Production 7. Purchasing 13. Logistics 8. Product manager 14. Disposal/Recycle	1. Top management 9. Environment 10. Health and Safety 11. Quality 16. R & D, Design 15. Corporate Marketing 12. Logistics

Figure 5. Positioning managers in the EMA framework

long term performance and how this is changing over time. Hence, it looks for support from an EMA system that provides information about strategic measures of physical environmental performance that is routinely gathered for top management to use in tracking performance. It also involves the environment manager and production manager in the continual improvement process (refer to Figure 6).

b) EMA Case Studies.

Through its Triple Bottom Line Technical Specialist Group, The Institute of Chartered Accountants in Australia has sought tenders for their Environmental Management Accounting Project.[3] The Institute is undertaking this project in partnership with EPA Victoria and

3) See the tender document at http://www.icaa.org.au/tech/index.cfm?id=A103674954

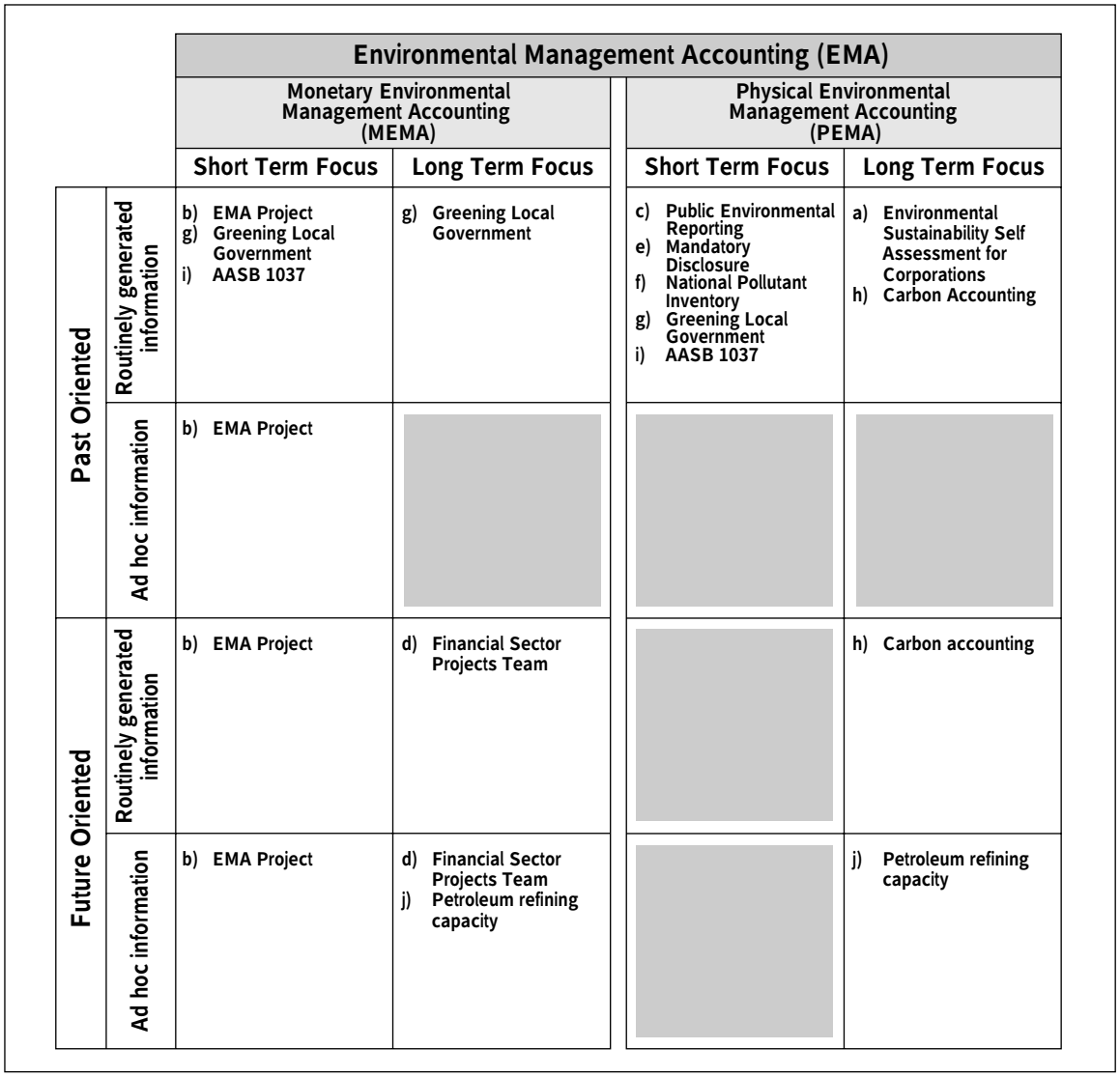

Figure 6. EMA Developments in Australia

Environment Australia, who together are providing $150,000 to the Institute to fund a total of four to five case studies, including at least one SME study, with the objective of promoting environmental management accounting in the business sector. The goal for each case study is to demonstrate how reforming management accounting practices within a business can achieve positive financial and environmental outcomes. A key objective of the project is to produce materials that identify how changes to management accounting procedures can improve profitability by reducing costs and/or identifying revenue opportunities whilst achieving better environmental outcomes. The process is in its early stages with tenders closed on 10 August 2001 and final reports due by 31 March 2002.

Classification: The Request for tender document provides no specific indication of what constitutes Environmental Management Accounting. The following comment is made:

" Firms can make sub-optimal business decisions because their internal accounting system does not properly account for environmental costs and benefits. For example, EPA Victoria has found that some companies choose waste disposal over waste reduction because their accounting system records disposal as a cheaper option. Disposal might appear cheaper because most environmental costs are placed in overhead accounts and therefore not properly allocated. Environmental management accounting assists companies to identify the full range of environmental costs and benefits within traditional accounting systems and may, in some cases, lead to improved decision making. "

This indicates a focus on short term costs and revenues rather than the long term. It also seems to imply an interest in ad hoc information for decisions, as well as routinely generated information that is affected by cost allocations. Hence, there is a past and a future orientation to this project. Accounting and finance managers, divisional managers and other functional areas may find the information generated by the project to be of use (refer to Figure 6). There is a clear intention that accountants are to be targeted by this initiative.

Indirect Influences:

c) Australian Public Environmental Reports (PER)

Environment Australia, the Commonwealth government environment group, seeks to encourage the publication of public environmental reports thereby encouraging environmental management to set up EMA systems that produce this information. A framework was produced in March 2000.[4] They define public environmental reporting as follows:

" Public environmental reporting (PER) is the voluntary public presentation of information about an organisation's environmental performance over a specified period, usually a financial year. An organisation's PER may be published as a stand alone document, a website or as part of an annual report "[5]

By the end of 2000, around 80 Australian organisations across a variety of industry sectors had produced a PER.[6] The number continues to increase. Environment Australia aims to create a comprehensive virtual library of Australian PERs to give companies and stakeholders insight into the range and quality of reporting to date. They provide no guarantee of quality, do not suggest that any of the reports represent best practice, and expect the publication to lead to continual improvement in reporting - although they do not say how this process of improvement will be brought about.

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4) http://www.ea.gov.au/industry/sustainable/per/pubs/perframework.pdf
5) http://www.ea.gov.au/industry/sustainable/per/
6) http://www.ea.gov.au/industry/sustainable/per/ausper.html

Example: MIM Holdings Ltd is a mining company. Its third annual environmental report examines (1) management ṡ commitment to the environment; (2) environmental management policy; (3) its commitment to the Australian Minerals Industry Code for Environmental Management; (4) environmental management systems; (5) environmental audit and risk management; (6) National Pollutant Inventory data; (6) rehabilitation; and (7) Community Relations.[7)]

Classification: PER ṡ have is a focus on the short run time period, on routine provision of EMA information related to past performance. The main focus is on aggregate information about the organization. Environmental management is the group most heavily involved (refer to Figure 6).

d) Financial Sector Projects Team.

The Financial Sector Projects Team is part of the Sustainable Industries Branch of Environment Australia, whose mission is to provide national leadership in the protection and conservation of the environment. The Financial Sector Projects Team was created by Environment Australia to work cooperatively with Australia ṡ financial services sector on the development of government and business policies that facilitate the integration of sustainability issues into their services, products and operations.

Their goal is to encourage financial institutions to incorporate sustainability information into their investment, lending and insurance decision making. They are trying to achieve this goal by improving understanding within the financial services sector about the commercial opportunities and risks presented by environmental issues, and by improving levels of consumer knowledge about the options for environmentally slanted financial products.[8)]

In some areas the finance sector is not as advanced as its international competitors:

- commitment and awareness - until recently, at an industry level, little interest had been shown in sustainable development. Unlike its European peers, only two financial institutions are signatories to the UNEP Financial Initiative. However, UNEP has now established a strong presence in this area and operates through the Victorian EPA.
- products and services - there is less demand for and supply of socially responsible investment products. However, products and services have been developed in response to the issues of climate change and community banking needs.
- greening of own operations - most financial institutions appear to have implemented environmental risk assessment procedures and undertaken energy efficiency and

7) http://www.mim.com.au/environment.html
8) http://www.ea.gov.au/industry/sustainable/finance/index.html

recycling programmes. However few have implemented company-wide environmental management systems or published public environmental and/or triple bottom line reports.[9]

Classification: Environmental Management Accounting information encouraged by this Project Team is future orientated because of the desire to influence short term decisions made by financial institutions eg decisions as to whether to grant credit after consideration of environmental risk. The focus is on monetary information for top management, credit analysts, and accounting and finance staff in financial institutions within a sustainable development frame of reference. Ad hoc and routine information will be encouraged (refer to Figure 6).

e) Mandatory disclosure

The only mandatory environmental disclosure requirement in Australia, is s299(1)(f) of the 1998 Company Law Review Act. Section 299(1)(f) reads as follows:

Annual Directors ' Report - General information (1) General information about operations and activities.

The Directors ' Report for a financial year must:

. . . (f) if the entity ś operations are subject to any particular and significant environmental regulation under a law of the Commonwealth or of a State or Territory - details of the entity ś performance in relation to environmental regulation

The importance of the disclosure requirement for management is largely at the top management level because Australia has the highest rate of share ownership in the world (appx. 52% either own shares directly or indirectly through superannuation funds) and ethical investment is a matter for top and environmental management to address.

Classification: This requirement for mandatory disclosure of non-monetary information is aimed at top management and environmental management who are concerned to ensure that they are in compliance with the requirements of corporate law. The information needs to be gathered on a regular basis by the EMA system, is routinely generated, short term in its orientation and related to past compliance (refer to Figure 6).

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9) http://www.ea.gov.au/industry/sustainable/finance/pubs/role-fin-sector.pdf

f) National Pollutant Inventory.

The National Pollutant Inventory (NPI) is Australia ṡ national public database of pollutant emissions. It is an internet database designed to provide business, the community, and government with information on the types and amounts of certain substances being emitted to the environment. The NPI is important for EMA because it requires management to establish a system for gathering, recording and disclosing information about pollutant emissions in Australia. It operates in a similar way to the US Toxic Release Inventory. Australian industrial facilities using more than a specified amount of the substances listed on the NPI reporting list are required to estimate and report emissions of these substances annually. Currently industries are required to report their emissions to air, land and water of 36 of the 90 listed substances.[10)]

Classification: Physical data is gathered in the organization ' s EMA on a regular basis by environmental management with exception reports being provided to top management, to guard against any penalties that might be incurred. The data relates to the past activities of a company, and has a short term focus (refer to Figure 6).

g) Greening Local Government.

Development of a chart of accounts that includes environmental categories, in order to help local governments in Australia make better decisions, has been supported by the Australian Local Government Association (ALGA) for several years. This development is of particular interest because the projects that have been undertaken have been directed by the Australian Bureau of Statistics (ABS) using the Integrated System of Environmental and Economic Accounts (SEEA), as proposed by the United Nations for macro environmental accounting. The Victorian EPA has also explored the use of the SEEA system as the basis for recording past environmental impacts in corporate accounts, and it is also of interest to note that EUROSTAT (the European Commission Statistics Agency) has, in June 2001, provided definitions and guidelines for measurement and reporting of company environmental expenditure in line with SEEA categories.

Tegert (2001), who has introduced the SEEA classification and environmental reporting at Eurobodalla Shire Council (ESC) summarises the situation as follows:

Simply by tracking environmental costs against the SEEA/ABS classifications, the environment can be managed in much the same way as a local government ṡ infrastructure assets - regular assessment of the asset ṡ condition and serviceability, examination of design life;

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10) The list of substances can be found at
http://www.environment.gov.au/epg/npi/about/background/list_of_subst.html

assessment of loads and pressures and calculation of costs to maintain, remediate or improve.

The draft Code of Accounting Practice is being prepared through the ABS and CPA. A Special Schedule, proposed to be appended to the AAS27 financial accounts, lists the:

- operating expenses and revenues against the SEEA classifications;
- the costs to maintain those environmental assets;
- the capitalised expenses to improve the environmental assets; and
- ultimately the loss of serviceability (defined as depreciation) of those environmental assets.

The draft Code of Accounting Practice references a range of different methods proposed for environmental valuation: damage evaluation; avoidance or prevention costing; restoration costs; and market evaluation.

At Eurobodalla Shire Council this draft method of environmental accounting is being introduced in the following way:

1. Recoding the Chart of Accounts to collect financial information in accord with the SEEA classifications.
2. Referencing environmental expenditures and revenues and capital expenditure in the 2000 SoER.
3. Introducing the philosophy of environmental accounting as a form of ' asset management ' by causing the assessment of environmental risk as a financial consequence of taking or not taking a particular action.
4. Reporting to council on those environmental risks and quantifying them as financial costs or opportunities lost, such as costs of remediation, prevention or penalties.
5. Eventually assess projects comparing traditional engineering approaches versus environmental approaches. For example, life cycle costs may be compared between a formed storm water channel, including pollution/sediment traps, to an alternate natural grassed stormwater channel where the type and density of vegetation is determined to trap and divert sediment and rubbish from entering a waterway. The different levels of risk can be assessed by modelling the amount of sediment or rubbish entering the waterway.

Classification:

The SEEA classification of environmental protection expenditure incorporates both monetary and physical measures of corporate impacts on the environment. Furthermore, it is predominantly focussed on the systematic and regular recording of short term and regular long term, past information which may provide trend statistics as a basis for future decision making

by environment and top management (refer to Figure 6).

h) National Carbon Accounting System

The National Carbon Accounting System (NCAS) is a government system that provides a complete accounting capability for sources and sinks of greenhouse gas emissions from Australian land based systems. Development of the system is underway and is described as follows:

> " A capacity to undertake full carbon accounting with a degree of rigour would, with proper information management and accounting tools in place, enable capacities for all other types of reporting. The fully integrated suite of accounting and modelling tools required for such a system can only be a medium to long term aspiration. However, in the short term, this need may be served by identification of the existing or readily developed models, which can, acting in concert, be used to derive a full carbon budget. Operating in this somewhat ' cobbled together ' fashion in the short-term will likely lead to considerable inefficiency in operation. Integration of model components is an important and ongoing activity that needs to be addressed jointly by the NCAS and Greenhouse Accounting CRC. " (Australian Greenhouse Office 1999)[11]

The system underpins reporting of Australia ṡ greenhouse gas emissions for the National Greenhouse Gas Inventory and Kyoto Protocol. It also supports emissions trading discussions and provides a basis for emissions projections to assess progress towards meeting international targets.

The key components of the system are:

land clearing

- area, rate and method of clearing

land use/management

- effects of land use/management regimes subsequent to clearing

biomass

- growth rates, biomass accumulation and carbon content of cleared and standing vegetation, both above and below ground
- decay of cleared vegetation and litter
- usage and decay cycle of wood products

soil carbon

- effects of land use practices on soil carbon content and rates of decay.

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11) http://www.greenhouse.gov.au/ncas/files/pdfs/tech10.pdf

The Australian Greenhouse Office (AGO) is responsible for planning and implementing the NCAS. Sequestering carbon in carbon sinks provides industry with a lower cost option in the short term, to bring its net emissions within the bounds agreed in the Kyoto protocol. Industries that will benefit include energy, transport, forestry, agriculture, mining, insurance and manufacturing.[12] The NCAS will be developed rapidly over the next few years- placing Australia at the leading edge of the science that underpins carbon accounting and land based emissions mitigation. It will provide support for carbon emissions trading at the corporate level.

Classification:

The emphasis is upon long term, routinely generated physical information for environment management support in future decision making (see Figure 6).

i) AASB 1037 Self-Generating and Regenerating Assets

The Australian Accounting Standards Board (AASB) produced, in 1998, an accounting standard that requires valuation of non-human living assets of companies (called SGARAs). These assets have to be valued at net market value - the amount that could be expected to be received from the disposal of SGARAs in an active and liquid market after deducting costs expected to be incurred in realising the proceeds of such a disposal. A collage of alternative measures can be used in the absence of an active and liquid market - net present value, historical cost, replacement cost, etc.

Classification:

Development of this external accounting standard influences EMA in an indirect way through financial reporting requirements. The focus is on short term monetary measures of performance related to the past and produced on a regular basis for use by accountants, production, product and environment managers.

j) Petroleum refining capacity.

At present, Australia has eight refineries of petroleum. Most of the refinery capacity was developed in the 1950 ṡ and, if it is to survive, needs upgrading to allow for new environmental laws (the National Fuel Quality Standards Act 2000)[13] relating improving fuel quality up to European Standards. Companies, such as Shell and Caltex, are in the process of assessing the physical impacts of new fuel quality standards. They also are assessing the monetary implications of this need for considerable additional investment if the refineries are to be kept open.

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12) http://www.greenhouse.crc.org.au/industry.pdf

13) http://scaleplus.law.gov.au/html/pasteact/browse/TOCFU.htm

Classification:

Petroleum refiners have to make ad hoc investment decisions about their existing refineries. First, they need to assess the long term physical impacts on their product and processes. Second, they have to assess the monetary implications of the new environmental legislation. Both aspects come together in an integrated assessment of whether to continue in business and EMA information is critical to the decision reached. The information is important for top managers, accountants and environmental managers.

Conclusion:

This brief examination of a number of EMA initiatives taking place in Australia indicates:

- Of the initiatives identified, some relate to promotion of EMA by certain bodies that have a direct influence on EMA (eg. a and b) while others try to have an indirect influence (eg. c, d, e, f, g, h, i and j).
- There is no shortage of indirect efforts to develop short run, routinely generated, past orientated EMA information expressed using physical measures. These measures are not, in general, integrated with monetary EMA.
- A number of empty boxes in the matrix, in Figure 6, reveal the lack of emphasis on:
  - (i) future orientated aspects of physical EMA,
  - (ii) the long term focus for ad hoc past orientated physical data, and
  - (iii) past, ad hoc information.
- The main focus is on initiatives directed at MEMA - plus an emphasis on conversion of existing management accounting to EMA, and on routinely generated, past short term PEMA information.
- Two of the most potentially useful developments are b) the EMA project and g) Greening Local Government. These two developments focus on the EMA systems, how to implement the systems, discovery of any problems with implementation, and how to overcome these problems.

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1st Session　Q&A

1st Session

Q&A in response to report 1

Floor

Thank you very much for providing a wide range of information.

According to the rightmost column of exhibit 5 on page 18, companies which disclose environmental accounting information have less return on total assets than those that do not so. Companies with lower profitability try to disclose environmental information harder, while companies with higher profitability do not tend to disclose environmental information. I suspect that the results are significant.

Kokubu

As value P in exhibit 5 is 0.24, the results were not significant. All the results shown in exhibits 5 and 6 were not significant.

That is, in examination as to whether there was any difference between companies disclosing environmental accounting information and those which did not, all of the obtained results were not significant. Although there were significant differences between companies which conformed to the standards in terms of sales, total assets and operating profits, there was no significant difference in terms of return on total assets.

Floor

We have learned about various topics such as company characteristics, environmental information disclosure. I would like to know your total image of disclosure and behavior led by these aspects, if possible.

Kokubu

At present, we are busy at pursuing research mainly on problem recognition and current status analysis, so it seems difficult to refer to behavior. However, I note two points. Firstly, the MOE s guideline has a considerable influence on environmental accounting. Secondly, companies disclosing environmental accounting information in compliance with some standard are relatively large in size.

In latter case, as we only did a two-tailed test as to whether there is any significant difference, we did not test hypothesis that larger companies executed excellent environmental accounting in compliance with the standard. The results such as average value, however, suggest such tendency.

Q&A in response to report 2

Floor

I am from the Philippines Institute of Certified Public Accountants. I would just like to clarify, if I understand it is right. I think, there is still no agreement as to what we are really addressing or what we would like to be reporting on, for example, one part of the report will take the shape of the concern and awareness of a company on the global issue of the environment. The other concern probably is the social cost of the report, and yet we are preparing it all for Environmental Accounting - and here comes the other confusion- where in accountancy we now have the disclosure for liabilities and possible disclosure of compliance and non-compliance of clients. I am just clarifying because I think that we will see the light at the end of the tunnel as to how we can classify this in the future. I think that is how I look at it - is it the way you look at it too?

Lee

At first, I couldn t catch your point. The first point is that do we include, how do we consider social costs in our scheme. Secondly, can you clearly point out the second point? The first one, I first explained...

Floor

The first one is that we would like the report to show the objective of the report....of awareness and concern.

Lee

As for the first question, we don t consider at the first stage the social aspects because it is very difficult to calculate social costs at the moment, so we are normally talking about the real amount which we paid. That is the basic starting point for this discussion. We discussed and categorized all the costs, like social costs, external costs, whatever, but it is still very difficult at the company levels. Secondly, the purpose of the environmental accounting, as in some cases, Korean companies realized that suddenly the international industry organization like the International Steel Organization or the International Semi-conductor Organization or whatever, they established their own guidelines for their own industry. I was one of the members of the International Steel Industry. We got an international working group for the members; we developed the environmental accounting guidelines for the steel industry. This means that the movement gives some impact to the leading companies everywhere in the world. So, POSCO was one of the members, one of the largest steel makers, they cannot resist that kind of movement, so they have some interest in that activities, and we developed our own ideas and gave some

input to the activities. That was the first stage, but eventually, they realized that environmental issues is very important from the CEO level to the working level, but still, it is quite difficult. The difficulty is words, how to integrate and implement the process in relation with computerized accounting systems. So at the moment, we are thinking about enterprise resource planning, ERP. So we tried to integrate environmental accounting process into the ERP system, but it was not ready at the moment from the advanced IT companies, even some bidding, the consulting firms, or ERP suppliers. So, that is one of the issues I think in this sector at the moment. Is that enough?

Floor

It sounds as though you are working on fairly similar lines to the Japanese guidelines that we were just hearing about. How far do you feel that adapting those would answer what you are looking for, or are you looking for something distinctly different?

Lee

I think that we cannot say any difference from Japan exactly, but the problem is the readiness of the industry. The Korean industry is not so well developed to introduce this kind of issue in the practice. But in the case of the Japanese, the globalization level or whatever, Japanese companies are larger than Korean companies. So in that aspect, it takes a couple of years more to introduce quite widely in Korea. On the other hand, the government ṡ position is a little different. The Japanese government, the Ministry of the Environment or MITI or whatever, they tried to make it quite concrete policy, but in the Korean case, I think that it is still in the discussion stage with the government. I am leading a team to introduce these issues in government policy measures, but still it is under consideration at the moment, so it takes one or two years more. In terms of time gap, I think about 3 to 5 years difference between Japan and Korea, I think.

Q&A in response to report 3

Floor

In figure 3, the terms " Future Oriented " and " Past Oriented " is described as " future data " and " past data " in Japanese version. I think these terms are probably based on a sense of direction of future orientation and past orientation. Considering managerial accounting, " Past Oriented " requires to be reported for accountability purposes, but accountability for the past has the feature of financial accounting rather than managerial accounting. So, in consideration of

managerial accounting, we need to provide information about the way to improve the present situation with this figure. It is unfortunate to give such a comment as to break the well-organized table, but in my opinion, the table would take a more complete form in terms of managerial accounting by adding " Present Oriented " or present focused data which spurs innovation for improvement of current operation. Please let us know your opinion.

Burrit

My comments would be that it is a useful comment to make, I actually do feel that the systems that we have in place are all important; that means to say that the past is important, contemporary information or current information is important, and using this information to perhaps predict the future is also important. So there are links between all three. My assumption in Figure 3 is that the past information includes contemporary information for decision making, in so far as I do not have real time information disclosed on this particular table, it would be too complicated to add that, but I entirely agree on your comment. Could I just say one other thing? Past information is very important for accountability purposes and that information can be used by external parties to make their decisions about how they will relate to the company, whereas for management purposes, past information is more useful for predicting the future, and for the decisions that they have to make.

Floor

My question might be inappropriate. I indeed agree that past and future information is important. The problem is that the table does not disclose real time information as another factor. For example using ERP, we have quantitative, physical data in a form of process management. I agree that past and future information is important, but, in my opinion, one more column " Present Oriented " would bring the figure to perfection. I never mean that past and future data is not important.

Burrit

Thank you, that is something which could take a while to discuss, but my own view would be past and current information are both used for predicting the future, so my preference would be to refer to past and contemporary, or past and current, information and just keep two boxes in the Figure. That would be my preference anyway. Perhaps we can talk more about this.