

The Factors Which Affect the Decision to Attain ISO 14000

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ABSTRACT

Formally adopted in 1996 by the International Organization of Standardization, ISO 14000 represents a new voluntary international environmental standard, which will likely be adopted by the vast majority of corporations. Its major focus is on the structure, implementation, and maintenance of a formal environmental management system. While the literature is clearly divided in its assessment of ISO 14000, an underlying common theme is that the decision to achieve ISO 14000 certification constitutes a major undertaking for most firms. Such an undertaking, it is argued, does not take place in a vacuum. Rather, it is a response to a number of factors or influences. However, no research to date has empirically identified these factors and explained how they can be leveraged into a competitive advantage. In this article, we use qualitative case studies to identify which factors affect the decision to attain ISO 14000 certification and we also explain how these factors can influence the level of success achieved during the certification process.

INTRODUCTION

The primary objective of this article is to explore the implications of ISO 14000 for environmental management. Developing a more accurate and realistic understanding of the implications of ISO 14000 certification will help alleviate some of the potential disappointments in the outcomes often associated with ISO 14000. The literature is clearly divided in its assessment of ISO 14000, which is viewed as either a variant of TQEM or a paper-driven process of limited value. An examination of this international environmental standard was inspired by recent visits to a number of manufacturing facilities. It was discovered that not only do managers embrace the ISO 14000 criteria, they view it as an integral part to their future success. These managers insist that ISO 14000 is worth chasing, not only because their customers might demand it, but also because ISO 14000 improves performance.

These findings raise an interesting issue. The issue pertains to the decision to pursue ISO 14000 certification. That is, if there is a real benefit to being ISO 14000 certified, then what factors influence this decision? Examples from these field visits will introduce the factors, which influenced certification, and critically challenges the criticisms commonly associated with ISO 14000. The article is organized as follows. First, we define and provide a background of ISO 14000. Then we use examples from managerial experiences to identify the factors, which affected certification status. The research concludes with an evaluation of the

factors underlying the decision to attain ISO 14000 certification and how these factors can be leveraged to obtain a competitive advantage.

ISO 14000 AS A MEANS OF ACHIEVING A COMPETITIVE ADVANTAGE

In the course of interviewing managers and touring manufacturing facilities for a number of recent research projects, the author was repeatedly struck by certain factors which were identified as having a critical impact on predisposition and progress toward attaining ISO 14000 certification. Many times we were told that these factors not only influenced their decision to pursue ISO 14000 but these factors also influenced the level of success achieved during the certification process. What follows is an attempt to re-conceptualize ISO 14000 as a program that can lead to a competitive advantage. Our approaches to studying ISO 14000 are qualitative and based on field studies. The next section details the qualitative methods used to conduct this research.

METHODOLOGY

The purpose of this study was to identify why companies seem to embrace ISO 14000 even though the standards have been the subject of great debate and criticism. Since the focus of this research was exploratory in nature (rather than confirmatory), qualitative data collection methods were used. Field-based data collection methods were used to ensure that the important variables were identified. It also helped us develop an understanding of why these variables might be important. A small detailed sample fit the needs of the research more than a large-scale survey would have.

The method followed was similar to the grounded theory development methodology suggested by Glasser and Strauss (1967). In instances where a well-developed set of theories regarding a particular branch of knowledge does not exist, Eisenhardt (1989) and McCutcheon and Meredith (1993) suggest that theory building can best be done through case study research. The researchers participating in this project relied primarily on the methods of qualitative data analysis developed by Miles and Huberman (1994), which consisted of simultaneous data collection, reduction, display, and conclusions testing. The end result was a series of case studies in which each case was treated as a replication.

Sample Selection

Cook and Campbell (1979) suggested that random samples of the same population be used in theory testing research. However, the sample selected for qualitative research such as in this study should be purposeful (Eisenhardt 1989; Miles and Huberman 1994). The goal of this study was to identify variables that explain the predisposition of ISO 14000 across manufacturing settings. Furthermore, the research set out to address a variety of ISO 14000 outcomes. Firms from different stages in ISO 14000, industries, products, processes, and sizes were selected based on literature search and general knowledge of appropriate case study candidates. In addition, other issues important to manufacturing strategy were addressed which would not have been served by limiting the sample solely to successful adopters of ISO 14000. Therefore, the sample included industries such as office furniture which the literature suggested would have a high, but not universal, rate of ISO 14000 adoption. Table 1. describes the number of firms involved in the field research, the industry, and the annual sales.

Each of the firms selected was chosen to represent different stages of ISO 14000 certification (e.g., assessing suitability, planning to implement, currently implementing, successfully implemented). The other firms included in the study were chosen because they were in the

same industries as the firms found in the literature search. The objective of this sampling approach was to construct a sample of firms that would be diverse enough to capture the variance of ISO 14000 variables across firms and products that may be overlooked in a single industry or product sample.

Table 1. Firms in the Sample

No. of firms	Industry	Annual sales (\$)
5	Tier I automotive suppliers	25M-5B
3	Chemical	15B
3	Office and furniture	1B
2	Aerospace	33M
1	Windows and doors	1B
1	OEM specialty trucks	25M
1	Pharmaceutical	15B

An initial idea of the level of ISO 14000 understanding and implementation at each potential firm was obtained through preliminary screening over the telephone. Some of the questions used in making our initial assessment can be found in Table 2. Twenty-two firms were initially contacted and screened.

Table 2. Initial assessment questions

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- Is your plant ISO 14000 certified?
 - Why are you (not) certified?
 - If not certified, are you considering certification?
 - What is your overall impression of ISO 14000?
 - Has ISO 14000 improved the overall competitive stance of your plant?
 - Specifically, how has ISO 14000 influenced your environmental performance?
 - How has ISO 14000 influenced your ability to provide the level and types of service required by your customers?
 - Please detail the types of documentation performed to be certified. Were these activities valuable?
 - Please describe the types of continuous improvement activities performed at the plant. Has certification helped/hindered or not affected these efforts?
 - Do you feel you have received a good return on this investment?
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Note: Managers were asked to explain all of their answers.

After the initial screening, which also addressed the willingness of the company to participate, 16 firms were again contacted and site visits were arranged. The interviews were conducted with several managers responsible for portions of the ISO 14000 certifications process at each site. Some titles of the people interviewed include “manager of:” environmental health and safety, corporate quality services, supervisor/planning group, plant planner, global director of development, environmental science and assessment, new product group, and design engineering.

Interview Protocol

Eisenhardt (1989) suggested that a researcher should have a well developed interview protocol before making the site visits. A structured interview protocol was used at all of the

plants. The interview protocol was developed based on the researchers' general understanding of ISO 14000. The protocol was pre-tested at four manufacturing facilities and then used for the 16 firms included in this study. Minor changes were made to the protocol after the pre-test. Questions focused on previous and current EMS, and the roles and experiences of the players involved. Interviews were conducted in the respondents' facilities, and discussions focused on the consideration of ISO 14000 as an important part of their EMS and the factors affecting their predisposition towards ISO 14000.

Research concerning environmental issues is fraught with Socially Desirable Response issues. To avoid responses exhibiting social desirability, different managers were questioned. The same structured interview protocol was used at all of the site visits. After each visit the protocol was reviewed, and/or updated to accommodate new lessons learned. This constant updating of the protocol after each visit is the foundation of grounded theory development (Glasser and Strauss 1967). When the sessions involved multiple respondents, all comments or views of the managers were recorded separately. Subsequent coding of the notes would highlight any differing views of the managers.

All respondents were asked if they were ISO 14000 certified. In addition, their reasons for certification (or for not being certified) were solicited. Of the 16 companies, 14 were certified, while the remaining 2 were considering certification. Finally, we discussed the outcomes of certification with those firms, which were certified. This research is built primarily on the responses of the 12 firms that were certified. However, the comments and concerns of the non-certified firms were also used to help explain why firms may be reluctant to adopt the environmental standard.

Qualitative theory building research is an iterative process. Eisenhardt (1989) suggested that data collection and data analysis should be done simultaneously. In other words, the data from one case is collected and then analyzed before the next replication is performed. Improvements in the protocol can be made between replications by collecting data in this manner. Important issues that are raised in early cases can be included in the protocol for subsequent replications. This ability to refine and improve upon the protocol between cases is a significant advantage of this type of research. The actual process was one where a case was collected, analyzed, the protocol was improved upon, and then the next case was collected.

Data Collection

The primary data collection was done using structured interviews in a field setting. Sixteen plants in 7 industries were visited over a one-year period. In the sample of 16 installations (one installation per site), 14 different companies were represented. The plants were located in 6 mid-western states: 1) Michigan; 2) Ohio; 3) Indiana; 4) Illinois; 5) Wisconsin; and 6) Minnesota.

Structured interviews at each plant generally took place with the plant manager as well as the environmental manager. At most plants, additional interviews also took place with company presidents or vice presidents, manufacturing engineers, quality engineers, purchasing managers, and designers. At three of the smaller plants, interviews were limited to the plant manager or presidents.

Data were collected following a strict interview protocol that included a tour of the plant. The primary researcher was accompanied on all visits by a second researcher who reviewed all field notes prior to final coding. The use of multiple respondents and multiple interviewers at

every plant helped limit possible biases introduced by a single respondent and researcher. The field notes identified responses to all of the protocol questions, answers to other questions that were raised during the interview and plant tour, and other information such as company publications.

Data Analysis

The two main components of data analysis included within and across case analysis. Within case analysis helped us examine ISO 14000 in a single context, while the across case analysis served as a form of replication where the constructs of interest in one setting were tested in other settings. One concern was controlling for the affects of the researchers' a priori beliefs as to the reasons why ISO 14000 was embraced. This was accomplished a variety of ways. First, the primary researcher wrote up the field notes prior to coding. The secondary researcher, who also went to the plant, reviewed these notes.

The second step taken was intended to mitigate against confirmation bias. That is, the amount of within case analysis performed before the cross case analysis was limited. Miles and Huberman (1994) note that the acts of coding and data reduction are actually forms of data analysis. In other words, the act of coding could lead to confirmation bias problems in future cases. Therefore, coding for within case analysis was limited to categorizing the individual case on previously identified constructs and identifying interesting new issues to pursue at future sites. We were more open to alternative explanations raised in future replications by avoiding comparisons early in the research.

The between case analysis consisted of looking for patterns of firms' experiences with ISO 14000 across the various organizations. Between case analysis is facilitated by using a variety of tools to reduce the amount of data and to display the data in a meaningful fashion (Miles and Huberman 1994; Yin 1994). Data reduction was done primarily through categorization. A number of categories were formed based on the literature. Through a process of combination, renaming, and redefining, the data was reduced to seven main concepts that were most frequently noted as reasons for embracing ISO 14000. The factors included: Previous experience with Total Quality Management; Past success with quality-based certification processes such as ISO 9000 or QS 9000; Previous experience with cross-functional teams and management; Firm size/Number of full-time equivalents; Nature or corporate ownership (foreign-owned plants are more likely to pursue and receive ISO 14000 certification); and End sales.

Following each interview, the field notes were typed. To facilitate data coding and analysis, a meta-matrix display was constructed. The next step involved coding the data using Nudist® qualitative data analysis software. On reviewing the first six field notes, a list of several primary codes was developed to capture information in different meta-environmental categories. The researchers reviewed the transcribed field notes for all 16 of the site visits at least three times. In doing this, the events and processes observed at each site were classified into an EMS category, and into several other complimentary environmental categories, including product and process hazards, factors affecting predisposition towards ISO 14000, metrics, tools, options, and opportunities. The meta-matrix is available from the authors upon request.

To check the reliability of the coding, an approach suggested by Miles and Huberman (1994) was applied: reliability = number of agreements/total of items. They suggest 70 percent inter-coder reliability is appropriate when using multiple raters to code field notes. An agreement

was achieved when at least two of the three primary researchers agreed on the coding used. The total number of agreements minus the number of disagreements comprised the actual number of agreements used in the reliability formula. The coding of each interview had reliabilities ranging from 0.90 to 1.00, with an average inter-coder reliability of 0.95.

RESULTS

ISO 14000 has only recently been introduced and many organizations are still struggling with the decision whether to implement the system and get certified. This may be attributable to having no clear picture of the critical factors for successful implementation of ISO 14000. In this section, case studies, combined with the literature, are used to determine which major factors affect the decision to attain ISO 14000 certification and how these factors can influence the level of success achieved during the certification process.

Past Experience with Total Quality Management

There has been a great deal of discussion within the literature about Total Quality Management (TQM) in environmental programs such as ISO 14000. Namely, environmental systems are viewed as being TQM systems modified to deal with pollution issues. The gradual evolution of quality to include aspects of the environment has been anticipated by several authors. The “no waste” aim of ISO 14000 closely parallels the TQM goal of “zero defects.” Because the two systems share a similar focus, it makes sense to use many of the tools, methods, and practices of TQM when implementing an EMS such as ISO 14000.

Several of the companies visited utilized TQM approaches to developing their environmental systems. Some of the relevant TQM principles which were integrated into their ISO 14000 based programs included: 1) a systems analysis process orientation that aimed to reduce inefficiencies and identify product problems; and 2) data-driven tools, such as cause and effect diagrams, quality evolution charts, pareto analysis, and control charts. A chemical manufacturer was among the first to extend their TQM initiatives to an EMS. Some of the TQM principles, which were integrated into their waste minimization programs, included the use of pareto analysis and control charts to signal pollution problems with the manufacturing process.

A first-tier automotive supplier also described that during the ISO 14000 certification process, statistical tools were both appropriate and beneficial for eliminating errors in air emission sampling/monitoring procedures. Several of the companies were also using benchmarking techniques to assess conformance to the ISO 14000 standards. One company regularly audited its facilities throughout the world in the areas of public relations, direct environmental impact, incident prevention, and continuous improvement. Standards were developed in each of these areas at the facility level ensuring business unit commitment and they generated a score for each facility.

Past Experience with ISO 9000 and QS 9000

It has been argued that ISO 14000 builds on the foundation established by ISO 9000 and QS 9000. Both of these certification processes are quality oriented, with QS 9000 oriented towards the automotive industry and ISO 9000 more broad based in its focus. Both ISO and QS 9000 are also process-based. Finally, both require external auditing and assessment before certification can be conferred. These traits are very much in evidence in the ISO 14000 certification process. In addition, it has been argued that past experience with these two quality-based certification processes positively prepares a firm to plan for and attain ISO 14000 certification.

It was observed at several of the companies visited that ISO 14000 status was positively influenced by the status of the plant in terms of either ISO 9000 or QS 9000 certification. All of the respondents agreed that operating two separate quality and environmental management systems would have been wasteful and redundant. Integration was not only possible at the facilities, it was preferable. Since they already had an ISO and/or QS 9000 quality management system in place and wanted to implement an ISO 14000 EMS, integration was the next logical step. By using the synergy, which exists between the two management systems, an EMS implementation was achieved with marginal additional expenditures.

The early research on the relationship between ISO/QS 9000 and ISO 14000 are decidedly mixed. While our findings suggest that firms who have achieved ISO 9000 certification should have a relatively easier time achieving ISO 14000 certification, this may not actually be the case. Several managers did warn us that significant differences between the two standards exist. Wilson (2000) likewise suggested that if these distinctions are not recognized, the potential advantages of an ISO 14000 EMS, as well as the synergies of an integrated quality and environmental management system, will not be seen. An existing QMS cannot be transformed into an EMS by merely replacing the word “quality” with the word “environmental.” ISO/QS 9000 focuses on waste as it applies to process inefficiencies, whereas ISO 14000 tends to focus more on concrete outputs, such as solid and hazardous waste.

Current Status of Cross-Functional Programs

Ultimately, to be certified on the ISO 14000 standards, the plant’s personnel must be able to work together. Many of the problems uncovered during the process of attaining ISO 14000 certification cannot be addressed by one functional area or group working in isolation. As a result, it is expected that success in implementing cross-functional programs should have a significant influence on the plant’s progress and status in attaining ISO 14000 certification.

A team orientation that uses the knowledge of employees to develop solutions for waste problems was integrated into the EMS for several of the cases. One company showed that employee involvement can be promoted by improving employee-management interaction and promoting responsibility for the environment among all levels of management including individual employees. Using such a team orientation for environmental management has already been advocated by a number of groups, most notably the Global Environmental Management Initiative (GEMI) and the Council on Environmental Quality (CEQ).

Another facility, whose environmental managers complained that a noncompliance analysis was taking too long to finish, assembled a team to: 1) arrive at a specification for turnaround time; and 2) analyze the reasons for existing turnaround time. The team working on the analysis delays showed that almost all of the turnaround time could be attributed to two factors: 1) a lack of communication between divisions within the company to anticipate information needs; and 2) a lack of standards for technicians. Shortly after beginning their improvement process, the analysis team used a histogram to measure how close they were to achieving their time-reduction goal. The histogram showed that they had reduced the mean delivery time and dispersion by over half.

Firm Size/Full-Time Equivalents

FTEE, which reports the number of employees in terms of full time equivalents, is a proxy for corporate size. It is included because some researchers have argued that ISO 14000

certification is primarily pursued by larger firms. That is, the larger the firm, the more likely it is to attempt and to achieve ISO 14000 certification. It was acknowledged during our investigation that adoption is most likely by larger firms. They have the staffing and environmental specialists to implement it. One manager said it would not apply ISO 14000 at its smaller facilities. If there is already an environmental management system in place targeting waste reduction, then there may be little advantage in applying ISO 14000 to a small site.

End Sales

End sales capture the percentage of total sales made by the plant that go directly to the end consumer, as compared to another industrial customer. It has been argued that the more a plant or firm sells directly to the end consumer, the greater the probability of it being interested in attaining ISO 14000 certification. The reason is that end consumers are more interested in the environmental activities of the supplier. Achieving ISO 14000 certification for such firms offers a method of differentiating their products and their corporate image from that of their competitors.

Subsequently, the development of EMS initiatives received a considerable boost among first-line suppliers in different industries such as automotive. Led by Rover Group and the European assembly operations of Toyota and Honda, one of the criteria for inclusion on the approved supplier list now is demonstration of an operating EMS such as ISO 14000. The justification was increasing pressure on the OEMs by consumers to demonstrate its commitment to improved environmental performance, as well as the need to reduce resource consumption. The “recyclability content” of new car models increasingly is becoming an important marketing attribute.

Ownership

A U.S.-based pharmaceutical firm, which is publicly traded, had a Belgium facility and it was their first facility to become ISO 14000 certified. They claim this was largely due to cultural influences in the European Union. Another facility visited was a Tier 1 supplier to the automotive industry. This is a publicly traded company owned by a larger company from England. Their primary product is automotive glass and it only does assembly with no cutting, bending, or fabrication. The direction for ISO 14000 certification came from the parent company in Britain. Headquarters said that all facilities globally had to be certified by 1999. Another plant is part of a privately owned foreign subsidiary. They make braking systems (e.g., calipers, wheel cylinders, etc.) and most of their parts are for passenger cars and light-duty trucks. The motivations influencing the decision to pursue ISO 14000 certification was the German influence of other European facilities being ISO 14000 certified. There is a strong environmental corporate culture coming from Europe, and all of the parent company’s European plants were certified, so the company wanted to try something similar in North America.

Most ISO 14000 registered sites in the U.S. are operated by affiliates of companies headquartered elsewhere. Many of these larger firms say they consider ISO 14000 to be inherently unfair to companies in the U.S. This perception was a result of the drafting process, in which the U.S. had much less input than European countries. U.S. corporations were behind the curve but are moving more aggressively now.

Exports/Exports to the European Union

These two variables measure different aspects of export sales. The first variable captures the percentage of total sales made by the plant/firm that consist of exports. The second variable measures the percentage of total sales made by the plant/firm that consists of exports destined to the European Union. Both variables are based on the view that ISO 14000 certification is most desirable internationally overall, and in the European Union, specifically. As the percentage of sales going to exports increase, the firm is increasingly likely to seek ISO 14000 certification.

A privately owned company in the U.S. manufactures automotive glass, windows, mirrors, glass touch screens that you see on the instrument panel. The CEO made a trip to Europe to visit their facilities there and saw the plants there being pressured by customers to pursue ISO 14000, and then made it a corporate priority. Their customers in Europe include Rover, Vauxhaull, Opel, and Volvo. These companies placed pressure on the European facilities to become ISO 14000 certified. External pressures have shown some less informal interest from their North American customers to pursue ISO 14000.

DISCUSSION

While many factors have been cited as influencing the predisposition toward ISO 14000 certification and the value of this certification, certain factors were identified as having a critical impact on predisposition and progress toward attaining this new form of certification. These factors included: Previous experiences with Total Quality Management; Past success with quality-based certification processes, such as ISO 9000 or QS 9000; Previous experience with cross-functional teams and management; Firm size/Full-Time Employee Equivalents; Nature of corporate ownership (foreign-owned plants are more likely to pursue and receive ISO 14000 certification); and, End sales.

These factors describe a situation where the respondents saw ISO 14000 as an extension of the TQM movement. They also describe a situation in which respondents recognized that success with ISO 14000 requires cross-functional teams and cooperation. There seems to be recognition that succeeding with ISO 14000 requires more than simply introducing a new program or creating a new department. Rather, ISO 14000 is an undertaking that requires the participation of multiple parties working together. It is argued that these various factors act to pre-condition the firm and its systems to the introduction, acceptance, and progress on ISO 14000.

This research was exploratory in nature and qualitative data collection methods were used. Our findings need to be evaluated in future studies which use confirmatory techniques to build and evaluate a model that explains the factors underlying the decision to attain ISO 14000 certification and the level of progress in becoming certified. In future studies, researchers should view the progress in ISO 14000 certification as a dependent variable, which can be explained in terms of certain critical (independent) explanatory variables identified in this article.

CONCLUDING COMMENTS

Customer demands and government regulation have and will continue to drive the acceptance of ISO 14000. Although many U.S. industries have not indicated that they will require their suppliers to become certified, many suppliers are seeking certification because they believe it will happen. It has already happened in the U.S. automotive industry. If well implemented,

ISO 14000 can result in less pollution, greater efficiencies, cost reductions, and improved productivity. Clearly, the extent of the improvements and the amount of the savings depend on several factors independent of ISO 14000.

ISO 14000 is a trend in environmental management, which cannot be ignored. In fact, for those companies, which wish to remain competitive, and improve their environmental systems, it can be an invaluable tool. Many managers warned that ISO 14000 certification can result in non-value added costs if it is pursued only for its marketing or regulatory appeal. The true commercial value associated with ISO 14000 can only be achieved when it is made consistent with a company's strategic direction. This means using the ISO 14000 standards as a foundation for a much broader system such as TQEM. The experiences of these companies can serve as an illustration for organizations contemplating pursuing certification. Through its standardization of environmental systems, ISO 14000 can help an organization not only reduce waste, but also gain a competitive advantage in the international marketplace.

REFERENCES AVAILABLE UPON REQUEST