

Quality of Environmental Management and Auditing Systems in Japan

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ABSTRACT; As the voice urging for more environmentally sound practices in industries are being heard louder, environmental auditing has been advocated as the proactive management tool to perform the task. Corporations in Japan as well as other countries are now working to form and implement environmental management and auditing systems accordingly. A questionnaire survey was conducted to find out the scope and extent of environmental auditing practice in Japan and it is shown that most Japanese companies have resources allocated for the practice but they do not have sufficient understanding concerning the formal(formally documented) objectives and policy of environmental auditing. It is found that big companies with their annual production more than ¥200 billion and other companies with less are different in terms of monetary and human resources allocation, motives of practice and the level of comparison of environmental policy with other companies. The practice of environmental auditing in Japan is greatly influenced by both the external(outside company) and internal(inside company) factors for decision-making which are inter-related.

KEYWORDS; Environmental Auditing, Proactive Management Tool, International Standardization

1. INTRODUCTION

Environmental auditing has attracted increasing attention world widely over the past few years as a proactive management tool to help both the industrial and governmental enterprises to stay in compliance with their environmental responsibilities. The most distinctive characteristic of environmental auditing is its function as a proactive management tool that helps to find inferiorities in environmental actions and check on the performance of goal-attaining organization, environmental management and equipment, and provide solutions for companies to be in compliance with all regulatory requirements. The European Union (EU), meanwhile, established an environmental management and auditing scheme in 1993 based on voluntary participation of private enterprises to provide a regulatory framework to be applied commonly in member nations (Rothery, B. 1993). The system is due to become effective in April 1995. Given these trends, the International Standardization Organization (ISO), an international institution engaged in promotion of international standardization for industrial products, etc. has been working on a full-scale study since 1993 to formulate international standards on environmental management. Presently, draft standards on an environmental management and auditing system is being shaped. Formal standards are to be published in the first half of 1996. Even before all these formal events that took place both internationally and locally, Japanese companies have started to carry out environmental auditing in

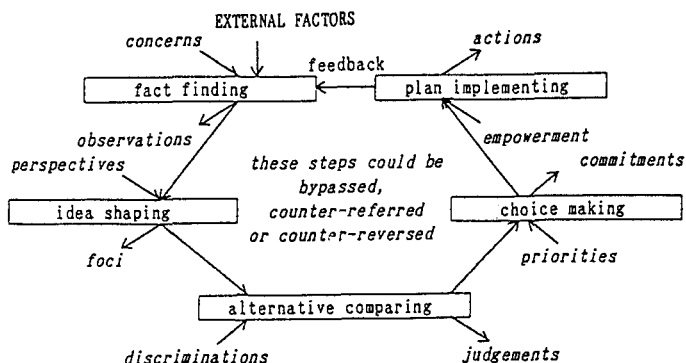


FIGURE 1 : DECISION MAKING PROCESS

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step-by-step approach though not widely and formally. The present condition of the practice of environmental auditing program in Japanese companies is still in the early stage. Only tens of companies are practicing it and only a quarter of those practicing it has documented their audit findings in report form (Kenichi Yamamoto,1993). The adoption of environmental auditing as any other environmental management tool, involves both the internal (inside company) and external(outside company) factors in decision-making process. Figure 1 shows the decision-making process of environmental auditing base on applied management science (Friend, J. and Hickling, A., 1987). One of the research objectives is to find out the external and internal factors which are involved in decision-making and how they are related to each other. A questionnaire survey was carried out to find out the adaptation pattern of Japanese corporations towards the international standardization of an environmental management and auditing systems.

2. OUTLINE OF SURVEY

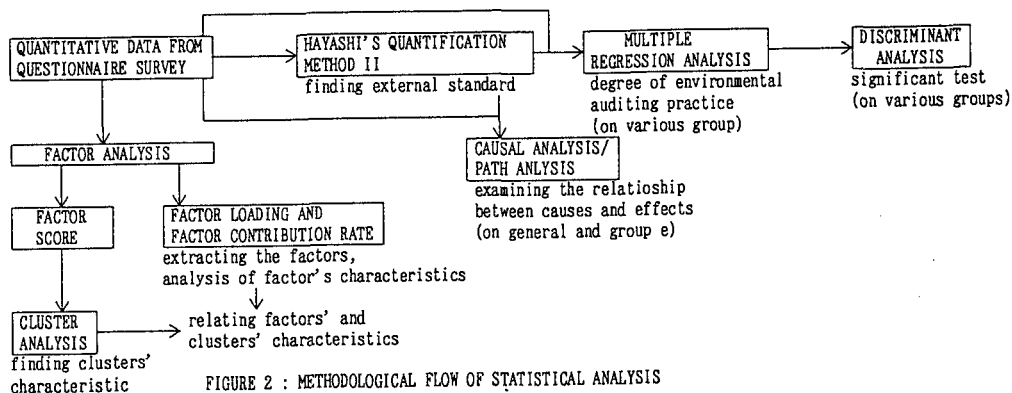
A questionnaire survey was carried out on Japanese corporations. The first batch of questionnaire was to the Keidanren members and the second batch was to the Osaka Industry Association (OIA). A total of 399 questionnaires had been sent out and 183 were returned. They are shown in Table 1. The question items and categories were formulated mainly based on the Global Environmental Management Initiative's Environmental Self-Assessment Program (GEMI , 1993). The questionnaire was divided into four parts with twenty one questions. The content of the questionnaire survey is listed in Table 2.

Title	Questionnaire on Practice of Environmental Auditing	
Purpose	Oto find out what are the factors that will enhance the practice of environmental auditing in Japanese companies Oto find out what are the factors that will explain the gap of the adoption of environmental auditing among Japanese companies Oto find out an equation for the practice of environmental auditing Oto find out the relationship between the causes and the effects of the practice of environmental auditing	
sample number	Keidanren 295	Osaka Industry Association 104
method	by mail	by mail
survey period	28.10.94--18.11.94	6.12.94--16.12.94
return rate	44.0% (130)	50.96% (53)

Part 1 Company Environmental Organization	
Q1	Objectives of the company policy
Q2	Comparison with the international company's policy
Q3	Inclusion of environmental policy in daily activities planning
Q4	Coordination of policy throughout organization
Q5	Motives of practising environmental auditing
Q6	Participation of management level in environmental auditing
Q7	Budget & number of staff allocated for environmental auditing
Q8	Environmental auditing's responsibility system
Q9	Involvement of external experts in managing env. auditing
Part 2 Environmental Auditing-related Information System	
Q10	Reporting of audit findings (internally)
Q11	External reporting
Q12	Does information made public vary according to external organization?
Q13	Q1 if yes, how does it vary?
Part 3 Environmental Auditing Practice	
Q13	Audit standard
Q14	Reporting system
Q15	Audit scope
Q16	Audit items
Q17	Auditors
Part 4 Company Profile	
Q18	Number of employees
Q19	Yearly sales (¥)
Q20	Industry type
Q21	When was the environmental-related organization formed?

3. STATISTICAL ANALYSIS FLOW

Quantitative data obtained from the questionnaire survey was first being sorted for its validity for various analyses. All the tests are simplified in Figure 2.



4. RESEARCH FINDINGS

4.1 Enhancing factors

Factor analysis was used to find out the main factors that help to enhance the adoption of environmental auditing. The first nine questions listed in table 2 were used to interpret the enhancing factors. These nine questions are named as X1,X2..X9 respectively. Each question has been quantified using three scale multiple choices with 1 as the lowest and 3 as the highest point. These nine variables of 133 samples were used in factor analysis and the two major factors which are prominent are shown in figure 3. They are named as the resources factor and the recognition factor. Variables X6 and X7 are the most contributing variables towards the resources factor and variables X1, X2 and X5 are the contributing factors towards the recognition factor. The resources factor implies the quantity and quality of the monetary and manpower resources for the practice of environmental auditing, and it also includes the support of top management level in terms of commitment to the practice. The recognition factor relates closely to the objectives of the company policy, comparison of environmental policy with other international or local companies and the motives of environmental auditing. It is also found that most of the Japanese companies do not well evaluate the significance of the formal practice (formally documented) of environmental auditing. They have records and monitoring data on wastes generated, raw materials used, amount of recycled materials and air and water pollutant emitted. These records and data are regularly inspected for the purpose of providing further recommendations to improve the efforts on conserving and protecting the environment. The regular process of data and records keeping, the inspection followed by recommendations and implementation of recommended action is actually the fundamental part of environmental auditing (Woolston, H..(ed.) 1993).

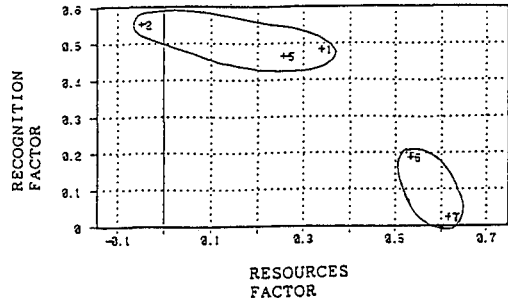


FIGURE 3 : THE FORMAL AND INFORMAL PRACTICE OF ENVIRONMENTAL AUDITING

4.2 Extent of practice

Samples were divided into groups according to variety of industrial production, environmental department formed or not at the main office in the 1970s and the 1990s, environmental department formed or not at the branch office in the 1970s and the 1990s, annual sales of the companies, and number of employees of companies. The asterisk in Table 3 is to show that samples in the group which are less than 30, are too small for any statistical test. The external standard value to imply degree of practical extent of environmental auditing, Y was calculated using the Hayashi's Quantification Method II. Together with the raw data of the nine variables mentioned in the beginning of this part, they were analyzed using the multiple regression analysis. All these groups were tested separately and the results are listed in Table 4. Overall, the extent of the practice of environmental auditing in Japanese companies as shown in the equation in test no 1(Table 4) implies that they have the support from their top management and also having monetary and manpower resources for the practice. On the other hand, they have little recognition about the

TABLE 3 : MULTIPLE REGRESSION ANALYSIS TEST NUMBERING SYSTEM

TEST GROUPS	KEIDANREN AND OSAKA INDUSTRY ASSOCIATION
GENERAL	1
MANUFACTURING	2
NON-MANUFACTURING	3
MAIN OFFICE 1990S(ENV. DEPT)	4
MAIN OFFICE 1970S(ENV. DEPT)	5
ANNUAL SALES >= 2.0E11	6
ANNUAL SALES <= 2.0E11	7
BRANCH OFFICE 1990S(ENV. DEPT)	8
BRANCH OFFICE 1970S(ENV. DEPT)	*
NUMBER OF WORKER <= 7000	9
NUMBER OF WORKER >= 7000	10

*sample number too small for test

TABLE 4 : EQUATION FOR THE DEGREE OF ENVIRONMENTAL AUDITING PRACTICE

TEST NO	EQUATION FOR THE DEGREE OF ENVIRONMENTAL AUDITING PRACTICE	R	N
1	$Y=0.29 - 0.14X_1 - 0.58X_2 - 0.16X_3 + 0.27X_4 + 0.67X_5$	0.880	133
2	$Y=0.12 + 0.03X_1 + 0.46X_2 + 0.35X_3 - 0.54X_4 - 0.49X_5$	0.871	101
3	$Y=0.28 + 0.27X_1 + 0.64X_2 - 0.12X_3 - 0.80X_4 - 0.11X_5$	0.908	32
4	$Y=2.78 - 0.47X_1 - 0.87X_2 - 0.10X_3 + 0.20X_4 + 0.24X_5$	0.868	45
5	$Y=3.82 - 0.44X_1 - 0.62X_2 - 0.08X_3 - 0.09X_4 - 0.37X_5$	0.856	53
6	$Y=3.90 + 0.03X_1 - 1.18X_2 - 0.39X_3 - 0.06X_4 + 0.23X_5$	0.910	82
7	$Y=0.15X_1 + 0.61X_2 + 0.04X_3 - 0.30X_4 - 0.60X_5 - 0.17$	0.893	51
8	$Y=2.15 + 0.10X_1 - 0.92X_2 - 0.27X_3 - 0.02X_4 + 0.34X_5$	0.913	57
9	$Y=0.06 + 0.14X_1 + 0.53X_2 + 0.07X_3 - 0.28X_4 - 0.85X_5$	0.875	83
10	$Y=0.12X_1 + 0.54X_2 + 0.33X_3 - 0.27X_4 - 0.77X_5 - 0.42$	0.898	50

* 99% SIGNIFICANT ** 95% SIGNIFICANT

formal practice of environmental auditing. This could be due to, firstly, difficulties in understanding the policy of the practice. Secondly, uncertain of their motives of practicing environmental auditing, and thirdly, opportunities for comparison of their companies' environmental policies with other companies are rare. The samples from (a) to (f) were further analyzed with the discriminant test in order to find out the difference between each pair of test groups. All these tests have the same hypothesis null as no difference between test groups and the hypothesis alternative as rejecting the hypothesis null.

TABLE 5 : RESULT OF THE DISCRIMINANT TEST ON VARIOUS GROUPS

TEST GROUPS	SIGNIFICANT OF TEST	CONTRIBUTING VARIABLES				
		X1	X2	X5	X6	X7
a) MANUFACTURING AND NON-MANUFACTURING	HO*					
b) BETWEEN KEIOANREN AND OSAKA INDUSTRY ASSOCIATION	NO COMPARISON CAN BE MADE					
c) ENV. DEPT. FORMED IN THE 1970S AND 1990S, MAIN OFFICE	HO*					
d) ENV. DEPT FORMED IN THE 1970S AND 1990S, BRANCH	HO*					
e) YEARLY SALES MORE AND LESS THAN 2,000	HA*		**			**
f) NUMBER OF WORKER, MORE AND LESS THAN 7000 PERSONS	HO*					

HO NO DIFFERENCE BETWEEN TEST GROUPS ; HA REJECTING HO

* 99% SIGNIFICANT ** 95% SIGNIFICANT ; : NO OUTSTANDING CONTRIBUTING VARIABLE

The test results are summarized in Table 5. It is found that there is no significant difference in the test groups (a),(c),(d) and (f). On the other hand, there is found to be a significant difference in test group (e). The manufacturing firms seem to have clearer motives for the practice compared to the non-manufacturing firms but they are not significantly different. The practice of environmental auditing is mainly due to the needs and the nature of industrial activities regardless whether it is manufacturing or non-manufacturing related. Basically, the Japanese companies are also bound by various environmental related regulations, such as the recycle law, basic environmental law, administrative guide for the formation of an environmental unit to control and prevent environmental pollution etc. In order to comply with the various environmental related regulations, Japanese companies find that it is worthy to make their effort to adopt environmental auditing. It is interesting to find that companies that have their environmental department formed in the 1990s are having more support from their top management and budget both in terms of monetary and human resources compared to those formed in the 1970s (test no 4 & 5) but they are found to be insignificant. Environmental department formed in the 1990s are mainly due to the increased awareness of the global environmental problems. Those formed in the 1970s are mainly due to the energy crisis and the environmental pollution problems. Those environmental pollution prone companies were required by the law to have an environmental unit or department to combat pollution problems and promote natural resources savings. The increased environmental awareness among the Japanese companies helps to encourage the adoption of the practice. Companies with their annual sales more than ¥200 billion and those with less are different in terms of monetary and human resources allocation, motives of practice and the comparison of environmental policy with other companies (test no 6 & 7). It is natural for companies with higher annual sales to be able to have better allocation compared to those with lower annual sales when they have the need to do so.

4.3 Internal and External factors Using path Analysis

During the decision-making process whether to adopt the practice of environmental auditing and even to decide on the extent of the practice, there would be many factors which the decision-makers need to consider. As any other management decision, the decision-making process is illustrated dynamically with the input/output of external and internal factors pertaining to the companies to select options of the audit standard, scope etc. The observed trend of Japanese corporations towards the international standardization of a management system is analyzed as follows. It is believe that the decision-making process is influenced by various internal and external factors and it is also the objective of the survey to find out how all these factors are related to each other in the decision-making process. The hypotheses for the path analysis are listed in Illustration 1 and the relevant equation for the hypotheses in Illustration 1 are shown in Illustration 2.

Internal = inside the company ; External = outside the company

Formal = environmental auditing practice that is institutioned.

Informal = environmental auditing practice that is not institutioned.

HYPOTHESES FOR CAUSAL/PATH ANALYSIS:

- External variables that are having direct effect on the formation of proactive policy
REGULATION → PROACTIVE POLICY
COMPARISON → PROACTIVE POLICY
- Direct effect of proactive policy on the formation of audit objective
PROACTIVE POLICY → AUDIT OBJECTIVE
- Direct effect of proactive policy, audit objective, evaluation on resources
PROACTIVE POLICY → RESOURCES
AUDIT OBJECTIVE → RESOURCES
EVALUATION → RESOURCES
- The total effect of external and internal effect on the practice of environmental auditing
EXTERNAL FACTORS: COMPARISON → PRACTICE OF ENVIRONMENTAL AUDITING
EXPERT ADVICE → PRACTICE OF ENVIRONMENTAL AUDITING
INTERNAL FACTORS: RESOURCES → PRACTICE OF ENVIRONMENTAL AUDITING
AUDIT OBJECTIVE → PRACTICE OF ENVIRONMENTAL AUDITING
EVALUATION → PRACTICE OF ENVIRONMENTAL AUDITING
- The factors that help to produce audit report (internally)
RESOURCES → REPORTING (INTERNALLY)
EVALUATION → REPORTING (INTERNALLY)
- The factors that help to produce audit report for external personnel
REPORT (INTERNALLY) → REPORTING (EXTERNALLY)
RESOURCES → REPORTING (EXTERNALLY)
PROACTIVE POLICY → REPORTING (EXTERNALLY)

ILLUSTRATION 1 : HYPOTHESES FOR CAUSAL/PATH ANALYSIS OF ENVIRONMENTAL AUDITING.

EQUATION FOR PATH ANALYSIS(DIRECT EFFECT)

$$\begin{aligned} \text{PROACTIVE POLICY} &= \beta_1(\text{REGULATION}) + \beta_2(\text{COMPARISON}) + \beta_0 \\ \text{AUDIT OBJECTIVE} &= \beta_3(\text{PROACTIVE POLICY}) + \beta_4 \\ \text{AUDIT RESOURCES} &= \beta_5(\text{PROACTIVE POLICY}) + \beta_6(\text{AUDIT OBJECTIVE}) + \beta_7(\text{EVALUATION}) + \beta_8 \\ \text{PRACTICE OF ENV.} &= \beta_9(\text{COMPARISON}) + \beta_{10}(\text{RESOURCES}) + \beta_{11}(\text{AUDIT OBJECTIVE}) + \\ &\quad \beta_{12}(\text{EXPERT ADVICE}) + \beta_{13}(\text{EVALUATION}) + \beta_{14} \\ \text{REPORTING} &= \beta_{15}(\text{RESOURCES}) + \beta_{16}(\text{EVALUATION}) + \beta_{17} \\ \text{(INTERNALLY)} & \\ \text{REPORTING} &= \beta_{18}(\text{RESOURCES}) + \beta_{19}(\text{PROACTIVE POLICY}) + \\ \text{(EXTERNALLY)} &\quad \beta_{20}(\text{REPORTING, INTERNALLY}) + \beta_{21} \end{aligned}$$

β = DIRECT EFFECT CORRELATION COEFFICIENT

ILLUSTRATION 2 : EQUATION FOR PATH ANALYSIS (DIRECT EFFECT)

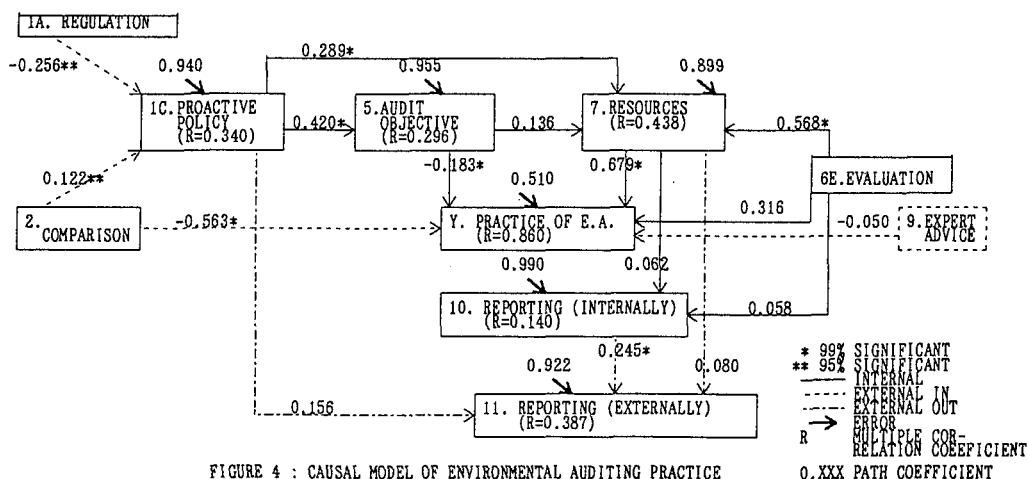


FIGURE 4 : CAUSAL MODEL OF ENVIRONMENTAL AUDITING PRACTICE

Figure 4 shows the causal model of the relationship between the external and internal factors that are involved in the practice of environmental auditing in Japanese companies. As stated in the hypotheses, environmental related regulations and comparison of environmental policy have a direct effect on the setting up of a proactive policy. The proactive policy will have direct effect on the formation of sound audit objectives, allocation of monetary and human resources needed for the practice. The feedback from audit findings plays a vital role in determining future allocation of monetary and human resources, and also help to improve the effectiveness of the practice through corrective actions. The practice of seeking advice from the external expert or consultant for an effective environmental auditing system is not prevalent among Japanese companies. From the companies' annual reports, pamphlets etc. that were enclosed together with the questionnaire replies, it is found that almost all if not all of the annual reports or audit

reports are written in similar format with identical content. The most distinctive characteristic of a Japanese company's annual report concerning environmental issue is the listing of all their environmental policies, environmental management planning and their environmental organization. Very little has been touched on the effectiveness of environmental management and auditing systems. Not much has been enclosed on the faults that they managed to detect and how they managed to provide solutions to those faults. It is crucial for Japanese companies to enclose such information in order to fulfill the relevant requirements of the international standardization on environmental management and auditing systems. Documentation of what has been done in an environmental auditing is important for a formal practice of environmental auditing (ICC, 1991 ; Rhodes, R. L., 1986). Basically, the Japanese companies are preparing themselves in a very rapid way to flow along with the trend of international standardization of environmental management and audit systems.

5. CONCLUSIONS

From the survey, firstly, it is found that the principle factors that contribute towards the practice of environmental auditing are, namely (a) the resources factor and (b) the recognition factor. The extent of the practice in Japanese companies is such that they have sufficient participation or support from the top management level, and also having monetary allocation and human resources for the practice. On the other hand, it is found that the Japanese companies do not have sufficient understanding concerning the formal practice of environmental auditing. They are still carrying out the informal practice of environmental auditing since the 1970s during the era of energy crisis and campaign on saving natural resources. The regular process of data and records keeping, and carrying out inspections followed by recommendations and implementation of recommended actions is actually the fundamental part of environmental auditing. The understanding on the formal practice can be increased by having a formal standardized procedure and standard for those who are related to follow or refer. Secondly, it is found that companies with their annual sales more than ¥200 billion and other companies with less are different in terms of monetary and human resources allocation, and motives of practice and the level of comparison of environmental policy with other companies. It is natural for companies with higher annual sales to be able to have better allocation compared to those with lower annual sales when they have the need to do so. Thirdly, it is found that the practice of environmental auditing in Japan is influenced by the external and internal factors that are inter-related to each other. Lastly, the Japanese authority should fasten the process of adoption of the ISO standard or having a modified standard that is equivalent or stricter than the ISO standard. It is said that the Japanese authority will set their own standard based on the ISO standard after it has been enforced. It is to be treated as an equivalent to the ISO standard and to be accepted accordingly, internationally. It is also a need for the Japanese authority to adopt the standard in order to avoid any international trade problems as what has happened with the ISO 9000. And, encouraging the audit findings to be made public among the Japanese companies will help to increase the understanding on the discipline and it will also help them to learn from each others' mistakes and to make the program more cost-effective.

6. LITERATURE CITED

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