

Evaluation of critical success factors of implementation of ISO 14001 using analytic hierarchy process (AHP): a case study from Malaysia

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Available online 25 October 2007

Abstract

The factors and sub-factors critical to the successful implementation of ISO 14001-based environmental management system (EMS) and benefits that can be reaped from the implementation were explored in this study. An empirical study using the analytic hierarchy process (AHP) was carried out to find the relative weights and priorities of these critical success factors and benefits. The study was carried out in Malaysia among companies in the electrical and electronics sector. The results of the study indicate that the critical success factors in the order of importance are as follows: management approach, organizational change, technical aspects, and external and social aspects. The results of the study also indicate 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.

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Keywords: ISO 14001; EMS; Analytic hierarchy process; Critical success factors; Implementation

1. Introduction

ISO 14001 has attracted interest from industry, international organizations and governments around the globe. ISO 14001 standards are designed to help organizations to establish management processes for controlling and improving their environmental performance and for reducing the impact of their operations on the environment. Policy-makers and industry both appear to be looking at the standards as a key component of a new paradigm for cooperation between regulators and industry. This realization seems to have resulted from a growing awareness that the fragmented, reactive approach to environmental management does not produce optimal results. With the progressively widespread adoption of the ISO 14001 standards, it is not surprising that, in the near future, the implementation of an environmental management system (EMS), through registration with ISO 14001, will be the norm rather than the exception [35,38]. ISO 14001 requires

that environmental considerations encompass every aspect of the company's operations and procedures.

Companies that wish to remain competitive and improve their environmental systems cannot ignore ISO 14001. The primary reasons why companies go for ISO 14001 registration are as follows: strong public pressure in developed and developing economies have made companies aware that the consumers are interested in the interactions of business operations with the environment [14,35,28]; to gain entry into the global market [35,15]; to maintain and gain competitive position in the global market [35,25]; to improve the company's image [26,23]; to improve the company's operations [26,33]; and to provide a clean environment through clean operations [20,26]. This awareness is seen all over the world, especially, among developing economies like Malaysia. A recent study by Tan [35], on Malaysian firms registered with ISO 14001, indicates that companies perceive benefits from adopting ISO 14001 standards. The costs and benefits of ISO 14001 certification have resulted in firms choosing this route as a tool for proactive environmental management. However, the ISO 14001 certification can result in non-value added costs if it

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is pursued only for its marketing or regulatory appeal. The true value can be realized only when EMS is made consistent with the company's strategic direction.

Environmental credibility is a fast becoming factor in national and international competitiveness. Implementation of ISO 14001 and subsequent registration can facilitate progress through measurement and innovation leading to increased profits, more efficient processes, reduced costs and a more credible image. Many countries have already declared ISO 14001 as their own national standard. Since the introduction of these standards, many companies from many countries have already been certified. Obtaining ISO 14001 certification is viewed by companies as a ticket to enter global market. According to statistics published by ISO in 2003, at least 49,462 ISO 14001 certificates have been issued in 118 countries. Japan, with a plan from the government to subsidize some of the costs for small and medium enterprises (SME), leads the pack.

Although these arguments portray ISO 14001 in a positive light, not all firms share that enthusiasm. Many organizations have decided to delay the certification or to reject it altogether [3]. This is because many organizations, with the intention to implement ISO 14001-based EMS, have had difficulties in determining the tangible and intangible benefits or impacts considering the cost incurred. Even companies that have successfully implemented ISO 14001 can question its effectiveness and true value to the company's overall performance [25]. Bansal and Bogner [3] argue that organizations need to look at both economic and institutional factors that influence them in implementing ISO 14001. The success factors of ISO 14001 implementation can vary from country to country and may include factors such as governmental legislation, economic and political factors, and culture.

The gap in the literature is filled by this study by identifying the critical success factors and benefits due to implementing ISO 14001. Although this study was done in Malaysia, we believe that the approach and the framework discussed in this paper can be applied in other countries. The success factors used in this study are grouped into four major constructs: (1) management approach (MA), (2) organizational change (OC), (3) external and social aspects (ENSA), and (4) technical aspects (TA). These four major constructs are broken down further into 14 sub-factors: (1) top management commitment and support (TMC), (2) environmental policies and objectives (EPO), (3) management reviews (MR), (4) training and awareness (TNA), (5) documentation and control (DC), (6) emergency response and preparedness (ERP), (7) communication (CM), (8) market pressure (MP), (9) government policies and legislation (GPL), (10) customer requirements (CR), (11) employee relations (ER), (12) production process enhancement (PPE), (13) monitoring and measuring equipment (MME), and (14) environmental specialist assistance (ESA). The benefits that accrue by implementing ISO 14001 are grouped into four main factors: (1) improved company reputation and image (ICRI), (2) increased staff morale and motivation (ISMM), (3) profit, performance, and opportunity (PPO), and (4) customer loyalty and trust (CLT). The rationale

for choosing these factors is given in Section 3. Since there are a few studies in developing economies, like Malaysia, and since the number of certified companies in Malaysia are few in number (only 97 as on April, 2004), this study is more of an exploratory study. Therefore, instead of using a rigorous statistical approach (which depends upon the sample size) we have used an analytical approach such as AHP (analytic hierarchy process) to study the factors that influence implementation and benefits of ISO 14001. This paper is organized as follows. Section 2 discusses the basics of ISO 14000 and previous studies related to the implementation of ISO 14001. Section 3 discusses the critical success factors and benefits of implementation. Section 4 discusses the methodology. Section 5 analyzes the results. Section 6 concludes with implications of the study.

2. Basics of ISO 14000 and previous implementation studies

ISO 14000 is a series of voluntary international standards for implementing an effective EMS. An EMS is defined as a part of the overall management system which includes the organizational structure, planning activities, responsibilities, practices, procedures and resources for developing, implementing, achieving, reviewing, and maintaining a company's environmental policy. ISO 14000 provides organizations with a framework for managing environmental impacts.

There are several EMS standards currently adopted by different regions and different countries [34]. ISO 14000 series consists of two groups of standards. The first group (ISO 14001 and ISO 14004) is to provide guidelines and principles for the establishment and operation of an EMS. The second group (ISO 14010, ISO 14011, and ISO 14012) is to provide guidelines for environmental auditing and analyzing and characterizing the environmental attributes of products. These standards can be used by organizations regardless of their size and business type to formalize a management process and to evaluate the effectiveness of their activities, operations, products, and services in the improvement of environmental and safety performance [25]. In this research, we concentrate only on the first group of standards, namely, ISO 14001 and ISO 14004. ISO 14001 is the most important of the series and is considered the reference standard in the area of environmental management.

ISO 14001 is built with core elements basically from proven management systems such as ISO 9000 series [19,1]. ISO 14001 is voluntary and there are no legal requirements to certify. It does not set any performance standards and focuses on management processes rather than specific environmental outcomes. This is the main criticism of the detractors of ISO 14001. However, organizations do agree that ISO 14001-based EMS can provide them with a platform to improve their systems and processes by having minimum impact on the environment.

There are a few studies related to the implementation of ISO 14001 (Ref. [24], a large food machinery manufacturer in Italy; Ref. [25], 6 firms in Hong Kong; Ref. [3], 115 firms

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