



# Recycling performance of firms before and after adoption of the ISO 14001 standard

Khalid A. Babakri <sup>a,b,\*</sup>, Robert A. Bennett <sup>a,b</sup>, Subba Rao <sup>a</sup>, Matthew Franchetti <sup>a,b</sup>

<sup>a</sup> *The University of Toledo, Environmentally Conscious Design and Manufacturing Laboratory, College of Engineering, MIME Department, 2801 West Bancroft Street, Toledo, OH 43606, USA*

<sup>b</sup> *The Lucas County Solid Waste Management District, 761 Key Street, Maumee, OH 43610, USA*

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## Abstract

The purpose of this paper is to study the impact of ISO 14001 certification on recycling performance. The research is based on a survey conducted on a sample of certified industrial companies that operate in United States. The paper reveals that companies' recycling performance is significantly positively affected by certification. The paper also reveals that earlier certified companies experience better recycling performance than more recently certified companies. Finally, the paper shows that smaller firms experience greater improvement in recycling performance than larger firms due to ISO 14001 certification.

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## 1. Introduction

In 1996, International Organization for Standardization (ISO) based in Geneva, developed the ISO 14000 series which describe the requirements to be fulfilled by organizations to implement an effective environmental management system (EMS). The ISO 14000 series consists of 21 standards and guidance documents. These environmental standards are divided into six categories: 1) environmental management system; 2) environmental auditing; 3) environmental performance evaluation; 4) environmental labeling; 5) life cycle assessment; and 6) environmental aspects in product standards [1].

ISO 14001 is considered the only standard designed for the purpose of audit and certification in the ISO 14000 series. The core elements of the ISO 14001 standard are environmental policy, planning, implementation and operation, checking and corrective action, review and improvement. General Motors, Daimler-Chrysler, Ford, Toyota, and other automobile manufacturers have adopted ISO 14001 certification and they are requiring their suppliers worldwide to adopt the certification as a

condition for continuing to do business [2]. Although ISO 14001 certification has been demanded by customers and stakeholders, companies still have no clear understanding of the benefits of implementing ISO 14001.

It is often assumed that ISO 14001 certification leads to a better performance for organizations. Some environmental management system (EMS) authors claim that the effective implementation of ISO 14001 elements will reduce or eliminate negative environmental impact and move a company toward better environmental performance [3]. However, few studies discuss the quantitative effects of implementing ISO 14001 on improving the environmental performance. This could be a result of the short period of time since this standard was first introduced in 1996 and the real demand by the customers after 1998 to have their suppliers certified to ISO 14001 standard.

This paper presents an empirical examination of the impact of ISO 14001 certification on the recycling performance of organizations. This research was conducted in the United States, and includes 177 industrial organizations. The aim of this research is to investigate the improvements of recycling performance for the organizations as result of adopting ISO 14001 certification. The main question for this paper can be described as follows:

\* Corresponding author. Tel.: +1-419-530-7395; fax: +1-419-530-8275.

E-mail address: [hkhalid80@hotmail.com](mailto:hkhalid80@hotmail.com) (K.A. Babakri).

“Does ISO 14001 certification lead to a better recycling performance for organizations?”

## 2. Literature review

Research into the relationship between ISO 14001 certification and the recycling performance of organizations is scarce. Few case studies discuss the positive impact of ISO 14001 certification on recycling performance. For example, Rondinelli and Vestage [3], in their study of Alcoa's Mt. Holly plant, found that ISO 14001 certification led to more ideas among the employees for materials recycling and increased their commitment to recycle. Additionally, during the period following the achievement of ISO 14001, the amount of waste that had to be sent to landfills was reduced from 7608 tons in 1995 to 4960 tons in 1998 and the waste cost of production per ton of aluminum dropped from \$8.33 in 1995 to \$6.50 in 1998.

Parry [4] used a combination of interviews and case studies to investigate the role of ISO 14001 in minimizing waste. According to the author improvement in recycling is one of the more quantifiable business benefit of ISO 14001 and some companies have captured the cost savings associated with reducing waste. Some of the success stories resulted from the companies ISO 14001 efforts to reduce waste and save cost include:

- Warner-Lambert Company reduced waste streams by 34% and reduced packaging waste. The company reported \$1 million annual saving.
- Ford Motor Company, St. Louis Assembly Plant, instituted a waste minimization program in accordance with ISO 14001. The plant reported a 35% reduction in the amount of solid waste going to the municipal landfill.
- The implementation of ISO 14001 in a Ford Ohio Assembly Plant helped in recycling more than 2300 steel drums in 1997 and saved the company more than \$15,000.
- The Ford Tulsa Glass Plant recycled more than 3 million pounds of scrap metal and 34,000 tons of glass in 1998.

Few surveys of companies participating in ISO 14001 indicate that companies experience positive impacts on their recycling performance. However, almost all of these surveys do not focus mainly on the impact of certification on recycling performance and they have been conducted one or two years after the release of the ISO 14001 standard in 1996 which means that many firms were in the early stages of the certification awareness. Therefore, the surveys could not effectively test the impact of ISO 14001 on recycling performance.

Table 1  
Respondents by time of certification

Time of certification	Number of responses	Percentage of total
1996	7	4.0%
1997	8	5.0%
1998	39	22%
1999	41	23%
2000	52	29%
2001	30	17%

Mohammed [5], for example, conducted a survey by sending questionnaires to 106 ISO 14001 certified firms in Japan in 1997. The results of the survey showed that about 69% of the respondent reduced paper purchases due to the implementation of ISO 14001. The survey also showed that more than 60% of the respondents have given special consideration to the reuse and recycling of their packing and final products. In addition, 41% of the respondents used recycled materials inside the firms.

## 3. Research methodology

### 3.1. Description of the sample

The data used in this paper comes from a questionnaire survey. In January 2002, the questionnaire was mailed to 584 manufacturing companies in the United States. A total of 177 sets of usable questionnaire were successfully collected, yielding a response rate of 30.3%. Company profile information in term of time of certification and company size is presented in Tables 1 and 2.

### 3.2. Variables considered

In order to test the impact of ISO 14001 certification on recycling performance for organizations, the following six recycling performance measures were developed from the literature review:

1. Percentage by weight of recycled content in the product

Table 2  
Firms size by number of employees

Number of employees	Number of responses	Percentage of total
1–50	13	7.34%
51–100	18	10.17%
101–250	39	22.03%
251to 500	49	27.68%
Over 500	58	32.77%

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