



## Impact of EMS (ISO 14001) Implementation in Some Sudanese Oil and Gas Industry

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### ABSTRACT

This study aimed to study the implementation of Environmental Management System (ISO 14001) in Sudanese Oil & Gas industry. Questionnaire was conducted with environmental heads for companies working in the field of oil and gas industry in Sudan. Questionnaires targeted and distributed to 42 organizations working in the field of oil and gas industry in Sudan, 34 organizations have been responded. The study results showed the experience of international companies which has certified ISO 14001, and that affected positively on the other Sudanese private organizations. Also this study showed shortage of governmental environmental legislation which has clear directives to control environmental impacts that resulted from oil & gas exploration and operation activities. Besides that, there is shortage in environmental legislations for the other scale of small and medium manufacturing industrial activities working in Sudan. Also this study found that, most of the surveyed organizations having environmental policy with established environmental procedures that reflected the efficiency of EMS in improving their environmental performance by reducing environmental impacts.

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### INTRODUCTION

After industrial revolution in 20<sup>th</sup> century the resulted negative impacts of these industrial activities increased the awareness of people towards environmental protection. On 1960s, people in the developed countries started to become conscious of environmental problems (Hunt and Johnson,

1995). These problems were mostly originated from different industrial activities which used toxic chemicals and produced emissions to air and water, and beside that some of industrial accidents leading to negative environmental impact. Since then, environmental problems have developed

first into regional problems (acidification and eutrophication of lakes and rivers) and then into global problems such as, for example, global warming or depletion of stratospheric ozone (Goetsch and Davis, 2001).

Corporate environmental management has evolved since the beginning of the 1990s into a more systematic and positive approach in many organizations in Europe and America. One reason for this is the overall costs of environmental protection and regulatory compliance (Kanna and Anton, 2002).

One of the benefits of implementing ISO 14001 is attracting financial investment companies and reducing insurance premiums can also prove as an attractive point of EMS, as the financial investors and lenders are more satisfied and sure when investing in an organization having EMS, and this can be supported from the results obtained from the previous study done to show the relationship between the companies (public) environmental practices and stockholder relationship. The study revealed, "When public companies improve their environmental practices, they are able to increase shareholder wealth by up to 5%. Furthermore the study also showed that when the environmental risks were reduced, the company becomes a more attractive investment to potential and current stockholders" (Harding, 1999).

Top management in environmentally positive organizations no longer view environmental compliance as a financial accountability. As an alternative, they start to identify the possibility for gaining a

competitive advantage by improving their environmental performance and making cost savings by reducing waste, raw material purchases and energy use (Porter and van der Linde, 1995; Sreenivasan Jayashree *et al.*, 2013).

The main objective of this study is to highlight the implementation of EMS by companies in the field of oil and gas industry in Sudan to achieve sustainable development. And also this study is to answer the study question: How does EMS standard implemented with the current Sudanese environmental legislations.

### **Oil and Gas Discovery in Sudan**

Oil was discovered in Sudan in the mid of 1970s. In 1978 Chevron company found the first oil in the Muglad Basin stretching deeply into Western Upper Nile in the South; however production did not start practically until 1999. In 1990 The Government of Sudan divided the former Chevron concessions into smaller units, and they eventually sold their rights; and in 1992 awarded the Melut Basin – Blocks 3 and 7 to Gulf Petroleum Corporation Sudan (GPC); and Lundin Petroleum from Sweden. In March 1997, the government of Sudan launched the site at Adar Yale. Production was only 5.000 bbl/d, but it was the first Sudanese crude oil to be exported. It was transported by truck to Melut, and from there by boat to Khartoum; and by May 1998, production had increased to 10.000 bbl/d.

In late 2006 the country's crude oil production almost doubled, making it Africa's fifth producer with more than 434.000 bbl/d. In 9 July 2011

Government South of Sudan announced and Sudan lost about 75% from its oil total production.

### **ISO 14000 Environmental management series**

This commenced in 1996, the ISO 14000 series of standards are internationally recognized standards for environmental management. The ISO 14000 series is a family of environmental management standards designed to provide an internationally recognized framework for environmental management, measurement, evaluation, and auditing. It is the first set of standards ever established in consultation with the global manufacturing community. The ISO 14000 series provides organizations with the tools to assess and control the environmental impact of their activities, products, or services. The ISO 14000 series is designed to be flexible enough to be used by any organization of any size, in any field (ISO 14000, 2003).

The result from literature review which found that companies implemented EMS would also result in better recruitment of employees, as it would attract the best of the potential human resource (Forte and Lamont, 1998).

One of the central elements of an EMS was found is the formulation and documentation of an organization's overall intentions and direction of the organization related to its environmental performance in an environmental policy (Ammenberg and Hjelms 2003). With this policy and the significant environmental aspects as a basis, environmental objectives, targets and improvement programs are established.

These objectives, targets and programs must then be deployed and shared through the whole organization. The term used for the establishment and deployment of objectives, targets and improvement programs is in this thesis 'environmental policy implementation'. From literature review, in contrast to the environmental policy, objectives and targets concretize what should actually be improved. Targets are usually fairly specific, measurable and time framed goals, whereas objectives are goals that are more specific than the stated ambitions in the policy, but somewhat generic in scope and purpose (Sayre, 1996).

### **Review for Environmental legislations in Sudan**

**I-** The first legislation in Sudan related to environmental management is the Environmental Protection Act 2001 (Yousif *et al.*, 2011). This Act is signed by the President of the Republic of Sudan and ratified by the National Meeting in June 2001 and still in force till today. The main outcome of the environmental protection act 2001, is emphasized to conduct Environmental Impact Assessment (EIA) for any new projects. Environmental Impact Assessment (EIA) "is a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects". This process is applied prior to major decisions and commitments being made. A broad definition of environment is adopted. Whenever necessary, social, cultural and health effects are considered as an integral part of EIA. Particular attention is given in EIA practice to prevent, mitigate and offset the significant adverse effects of proposed undertakings.

Under the environmental protection act 2001, the EIA became a legal requirement. The Act requires that an EIA study should be prepared by the developer of any project that might have negative impact on the environment. The study should be submitted to the higher council for environment and natural resources (HCENR) for approval (Yousif *et al.*, 2011). The higher council for environment and natural resources (HCENR) was established in 1991 under the name of Environment and Natural Resources Supreme Council (ENRSC) (Yousif *et al.*, 2011) and under the chairmanship and supervision of the President of the country, however, in 1995 became allied to the Ministry of Environment and Physical Development (MOEPD) under the chairmanship of the Minister of Environment and Physical Development. The Ministry of Environment lacks the financial, technical and professional capacities to perform its responsibilities besides being in a very marginal position compared to other federal ministries (Ali, 2007; MOEPD Seminar, 2010; Yousif *et al.*, 2011). The HCENR has been established as an administrative agency for the protection of environment and natural resources in Sudan through performing certain functions and responsibilities (EPA, 2001; Ali, 2002, 2007; MOEPD Seminar, 2010; Ahmed and Elturabi, 2011; Yousif *et al.*, 2011).

There are two major problems connected with the Environment Protection Act, 2001. Firstly, the confusion over responsibilities and mandates of different institutions and sectors involved in environmental management, for instance, the

responsibilities of Ministry of Environment and the HCENR in one hand and the responsibilities of Ministry of Environment and Ministry of Petroleum on the other hand. In many cases, this problem might result in lack of effective cooperation and coordination between these institutions. Secondly, this Act is an overall framework law which lacks the detailed regulations that guide the environmental requirements in different sectors. For example, in conducting an EIA study, the regulations are needed to state how many chapters there should be, what is the content, what are the team members, how should verify it, how long are the period of the monitoring and etc (Yousif *et al.*, 2013).

**II-** Petroleum Resources Act 1998 is one of the important legislations which regulate development and management of petroleum resources in the Sudan. The Act deals mainly with issues related to Oil and gas companies production and exploration process to control environmental impacts associated with this activities. However, issues regarding the consequences of those operations on the environment are less concentrated on the Petroleum Resources Act 1998. For instance, section 13(4) of this Act in general terms requires oil companies to protect the environment and to take the necessary measures to prevent pollution (Yousif *et al.*, 2011). This is considered most detailed legislation on the protection of the environment in oil and gas industry; and completed by the Regulations for Protection of the Environment in the Petroleum Industry (Amendment) 2005. This regulation has been ratified by Ministry of Energy and

Mining in 2002 and amended in 2005. The Regulations for Environmental protection in the Petroleum Industry (Amendment) 2005 should be adopted and implemented by all oil companies working in Sudan whether in upstream or downstream and this implementation should be under the direct supervision and follow up of the General Directorate of Environment and Safety (GDES); which is a governmental regulatory body under the Sudanese's Ministry of Petroleum. The Ministry of Petroleum is liable on behalf of the government to sign the oil agreements between the oil companies and the government (Yousif *et al.*, 2011). The GDES is one of the Directorates of the Sudanese Ministry of Petroleum; its task is mainly as a regulatory body to handle and monitor environmental, safety and health issues in the area of petroleum industry in the country.

**III-** National Strategy Proposal for Conserving the Environment NSPCE (within the framework of sustainable development) 2005; This Strategy proposal for conservation of the environment was formulated in the framework of sustainability in compliance with the Decree dictated by Sudanese President No. 114 issued on 21st March 2005 (Republic of Sudan; ministry of the cabinet general Secretariat of Consultancy Board. Executive Summary, June 2005). A group of Sudanese experts and scientists were appointed according to this Decree to prepare a proposal for this strategy.

### **The study area**

This study is mainly focused on the certified and non-certified ISO 14001 companies working in the field of Oil and Gas industry in Sudan. Some of the surveyed companies are operating Oil and Gas companies and some of its services and technical services companies working in different Oil and Gas exploration and operating blocks currently working in Sudan.

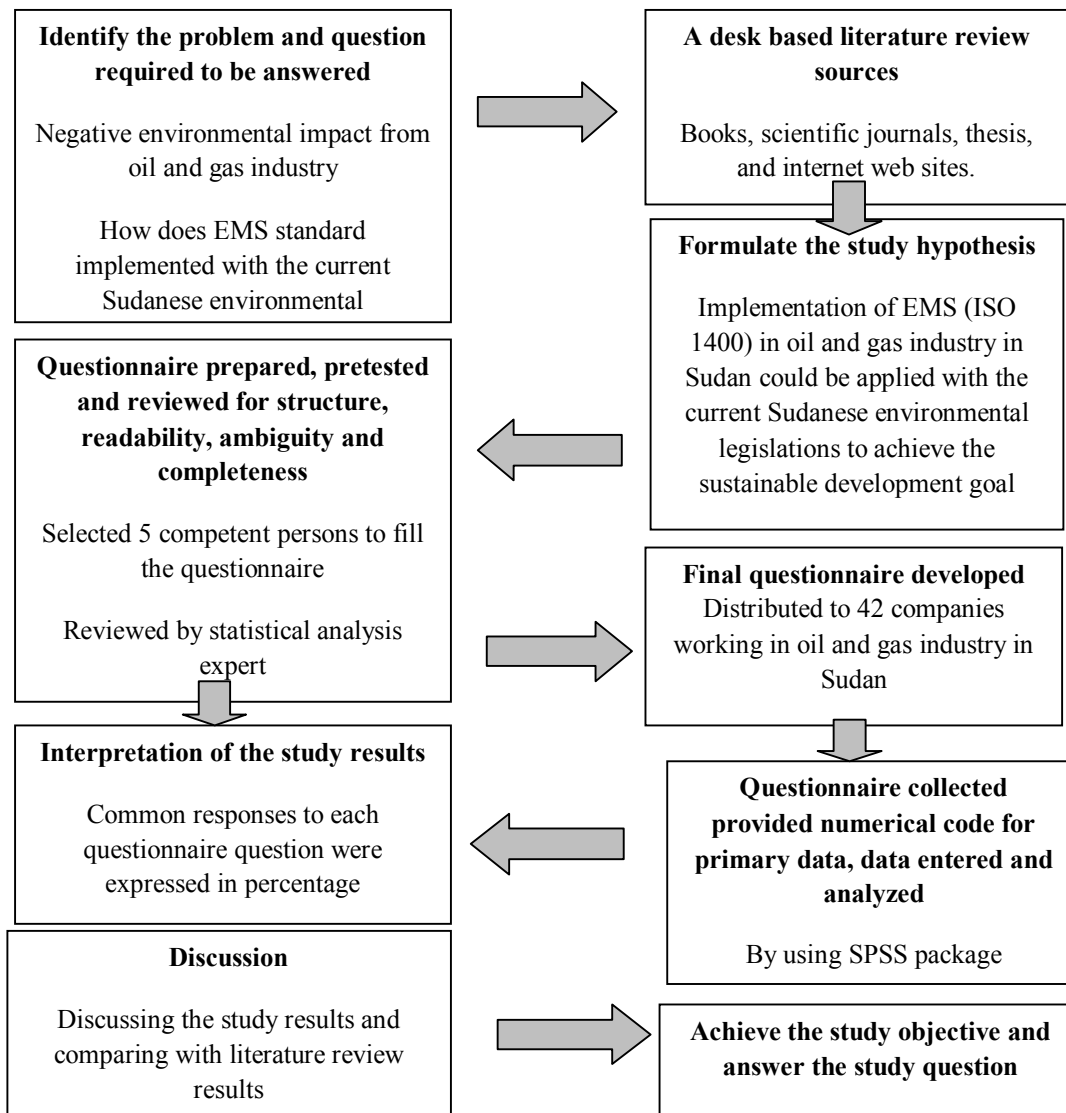
Ministry of petroleum in the Republic of Sudan divided the Oil and Gas fields into different blocks and each block has numbered. All the companies were surveyed having Head Quarter Office in Khartoum beside base camps at the Oil and Gas fields.

### **Research Methodology**

A desk based literature review sources used in this study to review implementation of EMS ISO 14001 in international and Sudanese different manufacturing and petroleum industries. A questionnaire survey method as (Denscombe, 1998) recommendation was selected to collect data from companies working in oil and gas industry in Sudan. The questionnaire was targeted companies and not individuals. For that reason one questionnaire distributed accordingly to the environmental head for each company. Questionnaire was prepared in order to achieve this study objective and also to reply the study question which has been already mentioned above.

### **Study Design**

The components of a this study included a series of steps to formulate the research questions or hypothesis, to test the hypothesis, to analyze the results, and to make the findings known, the steps of this study were as the followings:



**Figure 1: Research Methodology Design**

The questionnaire targeted environmental head in certified and non certified ISO 14001 companies working in the field of oil & gas industry in Sudan

In order to carry out the study survey effectively, most of the study questionnaire distributed by hand to the selected companies for the purpose of increasing the response rate and to avoid delaying time in filling and returning the questionnaires. A few numbers of the questionnaires were distributed by e-

mail system for those companies requested from the study author to be submitted by this system.

All answered questions were provided numerical code and analyzed by using SPSS package as showed in figure 1.

## RESULTS AND DISCUSSION

This part shows detailed results for the study questionnaire, and all the key trends from the findings received from respondents are

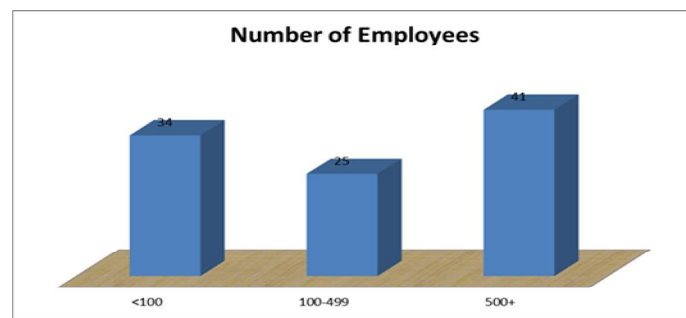
discussed by linking them to possible reasons and implications in the context of existing literature. This part provides information to achieve this study objective, and to answer the study questions; also to shows knowledge regarding implementation of the EMS in Sudanese oil and gas industry.

### **The Questionnaire Results and discussion**

Fourty two (42) Questionnaires were distributed to organizations working in the field of oil and gas industry in Sudan. Only 34 organizations responded by filling and returning back the questionnaire.

According to type of organization the survey has found that; 50% from the total number

of the organizations is private organizations, 18% is government organizations, and 32% is semi government organizations; with the intention of this result, most of the organizations in Sudanese oil and gas industry are private; or semi government; or sharing investment between national and multinational private organizations and Sudanese government. Sudanese oil and gas industry have different types of organizations and that could help to investigate broadly about implementation of environmental management system (EMS) in Sudanese oil and gas industry.



**Figure 2: Number of Employees divided into groups**

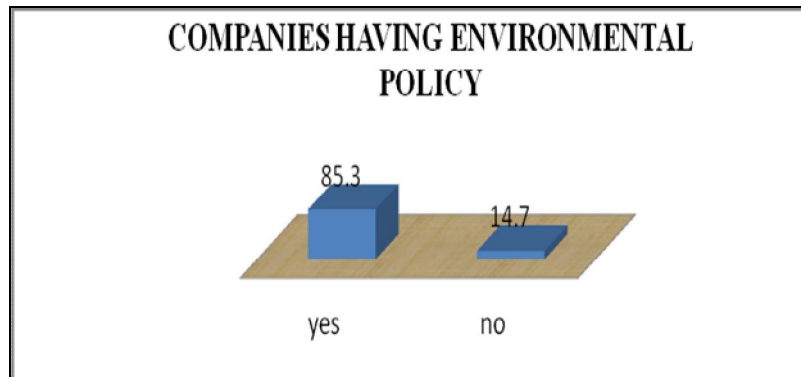
In this study numbers of employees classified into three groups or scales; organizations have less than 100 employees, organizations have employees number from 100 – 499 employee, and organizations have employees number from 500 to above. 41% from organizations found as a large scale organizations with employees number equal or above 500+ employee, 25 % of organizations found as medium scale organizations with employees number between 100 – 499 employee, and 34% from organizations surveyed is considered according to this study classification as small scale organizations with employees number less than 100 employee. This result

found that the majority of the surveyed organizations are large scale organizations or large enterprises organizations which showed the fast growing of Sudanese oil and gas industry. Chi square was tested to study the relationship between size of organization with respect to number of employees; with organizations having ISO 14001 certification (certified organizations) and P-value was found significant (less than  $< 0.05$ ).

To achieve this study objective to highlight the implementation of EMS by companies in the field of oil and gas industry in Sudan to achieve sustainable development; it was required to study type of organizations

according to employees' number and then to compare with EMS elements for those

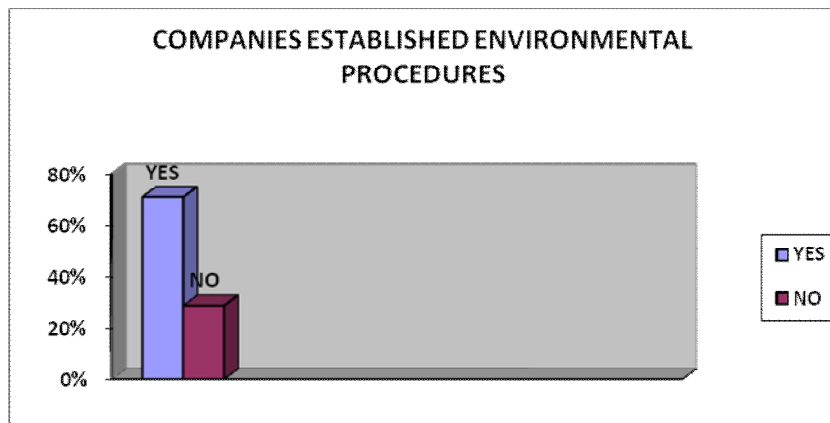
organizations having certified ISO 14001, to know if it is effective or not.



**Figure 3: Companies having Environmental Policy**

To answer the study question about how does an EMS standard implemented with the current Sudanese environmental legislations, two questions in questionnaire were prepared about companies having environmental policy and companies having

established environmental policy. 85.3% of the surveyed companies already having environmental policy and 70.6% from surveyed companies are established environmental procedures. 51% of the surveyed companies is certified ISO 14001.

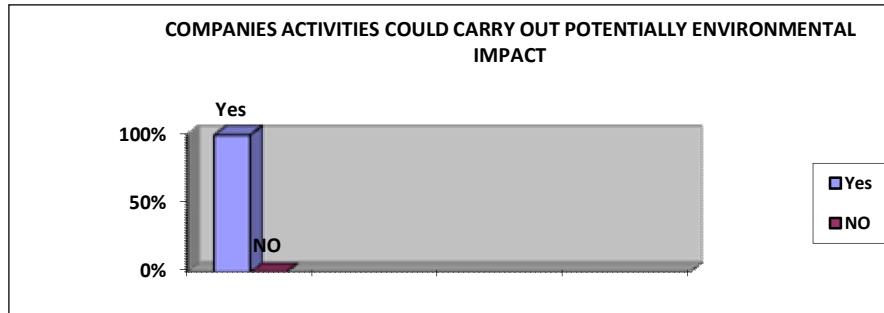


**Figure 4: Companies established Environmental Procedures**

To achieve the objective of this study to achieve sustainable development in Sudanese oil and gas industry by implementing EMS standards; question about the organization activities which could carry out potentially environmental impacts; almost all of respondents agreed about the

possibility of environmental impacts it could occurs during their organizations operation activities. This question has been prepared to achieve this study question about how an EMS standard contributing with oil and gas companies to achieve environmental improvement.





**Figure 5: Companies' activities could carry environmental impact**

The question respondents about the environmental policy mechanism it may have positive environmental affect on organizations industrial activities, 83.9% indicated that top management commitment as very important, then 66.7% indicated that compliance with national and international environmental standards as very important, 58.6% indicated that employees commitment as very important; and for liability and adoption of environmental protection policy the results of both of them were 54.8%. From literature review a previous study revealed top management should have a clear understanding on what are critical success factors in their implementation of EMS. A study highlighted that the majority of the critical success factors in implementing EMS ISO 14001 are management leadership and support, learning and training, internal analysis and sustainability (Ambika and Amrik, 2004).

Also another study claiming that management commitment, employee empowerment, rewards and feedback & review stood out as key elements in implementing EMS (Nalini and Bonnie, 2004). Again, different studies have emphasized that top management should put greatest effort in identifying environmental

aspects, environmental management system (EMS) documentation, training, EMS audits, operational control, environmental management program, objectives and targets, and document control (Khalid, Robert and Matthew, 2002). Top management may have to identify critical success factors that suites their organization because each organizations are unique having their very own organizational behaviors.

Question results about the improvement of environmental management system by top management, 71.9% of replies have been yes which point out a good environmental performance for the surveyed organizations. Regarding for the management review part, the question about routinely review of the environmental management system has been scored yes, 74.2% for compliance of applicable environmental laws, and 51.6% for internal audit reports.

The question about if the management include in the review the concept of continual improvement, 70% from the surveyed individuals replied by yes which showing a good commitment from top management to improve their organizations environmental performance. From literature review, the progress of the company in attaining ISO 14001 certification is influence

by four factors namely feedback and review, rewards and management commitment (Nalini & Bonnie, 2004). Another study revealed that resistance from the employees can be a major barrier to a company from successfully implementing EMS (Ford, Ford and McNamara, 2002).

## CONCLUSION

This study was about implementation of EMS (ISO 14001) in Sudanese oil & gas industry this studied comprehensively the current status of working organizations in Sudan. International organizations as well as Shareholder organizations practically could transfer the ISO 14001 benefits to the other private organizations and that could affect positively in improving the environmental performance. The study concentrated about policy and implementation of EMS in Sudanese Oil& Gas industry to measure the strength of the system be implemented in harmony with the current Sudanese environmental Act 2001, and that is finally to improve environmental performance. Also this study showed shortage of governmental environmental legislation which has clear directives to control environmental impacts of oil & gas exploration and operation activities, and also beside the other scale of small and medium manufacturing industrial activities.

Although Sudanese oil & gas industry is a new sector and just started operation in the end of 1990<sup>th</sup>, this study found that the majority of current organizations are large scale organizations with employees number more than 500 and established procedure to control environmental impacts; 51% of organizations were found having ISO 14001 certificate.

The relationship between types of organizations with respect to national or multinational organizations owners was found significant; this means implementation of EMS is important especially for those multinational organizations as their experience and the benefits were found from implementation of this system abroad. Also this study found that, most of the surveyed organizations having environmental policy. In this study and from literature review the role of top management to adopt and implement ISO 14001 was found foremost.

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