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# Environmental management system auditing within Australasian companies

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## **Abstract**

This paper focuses on various aspects of internal and external audits carried out to obtain and maintain ISO 14001 (the International Standard for the Environment released in September 1996) certification. The paper is based on the findings of a questionnaire survey mailed to ISO 14001 certified companies and examined the importance of auditing, its drivers and person(s) responsible for reviewing of the audit results. A response rate of almost 50 per cent was achieved. The findings show that the main reasons for conducting environmental audits go beyond merely satisfying the mandatory requirements of the standard. The responsibility for reviewing of the results and making changes in environmental management programs/plans rests primarily with the top management of the company. Furthermore, the involvement of suppliers in environmental audits needs to be nurtured and developed so that both parties can benefit from the ISO 14001 certification.

## **Introduction**

Organisations[1] use auditing as a main method to measure and monitor their performance, be that in financial, quality or environmental areas. The usage of the word “audit” was earlier restricted to the accounting profession, however, it is now also used in other disciplines. Nonetheless the objective of an audit, regardless of the discipline, fundamentally remains the same, that is, to evaluate and check the systems, procedures and standards. A survey conducted by Price Waterhouse in 1995 of 369 US companies found that more than 75 per cent of the respondents had conducted regular audits primarily for the reasons of “risk management, maintenance of public trust and (the) quest for total quality management” (McManus *et al.*, 1996, p. 144). In the views of Pearson *et al.* (1993, p. 4.1) “an environmental audit provides the means for ensuring compliance with legislation and a check on the adequacy of the company’s systems”.

The current literature on “environmental management auditing” (presented in the next section) generally focuses on the objectives of the audits, the challenges accompanied with it and the potential benefits procured by organisations from regular auditing. The literature, however, presents no clear reasons for auditing and, more importantly, what happens once the audits have been completed either by an internal or external auditor. Notwithstanding these gaps identified in the literature on environmental auditing, the findings reported in this paper are based on a questionnaire survey mailed to ISO 14001 certified organisations in Australia and New Zealand, examining a number of issues, including those related to auditing.

The purpose of this paper is to present the key findings of the survey. The reasons for carrying out the audits and the measures undertaken by organisations following the completion of the audit are identified. The findings should be of interest to organisations in both developing audit plans as well as being useful in benchmarking exercises. The next section of the paper presents a review of some of the relevant literature. Next, the survey methodology is described. This is followed by the results and discussion section. Finally, conclusions and recommendations are presented.

## **Literature review**

The importance and requirement of addressing environmental issues by organisations is well documented (Hogarth, 1999, p. 122; *Supply Management*, 1998, p. 44; Haugan, 1999, p. S2) and need not be discussed in detail here. It has been indicated time and again in the literature and organisational case studies that organisations need to show their commitment in recognising and addressing environmental issues, if they want to successfully operate in the twenty-first century. One of the ways in which organisations can demonstrate this commitment is by carrying out regular environmental audits[2].

Various definitions of environmental audit/auditing have been identified in the literature (see Appendix), though all directing towards the importance of regular monitoring, measurement, and recording of company's aspects and impacts in accordance with the legal requirements. Clause 4.5.4 of the ISO 14001 standard requires every organisation to periodically undertake an environmental management system audit in order to (Whitelaw, 1997, p. 114):

- determine whether the environmental management system conforms to planned arrangements (controlling and minimising the significant environmental impacts) and meets the requirements of the standard; and
- provide feedback to management of the results of such audits.

In the views of Ferdinand and Kleinsorge (1993), as cited in Ahmed *et al.* (1998, p. 59), an effective environmental audit system should comprise elements of:

- environmental policy;
- environmental reporting system;
- data collection procedures and environmental database;
- executive environmental information system; and
- decision support system (DSS) for analysing, planning and formulating corporate environmental strategy.

To incorporate these elements into a complete audit it is essential that a company's employees and management, in addition to its products and processes, are thoroughly monitored, evaluated, reviewed and the findings are documented. The ISO 14000 series itself and a number of researchers have indicated that the following objectives should be covered for an environmental audit to be objective in nature (Zingale and Himes, 1999, p. 18; Sayre, 1996, p. 139; Whitelaw, 1997, p. 134):

- determine if the facility is operating in accordance with all applicable environmental laws, regulations and permits and is meeting regulatory requirements and commitments;
- determine whether the management system is designed to achieve, and is achieving, regulatory compliance and continual improvement of environmental performance;
- provide opportunity for system improvements;
- determine if the plant staff is knowledgeable of and is implementing all plant procedures in accordance with internal policies and practices;
- determine the effectiveness of the system in meeting objectives; and
- meet ISO registration requirements.

Environmental audits can vary in their nature and can be grouped into three categories as shown in Figure 1.

Irrespective of the type of audit conducted, a number of reasons have been indicated in the literature as to why organisations conduct the audits including (Hemenway, 1995, p. 5; Switzer and Ehrenfeld, 1999, p. 17; Maltby, 1995):

- Identifying problems and risks in the operating systems and correcting them before they are detected by the regulators.
- Assisting in improving the company's environmental programs and plans.
- Assessing the impact of new business developments.
- Auditing the performance of the contractors and the regulators.
- Increasing management's awareness of the environmental issues.
- Measuring and tracking the environmental management system performance.

Audit records, in addition to showing compliance with the regulations, can at other times also act as a certificate, which can be used for accreditation and marketing purposes. Furthermore an audit provides the company with additional benefits, which in some circumstances can act as drivers for companies to conduct the audits. The benefits include (Elkington, 1990; Vinten, 1996; Pearson *et al.*, 1993, pp. 4.7, 8; Kim, 1997, pp. 9-11; Bragg *et al.*, 1998, p. 46; Welford, 1995, p. 57; 1996, pp. 123, 124; Taylor *et al.*, 1994, pp. 298-9), audits:

- act as an early warning system and information mechanism for management to help them make informed decisions to improve environmental action;
- increase employee awareness in environmental policies, responsibilities, issues, and impacts as environmental management becomes a responsibility shared by all managers and not the unique preserve of a specialised technical department;
- reduce financial capabilities and facilitates insurance cover in case of an accident resulting from compliance with regulations, guidelines and legislation;
- provide environmental performance against (pre-defined) aims and intentions;
- determine the extent to which EMS in a company is performing according to its documented procedures and aims;
- demonstrate company commitment of environmental protection to employees, the public and the authorities and accordingly improve relationships with the stakeholders, including the authorities and the community;

- provide an environmental database for environmental improvement planning, plant modification and emergency planning;
- provide safeguard for the (ecological) environment;
- indicate current or potential future problems that needs to be addressed;
- reduce exposure to litigation, incidents and adverse publicity;
- help assess and identify training needs and provide data to assist in developing training programs for employees and suppliers;
- enable companies to build on good environmental performance and give credit where appropriate and highlight deficiencies;
- assist the exchange and comparison of information between different plants or subsidiary companies; and
- provide cost saving opportunities, for instance, resulting from identification of deficiencies in usage of raw materials and energy.

Third party or an external audit is a prerequisite for obtaining ISO 14001 certification. Wilson (1999) cautions companies of the difference between the EMS conformance and environmental compliance audits before jumping to a third party audit. He comments that firms often get confused between the two and this may effect the scope and the findings of the audit, as in the case of an EMS conformance audit, the criteria for evaluation is the ISO 14001 standard or EMAS or a similar standard. On the other hand, in the case of an environmental standard, the criteria for audit would be the applicable to national or international regulation.

### **Research methodology**

Data for this paper were collected during mid-2000 by means of a questionnaire survey mailed to 286 companies in Australia and New Zealand that were certified to ISO 14001 and were listed on the register of Joint Accreditation System of Australia and New Zealand (JAS-ANZ) as on February 2000. JAS-ANZ is a National Register/database of Certified Suppliers, Certification Bodies and Registered Auditors of a number management systems, jointly operated by Australia and New Zealand (JAS-ANZ, 2000). The questionnaire explored a range of issues relating to the EMS adoption process as well as identifying the involvement of stakeholders, primarily top management, employees and suppliers during the EMS adoption stages (see Zutshi and Sohal, 2002a).

The questionnaire survey was the second stage of the research, the first stage being case studies, based on semi-structured, exploratory interviews with nine environmental managers from various industrial sectors and organisational sizes (see Zutshi and Sohal, 2001). The issues raised from the interviews, along with the literature review resulted in the content for the development of the questionnaire. Input for improving the content, wording and structure of the questionnaire was also sought and received from the Victorian Environmental Protection Agency (EPA), experts from Quality Assurance Services (QAS) and industrial practitioners and managers from organisations such as DuPont and Boral to name a few. A number of experienced researchers at Monash University also provided input into the development of the questionnaire. Since EMS experts and practitioners were involved in the development of the questionnaire, it was considered to be a part of the pilot-testing and accordingly a formal pilot test of the questionnaire was not carried out.

A pre-notification letter summarising the aim and objectives of the study was mailed to the prospective respondents approximately a week before the actual mail-out of the questionnaire. Of the initial mail-out to 286 companies in June 2000, nine questionnaires were returned undelivered because either the addressee had moved to another company or the mailing address was incomplete or incorrect. A follow-up letter requesting the respondents to complete the questionnaire was mailed approximately five weeks after the mail-out of the questionnaire. By the cut-off date (approximately six weeks after the mail out of the questionnaire) a total of 134 responses were received, giving a response rate of 48.4 per cent. Another six questionnaires were received after the cut-off date, representing a total response rate of 50.5 per cent. Jobber (1989, p. 134) defines response rate as “the percentage of total questionnaires mailed (and not returned by the postal service as undelivered) that were returned by respondents”. The six questionnaires received after the cut-off date were not included in the final analysis, as the analysis has already been started. Furthermore, two (one each from the State of Victoria, Australia and New Zealand) of the 134 questionnaires received were incomplete and were not included in the final analysis. Hence the analysis presented in this paper is, accordingly, based on 132 responses.

The responses received were coded and entered into the SPSS database and analysed using the means, frequencies and cross-tabulations. A number of studies have been reported in the literature, including Davis (1997); Sharma and Fisher (1997); Davenport *et al.* (1997); Brown *et al.* (1997); Preston and Saunders (1995); Brown and Wiele (1995); and Vargas and Cabanas (1995), that supports the use of means, frequency and percentages to be used as part of the analysis especially for exploratory studies. For most of the questions, respondents were asked to give their answer on a five-point Likert scale, where 1=“not at all” and 5=“to a very large extent”.

The questionnaire explored various aspects of EMS adoption (such as its benefits and impediments (see Zutshi and Sohal, 2002b) and the role of stakeholders (employees, suppliers and top management (see Zutshi and Sohal, 2002a)) during the EMS implementation, in addition to the auditing based questions. The findings of the last section of the questionnaire, pertaining to auditing are presented in the next section.

## **Discussion of the findings**

This section presents an overview of the respondents’ profile and the survey findings.

### ***Respondents’ profiles***

Table I presents the demographics of the questionnaire respondents. The majority of the sample comprised of Australasian owned (59.8 per cent) manufacturing (56.1 per cent) organisations operating primarily in Victoria, New South Wales and New Zealand. Based on Lee’s (1995) classification, majority of the responding organisations were small in size with less than 500 employees working at a given site.

### ***Reasons for internal audits***

Before proceeding to accredit itself with a system or standard, organisations require a reason/driver (in this case compliance with ISO 14001) and an assessment of their current

position against the standard requirements. This assessment is primarily carried out through an internal audit, which maybe accompanied by an initial environmental review (IER) or commonly known as the gap analysis. Pojasek (2001, p. 91) defines a gap analysis “as a process of determining the difference between what is and what should be present to have an effective EMS”. Gap analysis has also been defined as the process of “... assessing the gap between current program management and those elements found in an EMS” (*BioCycle*, 1999, p. 10).

A number of other authors have also identified the need for companies to use gap analysis as a tool to identify potential improvement areas when implementing an EMS (Goldstein, 1999, p. 74; Fuhs, 1999, p. 15; Foszcz, 1999, p. 8; Quinn, 2000, p. 26).

The findings of the internal audits, reviewed by top management and supervisors assists the companies in identification of potential improvement areas and not to mention to evaluate their status against these standard requirements. Also any non-conformances identified during an internal audit can be corrected before a third party audit is conducted (this also reduces the chances of getting a non-conformance during an external audit). To identify the reasons for conducting an audit, respondents were asked to reflect back on their experiences and indicate their reasons for conducting internal audits within their respective organisations.

Table II shows the mean and standard deviation for the reasons listed in the questionnaire for conducting internal audits, in addition to significant chi square values with respect to industry sector and business ownership. The three main reasons identified for conducting an internal environmental audit were:

1. “compliance with ISO 14001 standard” (mean 4.53);
2. “identification of potential improvement areas within the organisation” (mean 4.15);  
and
3. “organisations compliance with legislation” (mean 4.03).

These responses were in accordance with the literature findings where compliance to legislation/regulation was cited as the main reason/driver for organisations to implement, and if required, be certified to ISO 14001. Additional reasons for organisations to conduct internal audits included “increasing environmental awareness within their employees”; and “demonstrating the company’s commitment to their stakeholders (including the community) of being environmentally-conscious”. At the same time, “identifying cleaner production opportunities” and “improvement areas to improve environmental performance” within the organisation were not rated very highly by the respondents as reasons to conduct internal audits. This finding is surprising and needs to be further explored, as internal audits are usually a good starting point for organisations to internally identify and improve its performance in various areas.

Pressure from its stakeholders such as employees (mean 1.64), suppliers (mean 1.29) and customers (mean 1.69) was not identified by the respondents as a major driver or reason to conduct an internal audit. This could be attributed to the basic fact that suppliers and customers usually require a second or a third party audit rather than an internal audit. Also,

it is generally the management and not the employees who are responsible for conducting internal audits and recording, reviewing and accordingly taking appropriate action based on the findings.

With respect to both industry sector and ownership seven reasons were found to have a significant chi square value (see Table II). Of the seven reasons for carrying out an internal audit, one reason, “assess training program for future employee training” was found to be significant with both industry sector and ownership. Significance of this reason emphasises the importance of training and re-training of the employees in operating procedures and processes and any changes associated with them.

### ***Measures after internal audit***

As one would expect, on the completion of an internal audit, organisations take a number of measures to address the improvement areas identified. The survey responses indicate towards the same trend. Various measures were listed in the questionnaire and the responses were to be indicated on a five-point Likert scale (see Table III).

The results show that the significant steps undertaken by organisations following an internal audit included:

- “formulation of a preventive plan” (mean 4.25);
- “discussion of the audit findings with supervisor/site manager” (mean 4.21); and
- “discussion of the audit findings with the top management” (mean 3.97).

The contribution and role of top management in reviewing the results during the post-audit stage cannot be overlooked, they being the decision makers; resource providers and change initiators. The employees, being an intricate part of the organisations working procedures, needs to be aware and involved, as they play the primary role of change-implementer. The survey results, however show that the suggestions for improvement following the audit from the “top management” (mean 3.34) and “employees” (mean 3.32) had very low mean scores as compared to a measure such as “formulation of a preventive action plan” (mean 4.25). “Taking suggestions for improvement from the suppliers’ with a mean of only 1.56 shows that suppliers are yet to be actively involved and become a part of the organisation auditing process.

The above findings could be supported on the basis that any plans developed to address the gaps in the system would be finalised after discussion with management and employees and if applicable also with the suppliers. In case of the employees, the results show a higher level of understanding of the audit findings (mean 3.38). One possible explanation for the highest mean value for the “prevention action” variable could be that generally this would be the first measure taken by all organisations following the completion of the internal audits, regardless of the involvement of the employees or suppliers in developing the preventive plan.

The chi square significance value (Table III) with respect to both industry sector and ownership shows that no measure was significant with the industry sector and only two

measures were of some significance for the business ownership, namely to “use the results as basis for future audits” and “suggestions for improvement from site managers”.

### ***Review of internal audit findings***

As the EMS is implemented, audits conducted, results reviewed and measures undertaken to address the audit findings, changes in the responsibility for overseeing EMS programs can be observed within the company, with top management (about 28 per cent) primarily having this responsibility (see Table IV). One of the main reasons cited in the literature for the increased involvement of top management in reviewing of the EMS programs and internal audit findings is the growing evidence of the increasing accountability and liability of the top management in case of non-compliance.

Results also show that very few companies had a full-time environmental manager, specialist or a person exclusively looking after the environmental issues. In many companies, quality managers had been given the responsibility for environmental issues, as commented by the questionnaire respondents and also found during preliminary interviews (see Zutshi and Sohal, 2001). About one-fifth (19 per cent) of the responding companies had appointed an environmental management representative (EMR) who was given the responsibility for reviewing the implementation of the EMS programs. Respondents also indicated that in majority of the cases the EMRs were a part of the top management level. Regional managers (approximately 7 per cent) were found to have the least responsibility for looking after the audit findings.

### ***Frequency of auditing***

The results show that in approximately 39 per cent of the sampled organisations an internal audit was conducted every six months (by an internal auditor), regardless of the industry sector or ownership (see Table V). The findings also show that internal audits are conducted more frequently within the manufacturing as compared to the non-manufacturing based organisations. This could be attributed to their high-risk operations and the public perception of their operations being unsafe. In another 35 per cent of the sample respondents reported that an internal auditor conducted an audit every time changes took place in policies, procedures or operations of a department within company.

In approximately three-quarters (about 71 per cent) of the sampled organisations an external audit was undertaken every six months and in nearly one-fifth of the companies it was conducted yearly (see Table VI). Third party audits provide an external view-point on the effectiveness of the company's systems/operations. They are also a mandatory requirement of the ISO 14001 standard, applicable to certified companies. The standard mandates certified companies to go through surveillance audits by an external party twice a year and a full audit every three years, if the organisation wants to continue its certification to ISO 14001.

### ***Number of auditing days***

Along with the frequency of internal and external auditing, the questionnaire also asked the respondents to indicate the number of days required to conduct these audits. The

responses show that within the surveyed companies, on average it took about one to two days to go through an internal or external audit. The findings also show that in about 35 per cent of the sampled companies, it took five days to carry out an external audit (see Table VII) as compared to only 17 per cent of the companies taking five days to conduct an internal audit (see Table VIII). However approximately one-fifth (about 18 per cent) of the companies had spent more than ten days to carry out an internal audit as compared to only 1.5 per cent of the companies taking this time in carrying out an external audit. The variation in the length and time for completing the two types of audits is due to the differences of the objectives and outcomes from the two audits, external audits conducted primarily as part of the requirement for certification or re-certification and the internal audit conducted to identify areas for further improvements. These reported figures should be taken as approximations only as the exact time for either of the audits is dependent on both the size of the company and the maturity of the operating system.

### ***Documentation of audit finding***

All findings and measures taken by the companies following either the internal or external audits are documented by them. As shown in Table IX, 80 per cent of the respondent companies produced documentation in both hard (i.e. paper) and soft (i.e. electronic) forms. A slightly higher proportion of companies' preference for electronic form could be presumed on the convenience and saving of resources (such as paper waste, disposal costs) attached with it, as compared to more traditional formats, such as paper.

A higher proportion of manufacturing and Australasian organisations maintained both forms (hard and soft) of documentation as compared to non-manufacturing and foreign ownership companies (see Table IX). Managers should be aware that the ISO 14001 standard does not prioritise documentation in either hard or soft versions; its only pre-requisite being maintenance of the current, updated changes and a master copy of the "obsolete" documents. However, due to personal preferences of external auditors in some cases, organisations prefer to maintain both formats as a safeguard.

Irrespective of the frequency of the audits conducted and accordingly changes made in the operating processes and procedures, companies are required to regularly review and update their documentation. Even though a requirement of the standard, this practice is essential to avoid duplication of procedures and thus the confusion resulting from using both old and new procedures by the employees. The survey results show that in about one-quarter of the companies (29.54 per cent), the documentation was reviewed and updated at least once a year (see Table X). About one-fifth (21.21 per cent) of the companies reviewed and updated their documents twice a year. It was also indicated by the respondents that if any changes were made in the operating processes or procedures, the particular section of the document was updated immediately.

In almost one-third of the surveyed companies, new documentation was produced once a month (7.57 per cent) or once every three months (23.48 per cent) as processes and procedures were reviewed, revised and updated. However, in about one-half (48 per cent) of the companies new documents were produced only when required (see Table XI).

## Conclusion and recommendations

The paper has presented the key findings relating to internal/external audits conducted by Australasian organisation that had been certified to ISO 14001. The literature had identified gaps with respect to why companies undertake audits and the measures undertaken following the audits. This study attempts to fill this gap in the literature. The main findings of the survey can be summarised as follows:

- Compliance to environmental and other related legislation/regulation is the main reason for organisations to conduct internal audits.
- Discussion of the environmental audit findings with the supervisors and site managers, in addition to finalisation of preventive plans, are the initial measures taken by organisations following internal audits.
- Although employees and suppliers are informed of the environmental audit findings, they are not actively involved when actual improvement plans are discussed and finalised by organisational managers.
- Top management is primarily responsible for overseeing/reviewing the internal audit findings.
- As changes are made in the companies operating systems and procedures following the identification of the gaps/improvement areas during the environmental audits, these changes accordingly are regularly documented, reviewed and updated.
- The involvement and contribution of suppliers in organisations' change programs is still reserved and restricted.

The results suggest that many organisations are not benefiting from the time and resources that they deploy in completing internal or external audits and hence are missing the opportunity to use the findings of an audit exercise to make improvements in their systems and processes. Audits should be viewed as more than just an exercise to satisfy legal requirements. The real value comes from sharing the audit findings with the employees and suppliers, so that improvement opportunities identified can be readily implemented. The lack on involvement of employees and suppliers in developing improvement plans is a major shortcoming. This can lead to resistance by employees when changes are being introduced.

In addition to being involved in the implementation of the preventive and corrective plans, employees/employee representatives should also be involved in the planning and finalising of the improvement strategies. This is because employees are generally more knowledgeable about the intricacies of the operations and systems being changed and can provide managers with valuable suggestions and feedback. This would ensure that the preventive/corrective plans are readily accepted and implemented by the employees without any resistance and that employees feel ownership of the new systems/processes/procedures being developed.

As the concept of supply chain management becomes more popular and accepted, managers will need to consider more strategically how suppliers can be better integrated within the organisation's systems and processes. The findings of the study show that there is an enormous opportunity for organisations to develop better relations with their suppliers that will benefit both parties. Managers should recognise the contribution that suppliers can

make towards improving an organisations systems and processes, especially in instances where suppliers are dealing with a number of different customers supplying similar products/materials. The real value from this close supplier relationship will come from the transfer of knowledge and expertise between the two parties.

A limitation of this study is that it did not focus on any specific industry sector or organisational size to any great extent. Managers should therefore be cautious in directly applying the findings of the study to their organisation. It is recommended that future studies take a more focussed approach to examining the issues reported in this paper with respect to different industry sectors, organisational size and ownership.

## **Notes**

1. The words “company” and “organisation” have been used interchangeably within this paper.
2. The terms “environmental management system audits”, “environmental management audits and environmental audits” have been used interchangeably within this paper. Also the word “audit” refers to “environmental audits” unless otherwise stated.

**Table I**  
Respondents' profiles

	Frequency	Valid per cent	Cumulative per cent	
<b>Organisational sectors</b>				
Manufacturing	74	56.1	56.1	
Non-manufacturing	58	43.9	100.0	
<b>Ownership</b>				
Australasian	79	59.8	59.8	
Foreign-owned	53	40.2	100.0	
<b>State/country of origin</b>				
ACT	2	1.5	1.5	
New South Wales	30	22.7	24.2	
Northern territory	1	0.8	25.0	
Queensland	15	11.4	36.4	
South Australia	7	5.3	41.7	
Tasmania	8	6.1	47.7	
Victoria	36	27.3	75.0	
Western Australia	6	4.5	79.5	
New Zealand	25	18.9	98.5	
Other	2	1.5	100.0	
	<b>No. of employees</b>	<b>Employees on-site</b>	<b>In Australia/NZ</b>	<b>Employees worldwide</b>
<b>Sample classified by size</b>				
Small	0-500	114 (86.36)	53 (40.15)	12 (9.09)
Medium	501-1,000	7 (5.30)	17 (12.87)	5 (3.78)
Large	>1,000	5 (3.78)	26 (19.69)	30 (22.72)

**Note:** The values outside the brackets represent the frequency of responding organisations and those within the brackets represent the percentages. This was an open-ended question asking the respondents to identify the number of employees

**Table I** Respondents' profiles

**Table II**  
Reasons for internal audit

Reason for internal audit	n (Valid)	Mean statistic	SD	Sector $\chi^2$ sig.	Owner $\chi^2$ sig.
To identify organisations EMS compliance with the ISO 14000 standard	132	4.53	0.81	0.309	0.351
To identify potential improvement areas to improve environmental performance	132	4.15	0.86	0.832	0.222
To identify organisations EMS compliance with the legislation	132	4.03	1.03	0.761	0.247
To demonstrate company commitment to environmental protection to employees, the public and the authorities	132	3.89	1.08	0.999	0.274
To increase employees awareness in environmental matters	132	3.69	1.03	0.281	0.513
To monitor set targets	132	3.58	1.11	0.092	0.306
To identify potential emergency procedures	131	3.47	1.13	1.000	0.820
To assist while formulating environmental policies and programs	132	3.45	0.98	0.535	0.220
Assess training programs and provide data to assist in future employee training	131	3.31	1.04	0.085	0.074
To identify cleaner production opportunities	128	2.96	1.25	0.038	0.517
To identify potential cost saving areas, for example waste minimisation	131	2.94	1.16	0.291	0.954
To benchmark with other organisations	129	2.26	1.11	0.034	0.350
Assess the impact of new business development	131	2.24	1.18	0.075	0.902
Pressure from customers	131	1.69	0.96	0.454	0.149
Pressure from employees	130	1.64	0.77	0.849	0.075
Pressure from suppliers	129	1.29	0.61	0.221	0.380

**Note:** Means based on five-point Likert scale, where 1=not at all and 5=to a very large extent

**Table II** Reasons for internal audit

**Table III**

Measures after the internal audit

Measure after internal audit	n (Valid)	Mean statistic	SD	Sector $\chi^2$ sig.	Owner $\chi^2$ sig.
Formulation of a preventive action plan	132	4.25	5.07	0.771	0.581
Discussion of the audit findings with supervisors/site managers	131	4.21	0.76	0.208	0.057
Discussion of the audit findings with top management	132	3.97	1.00	0.554	0.772
Formulation of a corrective action plan	132	3.96	0.89	0.481	0.568
Setting up of achievable and measurable targets	132	3.91	1.01	0.105	0.321
Using the results as a basis for planning/scheduling of future audits	131	3.75	0.97	0.721	0.059
Suggestions for improvement from the site managers	132	3.70	0.94	0.809	0.026
Discussion of the audit findings with employees	132	3.38	1.02	0.407	0.805
Suggestions for improvement from the top management	131	3.34	1.21	0.800	0.991
Suggestions for improvement from the employees	132	3.32	1.04	0.374	0.845
Suggestions for improvement from the suppliers	131	1.56	0.80	0.516	0.664

Note: Means based on five-point Likert scale, where 1=not at all and 5=to a very large extent

**Table III Measures after the internal audit****Table IV**

Frequency (percentages) of organisations review of internal audit findings

Responsibility for review of internal audit findings	Industry sector		$\chi^2$ sig.	Business ownership		$\chi^2$ sig.
	Manufacturing	Non-manufacturing		Australasian	Foreign	
Supervisors on site	14 (10.60)	10 (7.57)	0.776	16 (12.12)	8 (6.06)	0.481
Area manager	12 (0.09)	6 (4.54)	0.314	10 (7.57)	8 (6.06)	0.657
Regional manager	5 (3.78)	4 (3.03)	0.992	6 (4.54)	3 (6.06)	0.686
Top management	21 (15.90)	15 (11.36)	0.711	24 (18.18)	12 (9.09)	0.360
EM Representative	46 (34.84)	29 (21.96)	0.202	43 (32.57)	32 (24.24)	0.552

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages. Multiple responses were allowed in the questionnaire

**Table IV Frequency (percentages) of organisations review of internal audit findings****Table V**

Frequency (percentage) of auditing by internal auditors

Time period for audit	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
Every six months	30 (22.72)	21 (15.90)	30 (22.72)	21 (15.90)	51 (38.6)
Every 12 months	18 (13.63)	16 (12.12)	20 (15.15)	14 (10.60)	34 (25.8)
Other	26 (19.69)	21 (15.90)	29 (21.96)	18 (13.63)	47 (35.6)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

**Table V Frequency (percentage) of auditing by internal auditors****Table VI**

Frequency (percentage) of auditing by external auditors

Time period	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
Every six months	55 (41.66)	39 (29.54)	52 (39.39)	42 (31.81)	94 (71.8)
Every 12 months	13 (9.84)	12 (9.09)	17 (12.87)	8 (6.06)	25 (19.1)
Other	5 (3.78)	5 (3.78)	7 (5.30)	3 (2.27)	10 (7.6)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

**Table VI Frequency (percentage) of auditing by external auditors**

**Table VII**

Frequency (percentages) for organisations internal audit days

Time for internal audit (days)	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
0-0.5	8 (6.06)	5 (3.78)	7 (5.30)	6 (4.54)	13 (9.84)
1-2	33 (25)	29 (21.96)	34 (25.75)	28 (21.21)	62 (46.96)
3-5	13 (9.84)	10 (7.57)	16 (12.12)	7 (5.30)	23 (17.42)
6-10	7 (5.30)	2 (1.51)	4 (3.03)	5 (3.78)	9 (6.81)
More than ten days	13 (9.84)	11 (8.33)	17 (12.87)	7 (5.30)	24 (18.18)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

**Table VII** Frequency (percentages) for organisations internal audit days**Table VIII**

Frequency (percentages) for organisations external audit days

Time for external audit (days)	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
0-0.5	2 (1.51)	2 (1.51)	3 (2.27)	1 (0.75)	4 (3.03)
1-2	44 (33.33)	27 (20.45)	44 (33.33)	27 (20.45)	71 (53.78)
3-5	24 (18.18)	23 (17.42)	23 (17.42)	24 (18.18)	47 (35.60)
6-10	3 (2.27)	5 (3.78)	7 (5.30)	1 (0.75)	8 (6.06)
More than ten days	1 (0.75)	1 (0.75)	2 (1.51)	0	2 (1.51)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

**Table VIII** Frequency (percentages) for organisations external audit days**Table IX**

Cross-tabulations for organisations documentation methods

Method of documentation	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
Hard copy (paper)	6 (4.54)	4 (3.03)	5 (3.78)	5 (3.78)	10 (7.57)
Soft copy (electronic)	8 (6.06)	6 (4.54)	8 (6.06)	6 (4.54)	14 (10.60)
Both hard and soft copies	60 (45.45)	46 (34.84)	65 (49.24)	41 (31.06)	106 (80.30)
Other	0	1 (0.75)	0	1 (0.75)	1 (0.75)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

**Table IX** Cross-tabulations for organisations documentation methods**Table X**

Frequency of review of documentation

Frequency documentation reviewed/updated	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
Once a month	7 (5.30)	1 (0.75)	6 (4.54)	2 (1.5)	8 (6.06)
Once every three months	9 (6.81)	6 (4.54)	11 (8.33)	4 (3.03)	15 (11.36)
Twice a year	14 (10.60)	14 (10.60)	17 (12.87)	11 (8.33)	28 (21.21)
Once a year	20 (15.15)	19 (14.39)	22 (16.66)	17 (12.87)	39 (29.54)
Other	24 (18.18)	18 (13.63)	23 (17.42)	19 (14.39)	42 (31.81)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

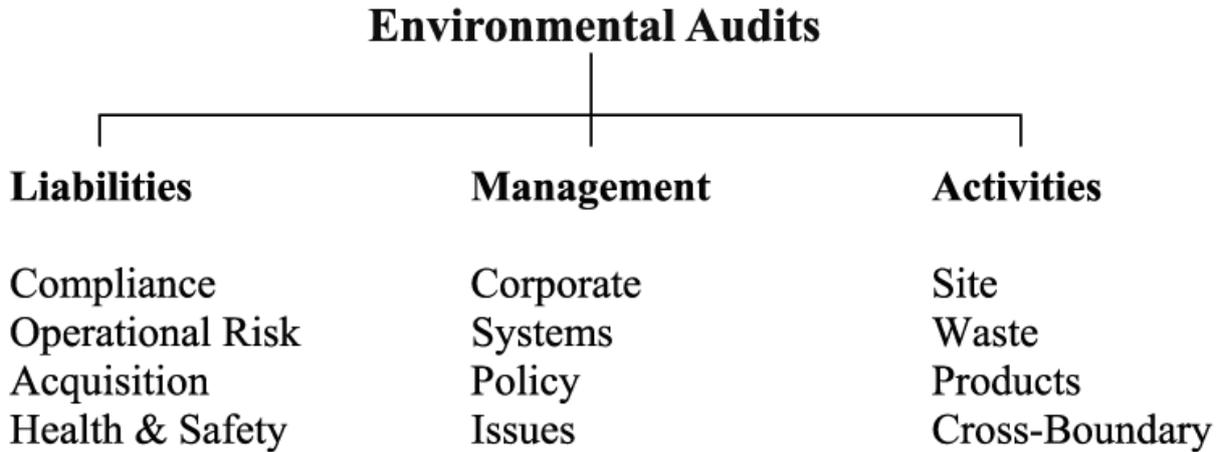
**Table X** Frequency of review of documentation

**Table XI**  
Frequency of new documentation produced

Frequency of producing documents	Industry sector		Business ownership		Total frequency
	Manufacturing	Non-manufacturing	Australasian	Foreign	
Once a month	7 (5.30)	3 (2.27)	7 (5.30)	3 (2.27)	10 (7.57)
Once every three months	17 (12.87)	14 (10.60)	20 (15.15)	11 (8.33)	31 (23.48)
Twice a year	9 (6.81)	9 (6.81)	11 (8.33)	7 (5.30)	18 (13.63)
Once a year	5 (3.78)	4 (3.03)	3 (2.27)	6 (4.54)	9 (6.81)
Other	35 (26.51)	28 (21.21)	38 (28.78)	25 (18.39)	63 (47.72)

Note: The values outside the brackets represent frequency of responding organisations and those within the brackets represent the percentages

*Table XI* Frequency of new documentation produced



**Sources:** Pearson *et al.* (1993, p. 43); Taylor *et al.* (1994, p. 298); Welford (1996, p. 127)

*Figure 1* Types of environmental audits

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### **Further reading**

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## **Appendix. Definitions of environmental audits/auditing**

International Standardisation Organisation (ISO), Geneva, defines an environmental management system audit as (Krut and Gleckman, 1998, p. 12):

A systematic and documented verification process of obtaining and evaluating evidence to determine whether an organisations environmental management system conforms to the environmental management system audit criteria set by the organisation, and for the communication of the results of this process to management.

Both the International Chamber of Commerce (ICC) and Confederation of British Industry (CBI) defines environmental auditing as (Pearson *et al.*, 1993, p. 4.2):

A management tool comprising a systematic, documented periodic and objective evaluation of how well organisations, management and equipment are performing with the aim of contributing to safeguard the environment by:

- Facilitating management control of environmental practices.
- Assessing compliance with company policies, which would include meeting regulatory requirements and standards applicable.

The US-EPA defined environmental auditing as (Pearson *et al.*, 1993, p. 4.2):

A systematic, documented periodic and objective review by regulated entities (private and public agencies) of facility operations and practices related to meeting environmental requirements.

Taylor *et al.* (1994, p. 458) provides the following definition of environmental auditing:

An inspection system that assesses the environmental effects of a company's activities, products and suppliers. It covers specific audits of health, safety, waste prevention and other matters and focuses on environmental issues of key concern – the organisation's impact on ozone depletion, pollution control, contamination of land or water, noise and odour pollution and waste minimisation, for example. It also takes into account the environmental performance of suppliers of raw materials, goods and services.