

A MODEL OF THE DECISION TO ACHIEVE ISO 14000 CERTIFICATION

Frank Montabon (montabon@pilot.msu.edu)*, Roger Calantone (rogercal@pilot.msu.edu)**, Steve Melnyk (melnyk@pilot.msu.edu)***, Robert Sroufe (sroufero@pilot.msu.edu)***

* Iowa State University, College of Business, Department of Logistics, Operations and Management Information Systems, 300 Carver Hall, Ames, Iowa 50011-2063

**Department of Marketing and Supply Chain Management (N370 NBC), The Eli Broad Graduate School of Management, East Lansing, MI 48824-1122

***Boston College, The Wallace E. Carrol School of Management, Operations and Strategic Management Department, 350 Fulton Hall, Chestnut Hill, Massachusetts 02467-0433

The research that made this paper possible was sponsored by the National Science Foundation (grant number DMI-9528759), the American Production and Inventory Control Society (grant 97-1) and the Center for Advanced Purchasing Studies

ABSTRACT

The ISO 14000 certification standard is a relatively new development. Based on the highly successful ISO 9000 certification standard in quality, ISO 14000 is oriented towards environmental performance. Its major focus is on the structure, implementation and maintenance of the formal corporate environmental management information system. However, since its release, the ISO 14000 standard has generated a great deal of discussion. Its level and rate of acceptance has not mirrored the rate previously observed for the ISO 9000 standards. In the United States, some firms have announced that they have no interest in being ISO 14000 certified, while others have committed themselves to this standard. To resolve the apparent paradox, this paper attempts to identify the determinants of ISO 14000 adoption, and why those determinants are important. Based on a survey sample consisting of some 1500 respondents, the paper also presents some initial findings.

INTRODUCTION

The year 1996 saw the introduction of a new international standard, ISO 14000. This new standard attempts to build on the success and experience of its predecessor, the ISO 9000 standards and its variants. However, while the ISO 9000 series focused on quality, ISO 14000 focuses primarily on the environmental management systems.

There are many intuitive reasons for why the ISO 14000 program should be potentially attractive to firms. However, there are indications that ISO 14000 may not be as widely accepted as the ISO 9000 system.

The concerns and objections to ISO 14000 center on several critical points. First, there is concern that the benefits offered by ISO 14000 may not be sufficient to offset the costs incurred in meeting the requirements of the ISO program. Second, there is the relationship between environmental performance and corporate performance. To

date there has been little evidence offered which shows that there is a strong positive relationship between improved environmental performance and strong corporate/strategic performance. As a result, many managers are hesitant to pursue ISO 14000 certification because they are not sure of the cost/benefit trade-off. In addition, because ISO 14000 is so new, there is a great deal of confusion and uncertainty surrounding it. Some managers may elect to wait until others have undergone ISO 14000 certification/registration before proceeding or until customers demand it. Finally, there is uncertainty over the entire process of third-party registration (i.e., how others will evaluate and assess ISO 14000 systems).

As a result of these and other factors, there are many unresolved questions regarding the extent to which this certification standard will be accepted within the marketplace. Specifically, this paper addresses the following issues:

- What is the ISO 14000 certification standard?
- What is the current status of ISO 14000 certification standard?
- What are the parallels between the ISO 9000 and ISO 14000 certification process?
- What factors, based on the research pertaining to ISO 9000, can potentially affect the acceptance and implementation of ISO 14000?

PROPOSED MODEL

The development of our model is based on a series of research projects the research team is conducting regarding environmentally responsible manufacturing. As part of this research stream, the research team has visited a number of firms in order to gain an understanding of the issues involved with environmentally responsible manufacturing. These visits were invaluable in helping us develop the constructs in our model. Our model appears in Figure 1.

Note that the model will be analyzed using structural equation modeling techniques, and thus has that notation in the figure.

The first construct in our model is “Knowledge of ISO 14000.” Obviously, if a firm knows little about the certification, it is unlikely that they are a prime candidate for undertaking it. As the ISO 14001 certification is still fairly new, it is reasonable to believe that firms that do have a good knowledge of ISO 14000 have more than just a passing interest in achieving certification. This was borne out quite clearly in our plant visits, as a number of managers mentioned that one of the largest obstacles they face in getting ISO 14001 projects approved is a lack of understanding about the certification and its potential impact on the firm.

Rothery (1995) stated that the growth of the ISO 9000 series was customer or market driven. Further, he described ISO 9000 as “voluntary”. On the other hand, he said that ISO 14000 “is totally driven by compliance with environmental regulations.” This view, that ISO 9000 has grown due to customer demand, and that ISO 14000 may grow primarily due to governmental decree, is a oft-expressed idea in articles about ISO 14000 (Hourahan 1996, Boiral and Sala 1998). Further, the importance of governmental influence in the adoption of ISO 14000 is borne out by some evidence. Boiral and Sala (1998) report that Germany, the Netherlands and South Africa are considering replacing some government regulation with ISO 14000. Conversely, Begley (1996) offered a different argument. He stated that outside the United States, “regulatory systems are less stringent, less prescriptive and less adversarial,” so ISO 14000 could be used to show a commitment to environmental performance. No matter how this argument is analyzed, the influence of government regulations on the adoption rate of ISO 14000 cannot be denied. Thus, in the model, a proposed construct of “Perception of Regulatory Uncertainty” has been included.

Similarly, all firms must deal with a changing competitive environment. Today’s business environment is so intense, it has been described by the term “hypercompetition” (see D’Aveni 1995; Ilinitich, D’Aveni and Lewin, 1996). A standardized certification allows a firm to cut through the fog of uncertainty, as it is a statement that a firm has adopted a world-wide standard of business practices. Each firm must make a judgment about its business environment uncertainty, and decide how to react to it. ISO 14001 certification is now available as one tool for a firm to deal with its business environment uncertainty. Thus, “Perception of Competitive Environment Uncertainty” construct is included in the model.

Of course, the changes in the regulatory climate are a big part of the overall business environment. Thus, there is a need to show a relationship between the constructs of “Perception of Regulatory Uncertainty” and “Perception of Competitive Environment Uncertainty”, and this has been done in the model.

Naturally, a firm will also base its decision on whether or not to pursue ISO 14001 certification on the cost/benefit ratio that it perceives the certification to have. As mentioned previously, perhaps the firm is in a market where ISO 14001 certification will be required. In this case, the cost/benefit ratio is quite clearly in favor of achieving certification. In other situations, the cost/benefit calculation may be more complicated. We have included this cost/benefit analysis in our model as “Perceived Performance Implications”. Obviously, this will have a direct bearing on the firm’s decision about ISO 14000. Of course, part of the calculation for the cost/benefit ratio will have to include the current business climate. That is why a relationship between “Perception of Competitive Environment Uncertainty” and “Perceived Performance Implication” is in the model.

Given the early reports on ISO 14000, it appears that a firm’s experience with ISO 9000 has a direct bearing on the decision on whether or not to achieve ISO 14001 certification. Thus, it appears that a positive ISO 9000 experience would encourage a firm to obtain ISO 14001 certification. As some authors have noted, there may be advantage to obtaining both certifications. Due to a foundation of similar principles, firms that have achieved an ISO 9000 certification should be familiar with the requirements for ISO 14001 certification. In any case, the firm’s ISO 9000 experience must be taken into account, so it is a construct in our model.

The firm’s stakeholders must also be considered in making this decision. For the purposes of this research, the primary stakeholders that will be included are customers, stockholders and the local community. Obviously, pressure from any of these groups could influence the ISO 14000 decision.

METHODOLOGY

An extensive survey was developed which covered not only the constructs involved in this model, but other issues relating to environmentally responsible manufacturing as well. Three professional associations provided mailing lists of 5,000 names each. The constituency of each of the associations was different enough that only a handful of names were found on more than one list. A modified Dillman (1978) approach was used to mail out the survey. A first wave was sent to all the names on our mailing list.

This mailing included the survey and letters of support from the sponsoring groups. A reminder postcard was used for the second wave. The third wave contained another copy of the survey. For each wave, a mailing was sent to each name on our mailing list, as the survey was conducted anonymously. The mailings were conducted in the fourth quarter of 1997.

DATA ANALYSIS

Preliminary Analysis

The research team received 1453 usable responses, for a response rate of 10.04%. While this is lower than the 20% that researchers strive to achieve, this response rate was not unexpected given that the length of the survey discouraged some potential respondents. The overall response rates by wave are summarized in Table 1. The data set represented a reasonably representative sample of American manufacturing firms, as can be seen in Table 2.

Confirmatory Factor Analysis

The first order of business was to test the measurement model via a confirmatory factor analysis (CFA). According to Anderson and Gerbing (1988), CFA provides a more rigorous method for assessing unidimensionality than coefficient alpha, exploratory factor analysis and item-total correlations. The CFA was done using elliptical re-weighted least squares (ERLS) rather than maximum likelihood (ML) or generalized least squares (GLS), as indicated by Sharma, Durvasula and Dillon (1989). This was indicated by a Mardia Coefficient of 349.89, which is strong evidence of multivariate nonnormality (Bentler, 1993).

The results of the CFA are shown in Table 3 and Table 4. The CFA was based on 855 cases, down from the total of 1510, due to list-wise deletion. As can be seen, the fit indices are all above the .90 cutoff that is usually suggested (Bagozzi and Yi, 1988; Hu and Bentler, 1995). All of the factor loadings are significant, as indicated by high t-values. The Wald and Lagrange Multiplier (LM) tests indicated no particular problems. Given all this, the measurement appears to be acceptable for structural analyses.

Full Model and Discussion

ERLS was also used for the full model. The results of the full model can be seen in Figure 2, Table 5 and Table 6. The fit indices fall just short of the recommended .90, however, the suggestions for changing the model from the Wald and LM tests did not do much to improve fit, and worse yet were theoretically untenable in some cases.

More interesting is a review of the relationships demonstrated in Figure 2. Most of the relationships were weak, and some were non-significant. This is a surprising result, mainly due to the fact that it refutes some previous literature. In particular, the relationship between ISO 9000 Experience and Commitment to ISO 14000 was both small and non-significant. This may be due to the fact that firms that have gone through ISO 9000 have seen both the good and bad of the ISO certification experience. Perhaps it is the case that how a firm's ISO 9000 experience influences their ISO 14000 decision is directly related to the results the firm achieved from the ISO 9000 certification process.

The relationship found in the model regarding Stakeholder demands is also curious. It was significant, but not very strong. This is born out by a quick review of the database's descriptive statistics, which show that the observables for this construct have low means.

Perhaps, most curious of all are the relationships that Competitive Environment Uncertainty and Perceived Performance Implications have with Commitment to ISO 14000. Though both relationships were found to be non-significant, what is interesting is that both were also found to be negative. To date, the two primary reasons that have been put forth for achieving ISO 14000 certification are economic (i.e., achieving higher resource productivity via less waste) and that it is the "right" (i.e., socially desirable) thing to do. These two negative relationships would seem to indicate that perhaps at least part of the economic argument is not as strong as previously theorized.

Overall, the results from the model were disappointing, and unfortunately, the SEM software was unable to suggest better fitting models. Certainly, the size and representativeness of the database provide the analysis with a lot of power. Generally, two conclusions can be drawn. First, the constructs that were used, based on a review of the literature, are apparently not as influential in the ISO 14000 decision as previously thought. Secondly, other analysis techniques should be attempted, such as logit regression.

Tables, figures and references available upon request.