

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 surveyed¹ 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’s 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

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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.

draft guideline was published in 1999. Furthermore, both of the MOE's and the METI's 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 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 in Appendix). 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.

The basic frame of environmental accounting system is indicated by Exhibit 2 (see Appendix). 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.

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(see Appendix).

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 (Exhibit3 in Appendix)

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. (Exhibit 4 in Appendix)

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.

2-3 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.

2-4 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 statements.

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

² JICPA Journal, August 2001

³ JICA Journal, October 2000

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 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 contents more deeply.

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

This study collected and analyzed environmental reports published during 2000⁴ 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 Exhibit5(see Appendix).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's 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's 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(see Appendix), were 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

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's definition of conformity with the MOE's guidelines refers to cases where the account titles of environmental costs substantially follow the guidelines.

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.

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(see Appendix), 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.

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(see Appendix) shows an analysis of the ways in which the guideline influences disclosures of environmental costs and effects.

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

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.

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

on the publication of environmental reports.

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

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 consolidated⁹. However, where it was not stated clearly whether the data were non-consolidated or consolidated, it was assumed that non-consolidated data was meant¹⁰.

Analysis was performed using the Spearman's rank correlation coefficient analysis. As the results set out in Exhibit 9(see Appendix) 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).

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

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."

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 through 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(see Appendix). 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.

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(see Appendix).

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 own original 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 calculate eco-efficiency ratios. (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 significant 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.

References

- Japan Accounting Association (2000) "*Development of Establishment of Environmental Accounting*", Japan Accounting Association (written in Japanese.)
- Japan Environmental Management Association for Industry (2000) *Research of Environmental Business Development and Promotion-Environmental Accounting-1999*, JEMAI (written in Japanese).
- Japan Environmental Management Association for Industry (2001) *Research of Environmental Business Development and Promotion-Environmental Accounting-2000*, JEMAI (written in Japanese).
- Kawano,M. (2001) "Environmental Reports – Present Situation and Issues.", *Yokohama Keiei Kenkyu* Vol.21, No.4 (written in Japanese).
- Kokubu,K. and Kurasaka,T. (2001) "Corporate Environmental Accounting: A Japanese Perspective" Discussion Paper No.2001-8, Graduate School of Business Administration, Kobe University.
- Kokubu,K., Noda,A. Shinabe,T. and Higashida,A. (2001) "Determinants of Environmental Report Publication and its Quality in Japanese Companies", Discussion Paper No.2001-24, Graduate School of Business Administration, Kobe University(written in Japanese.)
- Matsuo,N. (2001) "Environmental Accounting Information Disclosure by Japanese Companies" *Economic System Reform and Accounting System II*, Institute of Economic and Political Studies, Kansai University (written in Japanese).
- Ministry of the Environment (2000) *Developing an Environmental Accounting System*, The Ministry of the Environment (written in Japanese).
- Ministry of the Environment (2001a) *A Report on the Results of a Survey of Environmentally Friendly Corporate Behavior in Fiscal 2000*, The Ministry of the Environment (written in Japanese).
- Ministry of the Environment (2001b) *Environmental Accounting Guidebook II*, The Ministry of the Environment (written in Japanese).

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

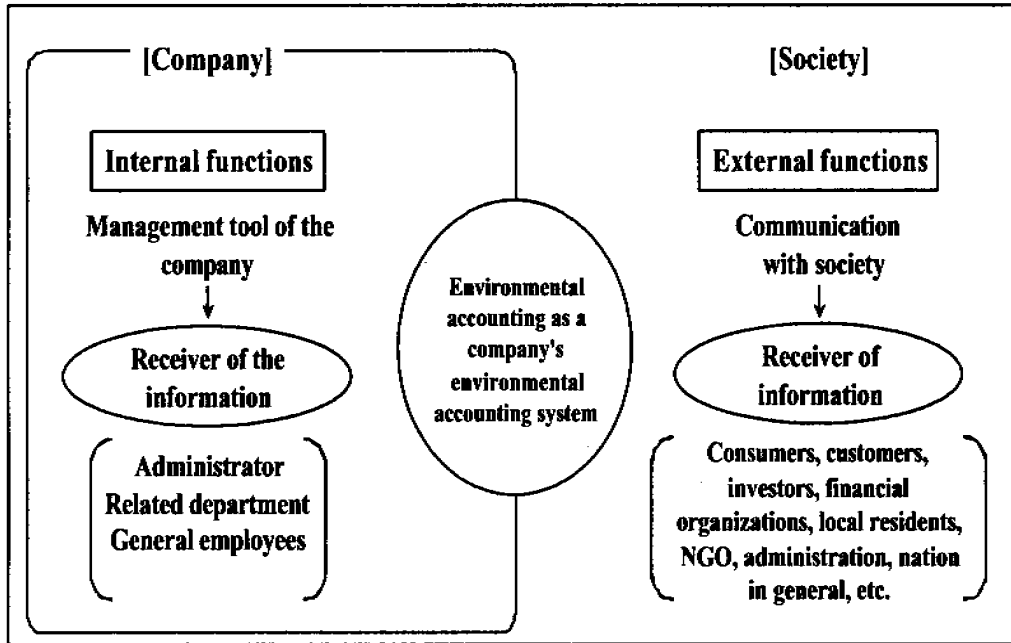


Exhibit 2 Basic Frame of Environmental Accounting System (MOE,2000)

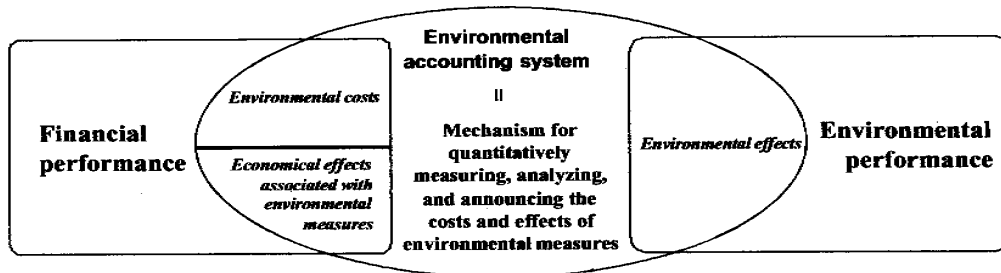


Exhibit 3 Environmental Costs and Effects (MOE, 2000)

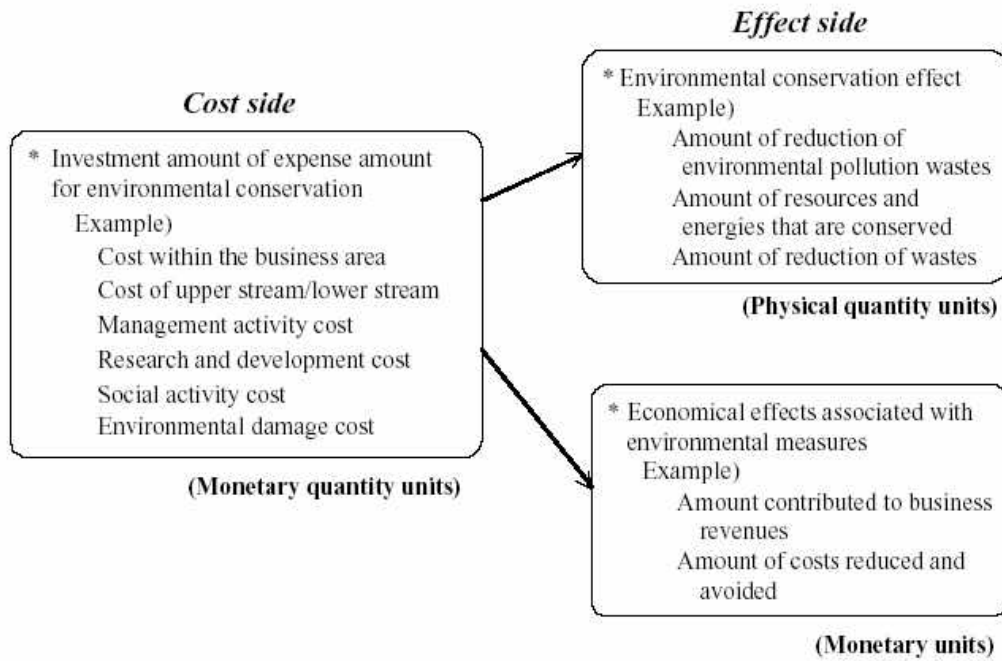


Exhibit 4 : Environmental Accounting Disclosure Format C

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)			

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		

Exhibit5 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	

Exhibit6 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 Date	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	

Exhibit7 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

Exhibit9 - 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

Exhibit9 - 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

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 Environmental 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

Exhibit11 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

Exhibit12 Spearman Ranking Correlationi Coefficient Between Environmental Cost and SubstanceEconomical 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

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	45	4	10	5
		b	3	0	0	0	0	0	0
		c	10	8	0	7	0	0	0
		d	1	0	0	0	0	0	0
Based on the MOE's 1999 Guideline Draft	19	a	11	4	0	4	1	2	0
		b	2	1	0	1	0	0	0
		c	6	2	0	2	0	1	0
		d	0	0	0	0	0	0	0
Companies Original Guideline	31	a	22	10	0	10	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	0	0	0	0
		d	37	0	0	0	0	0	0
		exception	1	0	0	0	0	0	0
None Environmental Accounting	73		-	-	-	-	-	-	-
Total	257		184	80	7	72	7	16	7

(*) Cost Disclosure Type

Cost	Disclosure type	Number of company	(%)	Notes
A	Cost and Investment Separately	109	59.3%	Conformity to the MOE's Guideline(84) + Original(22) = 106 (57.6%)
B	Cost and Investment Added Up Together	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%	

(6) Costs corresponding to environmental damages (environmental damage costs)						
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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.

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	

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

source: MOE(2000)