



A model of competency development for internal environmental auditors in ISO14001-certified organizations

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Abstract

This paper substantiates the problem of the effectiveness of internal environmental auditors in ISO 14001-certified organizations. The purpose of the article was to design a model to develop the competency of internal environmental auditors working within ISO 14001 standards. Data were collected from 548 participants responsible for the internal auditing within organizations certified to ISO 14001 standards in Thailand. The research revealed several aspects related to the model of internal auditor competency on self-actualization, explaining the audit processes, and systematic knowledge. Evaluation of the efficiency of the model of internal auditor competency learning indicated that learning course satisfaction was at the very high level, while both internal and external behaviors were at the high level. Knowledge, along with earlier and post-awareness were the two variables comprising internal behavior, while the data analysis indicated scores with a high degree of statistical significance. Skill, participation, and attitude were external behavior parameters and were assessed at the highest level. The paper expanded the practical potential of the internal auditors who had already taken and passed the training course in providing conscientious and professional care with integrity in the auditing processes in the organizations.

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Introduction

The operation of a company regarding environmental management can be evaluated using the standards set by Environmental Management System (EMS) ISO14001. It is possible to adhere to this standard in combination with other management aspects to support the organization's objectives. Its implementation does, however, have an effect in economic as well as environmental terms, since the imposition of an environmental standard can effectively create a trade barrier and force new legal obligations upon the organization. Due to the importance of environmental management throughout an organization, the EMS staff must depend on the cooperation of all departments throughout the organization. It is therefore necessary to implement a monitoring system which permits

assessments of the efficiency of the policy to be made, and to determine the extent to which environmental targets have been achieved, and the suitability of the aims and purposes of those targets. The normal expectation is to lower the levels of pollution produced by the organization in the course of its regular economic activity (Aroonsrimorakot, 2006).

It is the type of activity performed by an organization, or the particular use of environmental resources, that determines the laws to be applied in its environmental governance. While many businesses choose to have their environmental management practices certified according to international standards, this approach may not in fact lead to significant improvements. Studies have shown that despite the requirement to follow certain steps to comply with the standards, the people in many organizations do not understand the systems and do not carry out the operations correctly as specified. Wahid and Corner (2009) found that internal audit training is ineffective, while Chin, Poon, and Pun (2000) concurred, adding that audits do not lead to the correction or elimination of problems which are identified by researchers.

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Other studies have examined how training methods might be implemented to solve these problems, finding that audit administrators and management must be committed to reviewing their practice and making changes. Improving the channels of communication can be one effective means of supporting audit teams to provide better monitoring of environmental systems while meetings should be held to disseminate the outcomes of audits, and leaders should develop their skills to act upon the results (Cheng & Tummala, 1998).

These considerations will all affect the work of the environmental auditor in assessing compliance with the Environmental Management Systems ISO 14001 standard. McClelland (1973) studied workplace behavior to assess the performance of differing individuals and to find the approach which yields the best outcomes. It was revealed that individual characteristics within the group can drive those individuals to perform to a higher level. Outstanding practice requires a number of principal traits, such as knowledge, skills and self-concept. These ideas were adapted by Ramwarungkura (2007) who suggested the division of performance into its constituent categories of attitude, knowledge, and skills, so that managers of smaller organizations could use these to create a successful performance model.

The critical attributes of an effective environmental auditor under Environmental Management System ISO14001 standards include impartiality, independence and integrity, confidentiality, and the capacity to use the evidence available to produce a fair and objective report. However, little research exists on the subject of organizational efficiency in terms of how this can impact the performance of the auditor. It is therefore necessary to find a means of developing auditor performance within an organization's own environmental management system. The quality of auditing is very important, and each auditor brings differing potential qualities to the task. Ensuring that auditors are knowledgeable and can perform in an ethical manner for the environmental benefit of the organization and surrounding communities must therefore be a priority.

The evaluation of a learning model to develop competence comprises three stages: i) evaluation of the reaction; ii) evaluation of the learning, and iii) evaluation of post-training behavioral changes. The effectiveness of the Environmental Management System ISO14001 standards relies on the attitude, competence, integrity, and knowledge of the auditor, who represents a vital cog in the process of achieving organizational efficiency. Within that organization, environmental sustainability must be a part of the vision, mission, and goals so that the organization can apply collective wisdom to contribute to national, sustainable environmental development.

Literature Review

Theoretical concepts applied in this research are as follows:

International Standard ISO

A study by Charobram (2004) set out to determine the factors which influenced the success in preparing the Environmental Management System ISO14001 through a case study of the Office of the Northern Region Industrial Estate. The key factor in this study was held to be the full participation of every employee in the organization, since the commitment of managers and the awareness of the other staff were essential in order to achieve certification. For this organization, maintaining

the ISO14001 environmental management system once implemented demanded the constant monitoring of performance, so the design of the monitoring plan fell within the scope of the internal audit.

One option for improving monitoring is the use of self-assessment, which was investigated by Karapetrovic and Willborn (2001) with the goal of creating an audit process which would be wholly internal. This requires comprehensive knowledge of the materials, technology, and tools to be applied, and the design of work process plans to open and develop communication channels between managers and subordinates. The study also sought to provide policy advice and to design the assessment process so that work could be monitored objectively and accurately without compromise and with no need for workers to fear the process.

Competency

Another definition of competency was provided by Sakworawich (2004, p. 61) who noted that individual performance characteristics should encompass skills, abilities, and knowledge along with values and ethics, personality, and physical traits, and the capacity to match those attributes with the goals of the organization. In particular, success demands viability, and where individuals do not succeed, it is necessary to determine the reasons for the failure in order to make improvements.

Learning

According to Bloom (1975) the learning process is derived from the experience and behavior of an individual, and it is necessarily somewhat dependent on the environment and social conditions. Learning can be further divided into six categories which represent levels of learning, and which move from the superficial to the deep. The first level is acceptable, and this is followed by understanding and implementing. The three deeper categories are analysis, synthesis and evaluation, respectively. Different individuals will achieve different levels of learning in each given area of subject matter.

From a slightly different perspective, Pladisailert (2005) observed that the measurement of performance might not only depend upon an individual's abilities to work successfully, because additional factors such as money, facilities, and resources may also have an effect, but cannot be considered as part of the same overall measurement. When performance is evaluated, all these factors must be taken into consideration in order to avoid misleading results.

Environmental Education

One major international body with an interest in environmental education is UNESCO, whose stated aims include the building of awareness and the transfer of knowledge, along with the development of positive attitudes (UNESCO, 1976). Furthermore, it is necessary to support the development of skills, to improve participation and to provide criteria to permit evaluation. It is the belief of UNESCO that in order to develop a sustainable global environment, it is necessary to focus educational resources upon all global citizens so that they might have the skills and knowledge to protect and maintain their world.

According to Rawang (2009), environmental education encompasses a scientific approach which has its basis in the study of the environment itself in order to inspire learners to integrate their ideas to apply the theory. Students who wish to develop their knowledge and skills in this field can thus

implement systems of environmental management as follows:

1. the environmental education process first involves an analysis of the environmental situation, and secondly requires environmental assessment reviews.

2. the environmental education process has three main phases, which begins with the design or creation of the process of education, followed by the management of the process, and ending with the evaluation of the resulting environment.

3. the environmental management process also comprises three elements, which are firstly to define the alternatives to environmental management, then to participate in environmental management, and finally to evaluate the quality of the resulting environment.

Methodology

Scope of the Study

The scope can be sub-divided into four categories:

1. The areas of study comprised organizations in Thailand which are certified to ISO 14001 standards. The data for these companies was obtained from the public record through the National ICT Industry Intelligence: NI3 (TSIC, 2009).

2. The contents of the study included environmental issues, participatory management, internal auditing, and learning theories.

3. The population for the study comprised those Thai staff members in certified organizations who were responsible for the internal audits in their ISO 14001-certified organizations.

4. The study was carried out during the period January 2013 to April 2016

Population and Sampling

The population was the internal auditors in ISO 14001-certified organizations of 893 companies from the certified organizations data of Thai Industrial Standards Institute (TIS 2013). The sample group for study was 893 people who responded as internal auditors of each certified organization in ISO 14001 providing a response of 100 percent. The step of in-depth interviews was conducted by 10 experts in internal auditing from 10 certified organizations of ISO 14001, and who had experience of at least 10 years. The step of focus groups conducted by 20 experts comprised the ISO consultant, ISO certification bodies, internal environmental auditors, ISO trainers, and the environmental manager of the organizations which had experience of at least 10 years.

Data Collection

For the research and development of framework, it was necessary to define a descriptor level system and this study focused on the current situation in international environmental management system ISO 14001:2004-certified organizations, the development of a model of internal auditor competency learning in ISO 14001-certified organizations, which was based on environmental education conceptualization. The mixed process was undertaken for a three years and three months and consisted of four stages:

1. Initially the current situation was studied of the management systems of ISO 14001:2004 (TIS 2005), internal auditor responsibility, and competency. Using a questionnaire survey the following factors were included: representatives of professional internal environmental auditors in ISO 14001-certified organizations in different places and levels; the size of firms of different business types; requirements and results of the effectiveness of previous training of internal

environmental auditors on the knowledge, awareness of the internal auditors, and including the necessary training aims to competency development as follows: i) Internal auditor and organizations information; ii) international management system information; iii) Internal auditor knowledge of ISO 14001:2004; iv) internal auditor knowledge of guidelines in auditing according to ISO 19011:2011 (TIS 2011). v) Internal auditor awareness of internal auditing using ISO 14001:2004; vi) needs of competency development and improvement; vii) other suggestions in competency development.

2. The second stage of the work involved the analysis and synthesis of the model of competency development for internal auditors in ISO 14001. This stage used in-depth interviews and the questionnaire replies from the key informants in the first stage to consider the knowledge gap to increase the competency of auditors in different-sized organizations or other needs that appeared from the responses. The elements of the model competencies were developed from studying relevant documents or related research on competency development and was divided into three pillars: i) core competency; ii) functional competency; and iii) technical competency. Each competency was divided into four competencies: specific competency, unit competency, knowledge required, and details of behavior. The unit of competency provided details of the specification module in five parts: performance criteria, scope of work, knowledge required, performance required, and guidance evaluation.

3. In this stage, the research used the competency model and the database to develop a learning model to improve the performance of the internal auditors by using the training needs required and the details of behavior from the pillar competencies in the focus group to improve the internal auditor competency by four methods: i) topic list analysis, which found that there were three competencies—core competencies, functional competencies, and technical competencies—and all items could be identified from the topic list analysis sourced from the focus group, interviews with executives, and source documentation; ii) analysis of the involvement valuation subject; iii) behavioral objectives, that analyzed the consistency of subsection behavioral objectives; and iv) an opinion form on the consistency between behavioral objectives and the examination, using a peer review by five experts.

4. This stage involved the evaluation of the competency learning model to develop the internal auditor competency, with the researcher using the index and criteria in stages. Reaction evaluation involved: i) curriculum satisfaction; and ii) learning evaluation utilizing the test of theoretical knowledge before and after learning, so that the evaluation could assess the learning that had occurred regarding awareness, knowledge, skills, and attitude. The behavioral changes after learning about the activities of the organization and ISO certification bodies auditors was used to develop the consciousness assessment form.

Data Analysis

This study used a questionnaire, in-depth structured interviews, and focus groups to collect the data. Questionnaire responses were received from a total of 548 internal auditors serving in organizations which were certified to ISO 14001 standards, and whose work covered the areas under examination to answer the research objectives in this study. The statistical analysis applied a number of measures including percentages, frequencies, standard deviations, and one-way ANOVA.

1. This study investigated three different kinds of internal environmental auditors: i) those with current experience in large organizations; ii) those with current experience in medium-sized organizations, and iii) those with current experience in small organizations.

Hypothesis 1: The knowledge of the internal auditor covers ISO14001:2004

Hypothesis 2: The knowledge of the internal auditor covers ISO19011:2011

Hypothesis 3: The auditing awareness of the internal auditor covers ISO14001:2004

2. The aim was to create a model of competency development to provide training for internal environmental auditors in organizations certified to ISO 14001 standards. To achieve this aim, the data gathered from the 10 experts in internal auditing were analyzed using content analysis and descriptive statistics. The data obtained from the 20 focus group experts comprising ISO trainers, internal auditors, environmental managers, educators, ISO consultants, and staff from the ISO certification organizations were analyzed using content analysis and descriptive statistics.

3. Improvement of internal environmental auditing can result from the development of a learning model strategy to enhance the competency of internal audit staff.

4. The model to develop auditor competency for internal environmental audit staff must be evaluated in terms of efficiency using the data obtained from the 40 experienced internal environmental auditors from four organizations certified to ISO 14001 standards using the following strategy.

1) Conduct evaluation of the learning model for environmental auditors by analysis of learner satisfaction with the training model. The analysis should include statistical reports reporting the mean (\bar{X}) and standard deviation (SD).

2) Conduct pre- and post-tests to analyze the differences in auditors' knowledge levels before and after the implementation of the learning model. The analysis should include t-tests for the sample pairs and be performed using the SPSS software.

3) Additional data should be collected relating to the participants' attitude, skills, and participation, with evaluation conducted using statistical reports involving the mean (\bar{X}) and standard deviation (SD).

Results

Section 1: The results in this section cover the present status of internal auditor competency for Environmental Management System ISO 14001:2004.

1. The questionnaire respondents provided the following demographic data. The sample comprised males (52.01%) and females (47.99%), with the greatest age group being 36–40 years (34.49%). The largest educational group was diploma holders (31.02%), while the most frequently reported working status was that of leader (39.05%). The mean work experience was between 1 and 3 years (38.50%), while the mean experience time for internal auditors was also in the range 1–3 years (34.85%).

2. The questionnaire feedback received was arranged in terms of the size of the organizations the respondents represent. Small organizations were those with fewer than 50 employees and capital of less than THB 50 million (52.6%). Medium-sized organizations were those with 50–200 employees and capital of THB 50–200 million (31.79%). Large organizations were those with more than 200 employees and capital in excess of THB 200 million (15.61%). Other data were reported as follows:

1) a majority of organizations certified to ISO14001 standards reported between 4–6 internal environmental auditors (45.66%).

2) a majority of organizations certified to ISO14001 standards reported two planned annual activities related to the internal audit (68.21%).

3) a majority of organizations certified to ISO14001 standards reported corrective actions arising as a result of audits on 3–4 issues (45.38%).

3. The results of the study emphasized three different kinds of internal environmental auditor: i) those with current experience in large organizations; ii) those with current experience in medium-sized organizations, and iii) those with current experience in small organizations.

Hypothesis 1: The comparison of knowledge of the internal auditors covering ISO 14001:2004 is shown in Table 1 and shows that there are three different organization sizes of internal environmental auditors. Table 2 shows the knowledge of the internal auditors of small-sized and medium-sized organizations covered ISO 14001:2004 with a high degree of statistical significance ($p < .05, p = .00$ level).

Hypothesis 2: The comparison of knowledge of the internal auditors covering ISO 14001:2004 is shown in Table 3 for the different organization sizes of internal environmental auditors. Table 4 shows the knowledge of the internal auditor from small-size organizations covered ISO 19011:2011 with a high degree of statistical significance ($p < .05, p = .00$ level).

Hypothesis 3: The comparison of knowledge of internal auditor awareness of the auditing process is shown in Table 5 for the three different organization sizes of internal environmental auditor. Table 6 shows the auditing awareness of the internal auditor in small-sized organizations covered ISO 14001:2004 with a high degree of statistical significance ($p < .05, p = .00$ level).

Table 1
Comparison of knowledge of internal auditors covering ISO14001:2004

Knowledge of ISO14001:2004	df	SS	MS	F	Sig.
Between group	2	257.210	128.605	10.945	.000
Within group	545	6403.773	11.750		
Total	547	6660.984			

Table 2
Post-Hoc comparative analysis of knowledge of internal auditors covering ISO14001:2004

Size of the organization	N	Subset alpha = 0.05	
		1	2
Small organizations	271	19.00	
Medium organizations	182	19.52	
Large organizations	95		20.92
Significance		.427	1.00

Table 3
Comparison of knowledge of internal auditors covering ISO19011:2011

Knowledge of ISO19011:2011	df	SS	MS	F	Sig.
Between group	2	1927.142	963.571	79.241	.000
Within group	545	6627.243	12.160		
Total	547	8554.385			

Table 4
Post-Hoc comparative analysis of knowledge of internal auditors covering ISO19011:2011

Size of the organization	N	Subset alpha = 0.05	
		1	2
Small organizations	271	10.43	
Medium organizations	182		13.95
Large organizations	95		14.57
Significance		1.00	.297

Table 5
Comparison of knowledge of internal auditor awareness of auditing processes

Internal auditing awareness	df	SS	MS	F	Sig.
Between group	2	737.030	368.515	110.340	.000
Within group	545	1820.189	3.340		
Total	547	2557.219			

Table 6

Post-Hoc comparative analysis of knowledge of internal auditor awareness of auditing processes

Size of the organizations	N	Subset alpha = 0.05	
		1	2
Small organizations	271	9.00	
Medium organizations	182		11.13
Large organizations	95		11.62
Significance		1.00	.066

Section 2: This section presents the results from the study seeking to design a model for competency development and to develop a learning model in internal environmental audit staff in organizations certified to ISO 14001 standards.

The process of analysis and synthesis of the competency model of the internal environmental auditors found from the in-depth interviews and questionnaires with the samples, that it was a necessary consideration to increase the potential of the internal environmental auditors. Differences identified among auditors and other needs from the questionnaires or the interview, were used in the competency model in the focus group discussion by the 20 experts. Elements of the competency model which were studied from the documents or the related research on competency development were used by the researcher to define the feature element model of the competency for the internal environmental auditors according to three elements of pillar competency: core competency, functional competency, and technical competency. In addition, each competency was divided into four elements: 1) specific competency, 2) unit of competency, 3) knowledge requirement, and 4) details of behavior. The results of the focus group, which assessed the suitability of the core, functional, and technical competencies, including the competency model in the manual and competency learning of the internal auditors in ISO14001-certified organization is shown in Figure 1.

Self-actualization of the internal environmental auditors was included in the specific competency with four lists in units of competency and 10 sublists. The auditing processes of the internal environmental auditors were included in the specific competency with three lists in units of competency and seven sublists.

The systematic knowledge of the internal environmental auditors was included in the specific competency with five lists in units of competency and seven sublists.

2. The results of the learning model for competency development were: i) in terms of self-actualization, the model included 10 knowledge, competencies, 20 behavioral competencies, 10 unit competencies, and 4 specific competencies; ii) in terms of auditing there were 11 knowledge, competencies, 30 behavioral competencies, 7 unit competencies, and 3 specific competencies, and iii) in terms of systematic knowledge there were 22 knowledge competencies, 54 behavioral competencies, 7 unit competencies, and 5 specific competencies.

3. The results, as shown in Figure 2 of the study, seeking to develop a learning model for competency development in internal environmental audit staff in organizations certified to ISO 14001 standards, included a learning manual which encompasses four phases.

i) Establish the competencies which are deemed desirable to meet the organizational requirements. Managers can subdivide these needs into specific performance criteria.

ii) The education process for trainees involves two stages: learning and practicing. First of all, the knowledge is presented. Secondly the trainees must practice its application through group activities or presentations. Three further stages are applicable to this process:

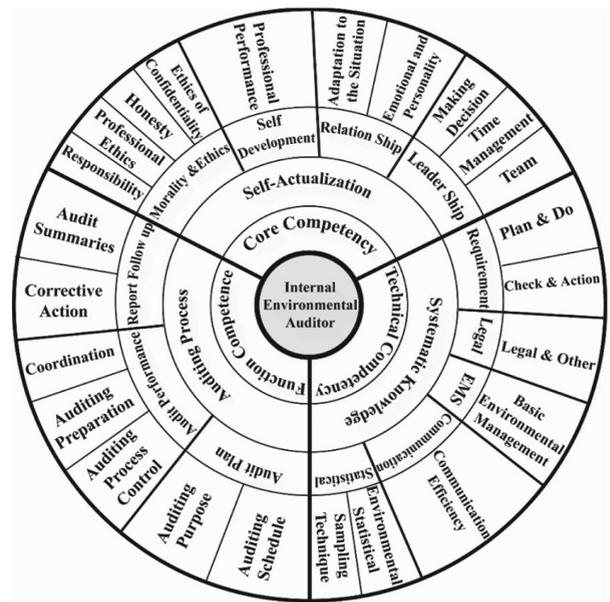


Figure 1 Model of internal environmental auditor competency in ISO14001-certified organizations

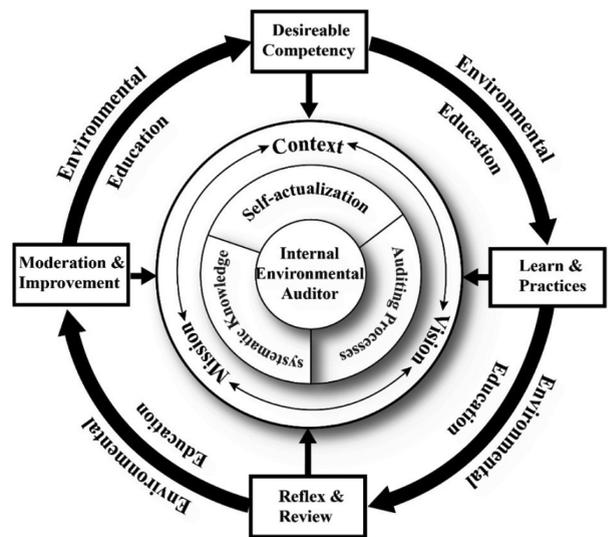


Figure 2 Model of internal environmental auditor competency learning in ISO14001-certified organizations

a) Self-actualization comprises mentality and ethics, self-development, relationships, and leadership.

b) Auditing processes comprise designing the audit plan, audit performance, reporting, and follow up.

c) Systematic knowledge comprises legal knowledge, environment management system knowledge, basic environmental management, communications knowledge, and knowledge of statistics.

iii) Reflex and review is a reflection of the key components of training. Participants must review their performance in the training and activities in the classroom, and then provide feedback in order to develop the training program itself. This process of reflection and review will lead to better outcomes for the trainees.

iii) In the final step, moderation and improvement are applied to the process of analyzing the strong and weak aspects of trainee performance so that training programs can be modified and improved to better meet the needs of the organization in terms of delivering qualified auditors with the appropriate skill sets.

Section 3: This section presents the results of the efficiency evaluation of the learning model for internal auditor competency under ISO 14001 certification. To carry out the evaluation, the data gathered from the 40 internal environmental auditors in four separate organizations certified to ISO 14001 standards were analyzed to produce the following outcomes:

1. In the assessment of the efficiency of the learning model to develop internal environmental auditor competency for ISO 14001 organizations, the trainees were required to complete questionnaires to determine their satisfaction levels with the training. The results showed satisfaction at the very high level ($\bar{X} = 4.63$, $SD = 0.16$).

2. Table 7 shows the results of evaluating the learning model efficiency in developing internal environmental auditor competence for organizations certified to ISO 14001 standards where the trainees were assessed in terms of their knowledge levels before and after the training.

The results covered the two variables of knowledge and awareness before the activities (58.77%) and compared these with the outcome after the activities (75.10%). These data reveal that the trainees had higher post-test scores than pre-test scores and that the difference was statistically significant at the .05 level of significance.

3. Table 8 shows the results from asking the environmental managers to respond to questionnaires investigating opinions regarding external behavior comprising three variables: skills, attitude and participation. The evaluation recorded high ratings with a mean of 4.02 and standard deviation of 0.14.

Table 7

Comparison between the attitudes of the trainees prior to the activities and their attitude afterward

Action	(\bar{X})	S.D.	T	p
Before undertaking the activities	58.77	5.090	15.230	.000
After undertaking the activities	75.10	4.544		

Table 8

Organizational managers rating of external behavior for the learning model for internal auditor competency

Question	Mean	SD	Level
Assigned responsibility	4.43	0.53	High
Performance in line with internal audit rules	4.57	0.53	Very High
Successful audit cooperation	4.43	0.53	High
Internal audit data confidentiality	4.00	0.58	High
Audit planned, implemented, and managed	4.43	0.53	High
Meeting objectives of audit process	4.29	0.49	High
Preparation of audit reports and follow-up	4.43	0.53	High
Systematic gathering of evidence	3.71	0.49	High
Suitable auditing approach	3.71	0.49	High
Sampling evidence for audit	4.00	0.00	High
Internal audit time management	4.57	0.53	Very High
Audit strength and weakness analysis	3.14	0.38	Moderate
Conformity assessment decisions	3.43	0.53	Moderate
Corrective action reports	3.29	0.49	Moderate
Corrective action evaluation	3.86	0.38	High
Total mean	4.02	0.14	High

Discussion

The study sought to create a learning model to develop the competencies of internal environmental auditors in organizations certified to ISO 14001 standards. The performance was examined from the perspective of organizations within the certification industry, and the efficiency of the learning program was evaluated to develop a better and more successful learning model. There were four phases involved in the overall process.

Phase 1: First, the results of the study were considered. The study evaluated the internal environmental auditors in three main areas: knowledge of ISO 14001:2004, knowledge of ISO 19011:2011, and awareness of auditing processes for ISO 14001:2004. The participating auditors worked with organizations ranging from small to large, as classified by workforce numbers and available capital. The outcomes showed significant differences in knowledge levels, which were dependent on the size of the organization with a confidence level of .05. This may be accounted for by the fact that large organizations are better placed to recruit staff who have the skills they require, and are able to employ them on a full-time basis to carry out specific tasks. The auditor in a large company may have only that function, whereas in a small company, the auditor may have a number of responsibilities. Furthermore, large organizations are better placed to specify their objectives and to provide training to achieve those goals. Their monitoring and evaluation systems are frequently more comprehensive and provide feedback which can be easily acted upon. The findings in this study also concurred with those of Siripong (2009) who noted from a study of an auto industry facility near Bangkok, Thailand that intrinsic motivation of the workforce was a key factor influencing the effectiveness of staff.

Phase 2: To study the efficiency of the learning model, the trainees completed questionnaires to evaluate their satisfaction with the program. The rating given overall was at the very high level ($\bar{X} = 4.63$, $SD = 0.18$). This result supported the findings of Sripakdee (2005) whose work investigated short vocational courses. The inference in this case was that the trainees will be able to successfully and effectively apply the content of their learning in their working roles, since the training was appropriate in meeting the requirements of the ISO 14001-certified organizations. Knowledge levels following the training were considered high ($\bar{X} = 4.83$). The trainees' understanding of the content showed improvement after the training period, reflecting the findings of Kamyong (1999) whose work evaluated the effectiveness of training methods and concluded that trainees' skills and knowledge can be upgraded by effective programs.

Phase 3: The trainees participating in the study were given pre- and post-tests to assess their internal behavior in terms of awareness and knowledge. The test results of 58.70 percent for the tests given before the training activities and of 75.10 percent following the training activities were significant at the .05 level. These findings matched those of Srimankongtham (1999) whose work involved the study of science at the Demonstration School of Srinakharinwirot University. In the current study the outcome showed that significant differences at the .01 level of confidence were observed between the pre- and post-test scores when students underwent education in science.

Phase 4: In the final stage of the study, the environmental managers were invited to evaluate the learning program model for the development of internal environmental auditor competency in terms of external behavior comprising skills, knowledge, and attitude. The ratings were given at the high

level ($\bar{X} = 4.02$, $SD = 0.14$) and the findings shared similarities with those of Rotjanapan (1986). The evaluation must ensure that the training is able to serve its purpose by producing trainees whose performance shows significant improvement in the areas where the training was designed to make advances. The positive feedback from managers regarding the performance of trainees indicated that satisfactory progress was made. Furthermore, Bangmo (2004) noted that the training is effective when it serves to alter the behavior of the trainee in the manner desired, and when this behavior can be maintained through further practical application in the post-training period.

Conclusion

The objective of this study was to design and create a model to develop the competency of internal environmental auditors working within organizations certified to ISO 14001 standards. It is clear that the responsibility for environmental management lies with the internal auditors, and thus the internal environmental auditors must have passed the internal audit training course to be suitably qualified to carry out audits competently in organizations certified to ISO 14001 standards. The study itself assessed the knowledge levels of internal auditors in three significant areas. These were knowledge of ISO 14001:2004, knowledge of ISO 19011:2011, and awareness of auditing processes for ISO 14001:2004. The auditors evaluated came from organizations of varying sizes divided into three categories by workforce and capital. The results revealed significant differences in knowledge levels dependent on the size of the organization at the confidence level of .05.

The training model for internal environmental auditor competency was assessed using questionnaires, and the trainees evaluated their training at the very high level ($\bar{X} = 4.63$, $SD = 0.16$). To investigate the efficiency of the training model, the trainees were given pre- and post-tests to assess their knowledge levels and awareness. The scores of 58.70 percent before the training activities and 75.10 percent after the training activities showed a significant difference at the 0.5 confidence level. Finally, the managers of environmental systems in organizations certified to ISO 14001 standards were asked to evaluate external behavior in terms of attitude, skill, and participation. These were assessed at the high level ($\bar{X} = 4.02$, $SD = 0.14$).

Recommendation

One the basis of the findings presented in this study, and to improve education practice in the field of environmental audits, the researchers make the following suggestions.

1. Some industry organizations have not yet achieved certification to ISO 14001 standards. It is therefore necessary that these organizations develop their staff to be able to implement the requirements for the certification process to drive stronger environmental management.

2. It would be beneficial to expand the implementation of the learning model for internal environmental auditor competence through either government or private organizations which might serve to offer training at low prices. This would benefit the wider community in leading to a greater number of persons qualified and capable of implementing environmental development processes within organizations.

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