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# How Does Management View Environmentally Responsible Manufacturing? An Empirical Study

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# How Does Management View Environmentally Responsible Manufacturing? An Empirical Study

## **Abstract**

This study focuses on assessing management's perceptions of Environmentally Responsible Manufacturing and the Environmental Management System (EMS) - the formal corporate system often held responsible for implementing ERM. This focus on management is needed given the importance of management support to any corporate-wide undertaking. The findings show that under certain conditions, which are widely applicable, there is a general lack of agreement between the various managerial levels about the EMS and its effects. Furthermore, top management, in several cases, does not have a very positive view of EMS and ERM. The result is the emergence of a potential obstacle to the widespread acceptance of ERM and EMS.

## **Disciplines**

Operations and Supply Chain Management | Sustainability

# HOW DOES MANAGEMENT VIEW ENVIRONMENTALLY RESPONSIBLE MANUFACTURING? AN EMPIRICAL STUDY

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## ABSTRACT

This study focuses on assessing management's perceptions of Environmentally Responsible Manufacturing and the Environmental Management System (EMS) – the formal corporate system often held responsible for implementing ERM. This focus on management is needed given the importance of management support to any corporate-wide undertaking. The findings show that under certain conditions, which are widely applicable, there is a general lack of agreement between the various managerial levels about the EMS and its effects. Furthermore, top management, in several cases, does not have a very positive view of EMS and ERM. The result is the emergence of a potential obstacle to the widespread acceptance of ERM and EMS.

## INTRODUCTION

Researchers, consultants, and business managers have long recognized the critical role of management, especially top management, in initiating, implementing, and supporting corporate and manufacturing initiatives. This recognition first gained prominence in the Production and Inventory Control (PIC) field in the late 1970s with the emergence of Manufacturing Resources Planning (MRP II) (Wight, 1984). At that time, several prominent writers (e.g., Berger, 1976, 1977; Bevis, 1977; Lee & Steinberg, 1977; Orlicky, 1975; Plossl & Wight, 1971; Wight, 1974) noted that for MRP II to succeed, management at all levels, especially the top, had to “buy in” to MRP II.

The importance of top management support (in all of its various dimensions) is once again reemerging. The reasons for this reemergence – ISO 14000 and the increasing awareness of the need for firms to be more environmentally responsible. Increasingly, firms are asked by customers, governments, investors, and stakeholders (e.g., workers and local communities) to reduce pollution and to improve overall corporate environmental performance.

Both ISO 9000 and ISO 14000 are essentially corporate, not functional, undertakings. They require the investment of significant levels of time, effort and resources. However, they are also undertakings where the costs are significant and incurred up front, while the benefits of environmental

initiatives are often not well defined and delayed. For these and other reasons, it can be argued that management support, involvement and commitment to improved environmental performance is critical to the success of these programs at the corporate level. Yet, researchers interested in assessing this level of management support are faced by a critical problem – at present, there is a lack of empirically based information dealing with management support of and attitudes towards environmental performance and systems. This study is intended to address this research shortcoming. Specifically, this paper will examine the following questions involving management's views of Environmentally Responsible Manufacturing (ERM) and the Environmental Management System (EMS) and its impact on corporate performance:

- How does management view ERM and its ability to positively influence the firm, its performance and the competitive stance of the firm in the marketplace?
- To what extent are these views shared by the various levels in corporate management? Which levels are most optimistic? Which least?
- Does the decision to actively commit the firm to ERM (as represented by the decision to actively pursue ISO 14000 certification) affect the views of management?

## ERM/EMS AND MANAGEMENT INVOLVEMENT

Given that ERM is a corporate system and in light of the expenses incurred in the attainment of ISO 14000 certification, management involvement, commitment, and support are critical to success. This observation has been noted previously (e.g., Makower, 1994; Tibor & Feldman, 1996). However, unique to ERM are several traits that hinder the degree to which management will be interested in supporting ERM. The first is that the relationship between ERM-related investments and improved corporate performance has yet to be conclusively established. Second, as Smith and Melnyk (1996) have noted, there are distinctive disincentives for management to become involved in ERM.

When examining the role of management in ERM, it is important to recognize that not every level of management will have the same level familiarity or enthusiasm for ERM (Smith & Melnyk, 1996).

## RESEARCH METHODOLOGY

The primary approach used in this research article is that of a large-scale survey. The reason for the survey was to allow the research team to collect data pertaining to the attitudes of the respondents towards environmentally responsible manufacturing, their plant's environmental management system, and towards voluntary environmental programs such as ISO 14000. The survey was also used to identify factors that influence these attitudes and the perceived effectiveness and efficiency of the plant environmental management systems. Since the details of the survey have been previously discussed in great detail (see Melnyk et al., 1999), the structure of the survey and the major attributes of the respondents will be briefly summarized.

## STATISTICAL ANALYSIS

To address the three research questions presented at the beginning of this paper, it was decided to use a One Way Analysis of Variance (ANOVA) where the major independent variable was Management. This variable, which consists of the respondents classified by managerial level, consists of four levels. It was decided to use this statistical procedure because it permitted the researchers to use the Multiple Comparison Procedure (MCP). This procedure classifies the various levels into homogeneous family. A family consists of those levels that are statistically significant from the other levels assigned to that same level. The MCP was used primarily to determine if the various managerial levels evaluated ERM in same way.

To further structure the statistical analysis, it was decided to segment the analysis into two groups: (1) Not Pursuing ISO14000; and, (2) Pursuing ISO14000. By comparing the families observed for the independent variable for each dependent variables between these two families, the researchers were able to determine if the decision to pursue ISO 14000 influenced how the various managerial groups perceived the impact of ERM.

## MAJOR FINDINGS

The summary results generated from the analysis of the data are presented in Table 2. In this table, the data is presented using three major factors to facilitate the understanding of the results. The first factor is whether the dependent variables are outcome oriented or EMS-related. The outcome oriented variables are those with variable labels beginning with ACT (ACTCOST to ACTALT). The EMS-related variables are those with variable labels beginning with EMS (i.e., EMSFORML to EMSREG). The second factor is whether the firm/plant is committed to ISO 14000 and it consists of two levels – those that are not and those that are committed. The third factor is management level.

A review of the results presented in Table 2 uncovers several interesting findings. First, the managers that are in firms committed to attaining ISO 14000 tend to have a more positive perception of the impact of EMS on corporate performance. Second, in general, managers in those firms committed to ISO 14000 also seem to perceive EMS as have a positive influence. The only exceptions to this positive perspective involve the three strategic dimensions of performance – cost (ACTCOST), lead time (ACTLT) and quality (ACTQUAL), where most of the average perceptions are below the midpoint 5 value. In addition, in the EMS related results, it appears that the management in those firms committed to ISO 14000 seem to view their EMS as being more complete, more proactive and more highly visible. This finding can be drawn from the data for variables such as EMSEPERF, EMSGOALS, EMSSUMM and EMSPROC. One area where the two groups have very similar views is that of seeing their EMS as being driven primarily by regulatory forces. Finally, the difference in views between the management levels seems to be less pronounced in those firms that are committed to ISO 14000 certification. This last finding, however, because of its importance to this study, must be evaluated statistically.

To evaluate whether there were significant differences in management views of EMS by level, a series of one-way ANOVAs were run with Scheffe's Multiple Comparison Procedure applied to identify homogeneous families. The results of this analysis are summarized in Table 3. It is useful to examine some of the results in this table to better understand the concept of a family. Consider the first variable in Table 3 – ACTCOST. For the respondents in firms not committed to ISO 14000, two families are listed. The first consists of management levels 4,2 and 1. The order is critical because it indicates that the lowest values for this family were recorded for group 4 while the highest were obtained from level 1. These three levels have been assigned to the same family because the differences between them is not statistically significant. As a result, these levels can be considered as having views that are essentially identical. The same cannot be said for the second family. This family consists of only management level 3. This grouping brings with it several important implications. First, this level is significantly different from the other three levels. It cannot be considered to be identical with these groups. Second, because it is the second family, level 3 has a more positive (higher) view of the impact of EMS on cost – an observation verified by reviewing the results presented in Table 2. However, for those respondents in firms committed to ISO 14000, we see that there is only one group. What this means is that there is no real significant difference in their views of the impact of EMS on costs.

The strongest results evident in Table 3 involve the difference in how managers at the various levels perceive

ERM and EMS. For those firms not committed to ISO 14000, several differences are evident. Out of the 25 dependent variables, two families are present for all but four of the variables (the exceptions being ACTLT, EMSCOST, EMSLT, and EMSQUAL). Furthermore, top management (level 1) tends to have the least positive view of EMS. In 12 of the 25 variables, top management has the lowest positive position on EMS. An important exception involves EMSFAD and EMSREG, where even though top management is at the low end, this indicates that top management views EMS not be as much of a fad or a result of regulations. In contrast, the third management level (supervisors, team coordinators, assistant managers), who are the management personnel most in contact with the shop floor and the operation of the execution system, except for two variables (ACTLT and EMSLT) tend to be in the second family. This indicates that the people operating at this level tend to have a persistently different (and often more positive) view of EMS and its impact on corporate activities. When we examine the respondents taken from firms committed to ISO 14000, we find that there is generally a reasonable level of consensus about EMS and its attributes and its impact on the firm and its performance.

### DISCUSSION OF RESULTS

The findings presented some interesting and somewhat unexpected findings. The first step in this discussion is to focus on the results observed in those firms not committed to ISO 14000. Initially, it was expected that those managers at the highest level (1) and those at the lowest levels (3,4) would have the most positive view of EMS. Yet, what was found was that except for level 3, there was generally very little difference between the views and perceptions of the remaining three levels. However, level 3, as previously noted, had a significantly different view of EMS – a view that in general was far more positive. There are several possible explanations for this result. The first is that the managers found in level 3 tend to have a greater appreciation of EMS and ERM because they are in contact on almost a day-by-day basis with pollution (the problem being addressed by ERM and the EMS) and with the operation of the EMS. They see what the system does and how it really affects operations. In contrast, the other three levels, because they are not in as frequent contact with pollution, tend to see ERM/EMS as more of a constraint and less of an opportunity. In such a setting, the lack of upper level support for ERM/EMS would seem to imply greater difficulty in securing funding and approval for such any ERM-related investment or initiative such as ISO 14000. Another explanation for this finding is that top management really does have a low view of ERM/EMS. Any positive views that they present on these developments is really more for publicity and external consumption, rather than a true statement of what they believe. Finally, it can be argued that

the evidence speaks more about the type of firms found in this grouping.

In examining the findings for those firms committed to ISO 14000, somewhat similar explanations can be made. One possible explanation for this behavior lies in the nature of ISO 14000. Being a corporate undertaking, the implementation of ISO 14000 forces management at all levels to become familiar with not only the standard, but also ERM and EMS (the focus of ISO 14001 – the standard that deals with certification of compliance in the EMS). The result is that a consensus is formed between the various levels of management – a consensus that is evident in the reporting findings. Alternatively, it could be argued that the consensus is an indicator that the respondents belong to either the innovator or early adopter categories of users.

Determining which if any of these possible explanations actually account for the observed findings requires additional research. This line of research is left for future researchers to carry out.

### CONCLUDING COMMENTS

Management support and involvement is critical to the success of any corporate EMS and to the ability of the firm to effectively reduce pollution and to become more environmentally responsible. In essence, it is management support and involvement will ultimately sell ERM. As a result, it is important that we understand the position of management regarding ERM and EMS. This paper began by asking a simple but critical question, “How do managers within firms perceive ERM and EMS?” This simple question has been addressed by a somewhat more complex answer. What this study has shown that how management perceives ERM and EMS is greatly influenced by whether the firm itself is committed to ISO 14000. In addition, it has shown that within these two groups is diverse. While the views of management are almost consistent across the four levels within the firms committed to ISO 14000, there are several important differences in views within the management found at those firms not committed to ISO 14000. Within this second group, representing the vast bulk of the respondents, ERM and EMS are generally perceived in not a very positive light. This finding identifies a major obstacle for the widespread acceptance and use of ERM-related systems, initiatives, and tools. This is an obstacle that must be overcome. The study has also uncovered several possible areas for future research. In summary, if management support, commitment, and involvement are critical to any corporate-wide undertaking (such as ERM), ERM has yet satisfied the conditions necessary to secure this level of support.

*Full version of paper available upon request.*