# Role of environmental management system in reducing pollution of industrial enterprises in Egypt

**Submitted By**

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B.Sc. of Mechanical Power, Faculty of Engineering
Ain Shams University, 2002

A thesis submitted in Partial Fulfillment
Of
The requirement for the Master Degree
In
Environmental Sciences

Department of Environmental Engineering Science
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## ACKNOWLEDGMENTS

The author wishes to express his deep gratitude to Prof. Dr. Kaddah Shaker Kaddah, Prof. Dr. Mahmoud A. Ibrahim Hewehy and Dr. Mohamed Nasr Farid for their supervision and for their invaluable guidance.

They have been a source of encouragement and they give generously their time in the preparation of this thesis.
The researcher is indebted to all PETROJET central workshops staff for their advice and assistance.

Thanks are due to HSE Corporate department in both PETROJET and RASHPETCO staff for their help and co-operation.
Warm thanks also due to Eng. Gamal Fathy, Eng. Mahmood Ahmed, Eng. Ahmed Tawfik and Eng. Mahmoud Khalil.

The author wishes to express his heartfelt thanks to his father, mother, wife and children for their support, understanding and patience.

## ABSTRACT

This thesis provides an assessment of environmental pollution associated with fabrication workshops. It identifies control measures used to control environmental pollution in the workshops. In addition an evaluation of the critical success factors required for implementing ISO 14001was completed. A key component for implementation required an assessment of personnel (management and workforce) awareness regarding to environmental policy. This was done through interviews with all persons working at workshops.

Environmental measurements before and after EMS implementation were recorded.

The thesis proposed EMS improvements for the following areas:

- Environmental aspects and evaluation of impacts.
- Legal requirements.
- Control measures for reducing environmental aspects associated with fabrication activities e.g. welding, cutting, blasting, energy efficiency, material consumption, water and waste management.

The results showed the need to secure management commitment there by gaining employees involvement and participation. Best improvements were noted in the following areas, increase efficiency in raw material usage, reduction in energy usage and reduction in water usage.

In terms of external factors enforcement by Egyptian environmental regulator to monitor strict compliance through increased inspections and surveys is recommended.

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## ABBREVIATION

| Abbreviation | Nomenclature |
|---|---|
| ADM. | Administration |
| BSI | British Standard Institute , United kingdom |
| CB | Circuit Breaker |
| CBMP | Concrete Blocks Maintenance Program |
| CEO | Chief Executive Manager |
| EEAA | Egyptian Environmental Affairs Agency |
| EIA | Environmental Impact Assessment |
| ELCB | Earth Leakage Circuit Breaker |
| EMAS | Eco-Management and Audit Scheme |
| EMS | Environmental Management System |
| FFP | Firefighting Program |
| FIFO | First In First Out |
| GM | General Manager |
| HSE | Health, Safety and Environment |
| ISO | International Organization for Standardization |
| KPI | Key Performance Indicators |
| LIFO | Last In First Out |
| LPG | Liquefied Petroleum Gas |
| M/C | Machines |
| MATR | Master Action Tracking Register |
| MGR | Manager |
| MWT | Management Walk Through |
| NCR | Nonconformance Report |
| OHSAS | Occupational Health and Safety Assessment Series |
| OHSMS | Occupational Health and Safety Management System |
| PMP | Preventive Maintenance Plan |
| PPE | Personal Protective Equipment |
| QC | Quality Control |
| QMS | Quality Management System |
| SUV | Sport Utility Vehicle |
| SWI | Safe Work Instructions |
| TBM | Tool Box Meeting |
| UV | Ultraviolet |
| VOC | Volatile Organic Compound |
| WC | Water Closet |
| WS | Workshops |
| WSM | Workshops Manager |

# CHAPTER ONE

# INTRODUCTION

This study aims to develop guidelines, practical mechanisms and control measures to increase EMS effectiveness inside industrial enterprises as tools to reach to cleaner production. The barriers of current EMS inside the selected enterprise were assessed.

The study measures the percentage of improvement that occurred before and after practical application of the guidelines. Finally the study concludes with recommendations to improve ISO 14001, Environmental laws in Egypt and top management commitment inside the enterprise.

The study is divided into six chapters.

Chapter (1) thesis introduction

Chapter (2) highlights the history of management systems, develops an overview of literature review and a comparison between these reviews. In addition this chapter compares between ISO 9001, ISO 14001 and OHSAS 18001in order to identify the benefits of managing these management systems as an integrated system. Also this chapter identifies the aim of this work.

Chapter (3) guidelines, control measures of the most important activities inside the enterprise are developed.

Chapter (4) Data for EMS inside the selected enterprise was gathered, activities inside this enterprise are identified, key performance indicators are addressed and monitored before implementation.

Chapter (5) the enterprise's environmental performance before and after EMS effectively implemented was compared through KPIs measurements.

Chapter (6) contains the conclusions and recommendations

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

All enterprises have a way of doing things. For some it rests in the mind of the leaders, for others it is translated onto paper and for most it is a mixture of the two. The logical step was to improve these systems and make them more predictable, more efficient and more effective - optimizing performance across the whole enterprise - not focusing on particular parts at the expense of the others. Management systems encourage the formalization of those parts of the system that served the achievement of environment, quality and safety as shown in figure (1). **(Hoyle, 2001)**


**Fig (1) the way we manage the business**
**(Hoyle, 2001)**

The development of ISO14001 came about because of the need for improved environmental performance expressed at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. The International Organization for Standardization (ISO) was charged with creating an internationally recognized environmental management system. ISO14001 was developed in under three years, much quicker than it usually takes to develop an international standard mainly because it relied heavily on the content of BS7750 as a framework.

## 2.2 Benefits of implementing ISO 14001

Pollution prevention with the use of modern cleaner technologies in industrial sectors is the cornerstone of successful environmental policy

certified according to the requirements of the international standard ISO 14001 **(Radonjiča, 2007).** Whether the ISO 14001 certification can accelerate initiatives for the adoption of new and cleaner technologies within the certified firms on one hand, and, on the other hand, to find out to what extent it helped to upgrade their environmental performance **(Radonjiča, 2007)**. In general, certified enterprises consider ISO 14001 as a very useful tool in promoting and adopting new cleaner technologies. ISO 14001 seems to be particularly important to create better conditions for the technology changes in companies **(Radonjiča, 2007).**

The benefits of implementing ISO 14001 are: standardization of environmental management procedures for internal operations; saving resources and reducing wastage for corporate management; improving corporate image for marketing effects; enhancing environmental awareness of suppliers for supplier relations critical factors affecting implementation of the standards. **(Zenga, 2005)**

The results of a study carried out in Malaysia among companies in the electrical and electronics sector indicated the benefits that can be obtained by the implementation of ISO 14001: improvement in the company's image and reputation, improvement in company's processes and profits, improvement in customer loyalty and trust, and improvement in staff morale and employer–employee relations. **(Murali Sambasivan, September 2008).**

The author agrees that by applying ISO 14001 requirements there are considerable environmental and business benefits. However the focus in Egypt based upon author's experience is that companies get the ISO certificate and then reduce the effort to maintain the certification because third party accreditation bodies don't maintain the same level of diligence.

## 2.3 Major factors affect ISO 14001 implementation

The major factors affect ISO 14001 are: (1) environmental consciousness of top leaders; (2) environmental consciousness of middle management; (3) well-defined responsibility for environmental management; (4) legal system; and (5) legal enforcement. **(Zenga, 2005).** Severe environmental deterioration in many countries due to rapid changes in the industry and the possible measures including promotion of ISO 14001 to mitigate this deterioration within the enterprises are introduced **(Zenga, 2005)**. The government should take the lead in improving the legal framework, providing financial support and training to promote ISO 14001 to the Chinese enterprises. **(Zenga, 2005)**.

The main drivers for certification were reported to ensure regulatory compliance, to enhance the firm's reputation, and to improve environmental performance. Although motivation to achieve cost reductions was least emphasized, motivations to the EMS components suggest that internal motivations have an influence on most EMS components **(Gerald E. Fryxell, 2004)**. The next steps include encouraging further public participation and taking an integrated approach leading to an industrial ecosystem, which can realize better environmental performance at the industry. **(Yong Geng, 2003)**.

The results of a study carried out in Malaysia among companies in the electrical and electronics sector indicated that the critical success factors in the order of importance are as follows: management approach, enterprise change, and technical aspects, external and social aspects.

In a study of underlying mechanisms in the maintenance of ISO 14001 environmental management system, it determined five underlying processes (transforming and value adding; administrating and improving; understanding and accepting; communicating and learning; availability of resources) and five key actors (external environment; environmental