Inserting the environmental culture as a specific element within EMS in oil and gas industry operations

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Abstract

The environmental culture (EC) is the total learned behaviour, attitudes, practices and knowledge for the society with respect to maintaining or protecting its natural resources. The development of EC is associated primarily with environmental education, awareness, ethics, and training of employees inside and peoples outside of oil and gas industry operations. EC is considered as a specific element, because it influences on decisions about dealing with environmental problems or accidents. The procedure of inserting EC into an environmental management system (EMS) results in more effective environmental protection management and related problems solving. The oil and gas industry operations are series of functions of cementing, acidizing, stimulation, nitrogen services, coiled tubing, fracturing, filtration, grouting, cleaning, oil recovery, maintenance, transporting, and chemical with mechanical treatment.

As a new topic, EC is defined as a new element, and the procedure of inserting EC into EMS can be done for improved environmental protection, resulting in an efficient EMS for oil and gas industry operations. The most reputable national and international organizations (such as EMAS, BS 7750, GEM1, and IS0 14000 series) do not refer to EC – they did not enter it into their programs because there is a gap in their contents.

As a tactic, inserting EC can achieve the same 17 elements created by International Standards (ISO 14001) and the Environmental Protection Agency (EPA) for gaining results of better outcomes for environmental protection.
Keywords: environmental management system (EMS), environmental culture, environmental awareness, oil and gas industry operations, national and international standards.

WIT Transactions on Ecology and The Environment, Vol 186, © 2014 WIT Press
www.witpress.com, ISSN 1743-3541 (on-line)
doi:10.2495/ESUS140311

1 Introduction

1.1 Definition of culture

Culture is a collection of thoughts and deals with people's ways of life. Culture is the ideas, customs, and social behaviour of a particular people or society (Oxford dictionary [1]). It is a way of thinking of employees within an organization and is concerned with people and their thoughts about their surroundings. The social-cultural environment is a set of practices and behaviours within a company (Business dictionary [2]). Culture also has other meanings; it is a network of texts, images, speech, codes of behavior, and the structures which shape every aspect of social life (Kumi [3]).

1.2 Environmental management systems (EMS)

EMS provides a structure by which specific activities related to environmental protection can be effectively carried out. The International Organization for Standardization (ISO 14001: 2004) defines an EMS as "that part of the overall management system which includes organizational structure, planning, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing, and organization's environmental policy" (ISO 14001 [4]), and it consists of 10 elements. The British Standards Institute (BS 8555: 2003 Environmental management systems guide to implementation and use of environmental performance evaluation) has defined an EMS in a similar way to ISO 14001: 2004 and also consists of 10 elements (BO [5] and NINA [6]).

The EMS enables an organization to manage environmental issues in a reliable and measured approach. In addition, it is able to establish the suitable environmental goals and objectives with the required elements. An EMS model was made by NINA [6], which consisted of 7 elements and was different from the ISO 14001 and EMAS (Eco-Management and Audit Scheme) systems, but it confirms that EMS offers a systematic approach to managing environmental issues, and there are strong links between EMS and environmental impact assessments (EIAs) in operations of oil and gas companies (Palframan [7]).

1.3 Oil and gas industry operations

The oil and gas industry comprises manufacturing and productive projects in oil and gas business fields, which consist of both upstream (an industry that is responsible for the exploration and recovery) and downstream (an industry that is responsible for the sales and delivery) activities.

The operations of the oil and gas industry are a series of functions that are involved in a single process, such as cementing, acidizing, stimulation, nitrogen services, coiled tubing, fracturing, filtration, grouting, cleaning, oil recovery, maintenance, transporting, chemical treatment and other related actions. As a standard classification, the industry and operations are categorized according to the standard industrial classification (SIC) which has the codes – 1311, 1321, 1381, 1382, 1389 – that consist of 67 operations, and this sector has a large range of operations (UNDP/Forum [8]).

1.4 Environmental culture

The term of environmental culture (EC) became popular in professional and social consciousness just a few years ago. The EC is the total of learned behaviours, attitudes, practices and knowledge that a society has with respect to maintaining or protecting its natural resources. The EC leads to change and it is necessary to be introduced into organizational practices – if it is performed well it will lead to new required conditions that accept efforts to adopt changes (Edward [9]). The EC should be practiced by employees in oil and gas industry operations, because the environmental problems cannot be solved without the active participation of employees, and environmental protection programs would fail without understanding the environmental issues they tackle. In addition, the traditional development of environmental culture is primarily associated with environmental education, training, and awareness of employees.

The EC is calculated as a specific element within EMS, because the major environmental issues consist of forces such as the element of culture (All business [10]). In order to enhance an environmental culture, the thinking of employees should be improved. Significant findings of a comparative study indicate that in order to protect environmental elements, we have to think globally and act locally for the best understanding of environmental problems (Noel [11]).

1.5 Aims of the research

The aims of this research are summarized as follows:

- Indicating that there is no occurrence of EC as an element in previous EMS.
- Explaining the importance of functioning EC in oil and gas industry operations.
- Presenting a proposal with the detailed requirements of inserting EC as a new element into EMS, having 17 basic elements in oil and gas industry operations.

2 Review of previous environmental management systems

There are many national and international organizations that have developed or presented guidelines for environmental management systems, such as; EMAS: 1993, BS 7750: 1994, GEM1: 1993, and ISO 14000: 2004 series, but they had no EC element in their systems, the application of these EMSs were based on the size and state of oil and gas industry operations.

The EMAS: 1993 requires a review of the environmental issues by the company, but it does not refer to the EC as an active element (EMAS [12]). The BS 7750: 1994 has a rigid regulatory program, but it did not enter the EC into its program either (BSI [13]). The GEMI: 1993 was found to improve the environmental performance of business, but it specifies no approach to the EC

(GEMI [14]). Concerning the ISO 14000: 2004 series, the first part of this series (ISO 14001: 2004) provides guidelines on how to develop and implement an EMS in organizations, but this standard does not include employee's health, safety and EC (ISO [15]).

Furthermore, the API (American Petroleum Institute) has best practices for environmental protection, but it does not refer to EC as being needed (Alexandra [16]).

3 Procedures of inserting EC

Procedures of inserting EC into EMS in oil and gas industry operations can involve some key steps; the development of environmental awareness can be considered as the first step. An increase in environmental awareness by employees may occur at different levels of management and responsibilities, and according to ISO 14001: 2004, section A.4.3, top management should develop, maintain, and implement environmental awareness during a plan. The education and training for employees can facilitate the implementation of constituted EMS, which contains the EC element, thus a new framework can be designed for oil and gas industry operations, and in particular, the EMS should be measured as an open system that can take a wide range of elements as needed.

The insertion procedure should be parallelized with state rules and regulations, In addition, any noncompliance in the system should be avoided or eliminated. 29 companies of oil and gas exploration and production were interviewed to develop approaches to EMS; they combined strongly with both regulations and experience of work (Lisa [17]).

Inserting EC is a very accurate procedure because there are mutual effects between three aspects, these being operations, pollutions, and employees, and their tasks are more interconnected with each other. The inserting procedure also has additional relations with other aspects. Culture has multi-functional effects, such as environment-related health problems, and good co-operation between states, national, and local authorities is required (EC [18]). The organizations should have a clear and meaningful statement of safety policy which reflects the organization's safety culture (Jaime and Herriot [19]).

4 Final proposal of an EMS

The systems of both ISO 14001 and the EPA point out 17 elements of EMS. EC can be inserted into a new EMS with detailed requirements derived from the same 17 elements, which are explained in Table 1, then a framework of a new EMS can be produced, which will be ready for the efficient implementation in oil and gas industry operations; this would be presented as a proposal for these operations. In order to create a more precise system, the 17 elements are divided to 5 sections of basic subjects according to international standards.

Table 1: Inserting EC into EMS by 17 elements and 5 sections.

Section (1): policy, aspects, legal, and objectives	
No.	Inserting EC in detail
1	Environmental culture policy: *Supported by senior management. Develop an EC statement of your oil and gas operations. Use this EC policy as a framework for planning and action.*
2	Environmental culture aspects: *Identification of EC aspects about significant environmental impacts that the oil and gas industry may cause. Identify EC attributes of your oil and gas activities and services.*
3	Environmental culture legal: *Identification of EC legal and other requirements. Identify and ensure access to relevant EC laws, regulations, and other requirements to which your oil and gas industry adheres.*
4	Environmental culture objectives and targets: *Development of EC objectives, goals, targets, and their environmental management programs for your oil and gas industry operations, in line with your EC policy and views of interested parties.*
Section (2): responsibilities, training, and communication	
5	Environmental culture resources, roles, responsibilities and authorities (Structure and responsibility): *Definition of EC resources, roles, responsibilities and authorities for EC- management, and provide appropriate resources for EC in your oil and gas industry operations.*
6	Environmental culture competence, training and awareness: *Development of EC skills, training, and awareness procedures, and ensure that your employees are trained and capable of carrying out their EC responsibilities.*
7	Environmental culture communication: *A communication process of the EC management system to all stakeholders and interested parties, and establish processes for internal and external communications on EC issues.*

Table 1: Continued.

Section (3): documentation, document control, operational control, and records	
No.	Inserting EC in detail
8	Environmental culture documentation: *Development of EC documentation as required by the standards, and establishes EC documentation, and maintains information on your EC and related documents.*
9	Environmental culture document control: *Development of EC document control procedures, and establishes document control, and ensures effective management of EC document control.*
10	Environmental culture operational control: *Development of EC operational control procedures, and identify, plan, and manage your EC operations and activities in line with your EC policy, objectives, and targets.*
11	Environmental culture records: *Developments of an EC records procedure, and maintain and manage records of EC performance.*
Section (4): emergency, measuring, evaluation, and preventive actions	
12	Environmental culture of emergency preparedness and response: *Development of EC of emergency preparedness and response procedures, and identify EC for potential emergencies and develop EC procedures for preventing and responding to them.*
13	Monitoring and measuring of environmental culture: *Development of procedures for monitoring and measuring of EC operations that can have significant impact on the environment, and conduct periodic assessments of EC compliance with legal requirements.*
14	Evaluation of environmental culture compliance: *Development of procedures for an evaluation of EC compliance with environmental management system.*
15	Environmental culture non-conformance, corrective and preventative actions: *Development of procedures for the management of EC non-conformance, corrective and preventative actions, and identify and correct EC problems and prevent their recurrence.*

Table 1: Continued.

Section (5): internal environmental culture audits and management review	
No.	Inserting EC in detail
16	Internal environmental culture audits and EC audits: *Development a program for EC audit within completing internal ISO 14001 audits, and for EC auditing, periodically verify that it within EMS is operating as intended.*
17	Environmental culture management review: *Development of procedures for EC- management reviews by senior management, and periodically reviews EC-management with an eye to continual improvement.*

5 Results and discussion

5.1 Results

We found that EC is important and should be considered as a crucial element within an EMS, just as others are; its absence may cause environmental pollution and accidents in oil and gas industry operations. We found that EC is strongly connected with both the employees inside and the people outside of oil and gas industry operations, and a higher level of EC could be obtained through their awareness and training. The procedure of inserting EC into EMS enhances environmental protection objectives, and the level of EC indicates the grade of understanding by people and points out how to deal with environmental issues since the EC is linked to thinking ability and ideas capacity. We found that there is currently a gap in EMSs that are developed by major national and international organizations, because they do not refer to EC as an obvious element, and do not include it in their own environmental programs.

5.2 Discussion

It is extremely difficult to implement EMS without an active EC element. Without EC a situation can lead to environmental pollution and accidents, therefore the inserting procedure of EC within EMS is necessary. The EMS is an open system, hence an EC can be added into constituted EMS. The oil and gas industry operations face great challenges to minimize environmental pollution, and here the EC shares this objective. Oil and gas industry operations vary from others, because they are characterized by fast and close dealings with environmental elements, but EC is concerned with employees and they are connected with operations in the oil and gas industry, which means that there is an existence of mutual effects between them. EC can be enhanced by the education and training of employees in order to increase their experience and awareness about environmental issues. When constituting an EMS with inserted EC, it enables

operations to be managed with reliable and measured improvement, giving more advantages, and leads to more effective environmental protection. A proposal of a new EMS with inserted EC, with detailed requirements, was presented according to the same 17 elements of international standards.

6 Conclusions and recommendations

6.1 Conclusions

The EC is a total learned behaviour, attitudes, practices and knowledge that people have with respect to maintain and protect natural resources. EC depends on awareness, ethics, education, and training of employees inside and people outside of the oil and gas companies. The traditional development of EC is associated primarily with environmental education. Research defines some topics related to EC. Major developed guidelines for EMSs such as EMAS, BS 7750, GEM1, and ISO 14000 series contain some elements of varying numbers, but they are deficient in containing any culture element in their outlined systems. The operations of the oil and gas industry have been classified according to standard industrial classification (SIC), they consist of a series of functions of cementing, acidizing, stimulation, nitrogen services, coiled tubing, fracturing, filtration, grouting, cleaning, oil recovery, maintenance, transporting, and chemical with mechanical treatment. The procedure of inserting EC into EMS derives from 17 elements with detailed requirements and needs to be implemented in oil and gas industry operations, as a proposal to constitute a new EMS containing EC.

6.2 Recommendations

There are great challenges that face oil and gas industry operations to protect environmental elements, and minimize environmental pollution and accidents. Research recommends constituting a new EMS containing the EC element. Most companies of oil and gas operations need to redesign their existing EMS model incorporating EC by external assessors or certification organizations, because the improvement of EC by employees is extremely necessary if they are to have continual connections with operations and environmental elements. The inserting procedure of EC within EMS is recommended, with the detailed requirement of EC according to the same 17 elements of ISO 14001 and EPA, and with 5 sections of basic subjects for a more accurate and precise implementation.

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