

Aligning Accountability and Awareness for Environmental Performance in Operations

Environmental Issues Track

Karen R. Chinander, Ph.D.
Department of Management
University of Miami
414 Jenkins Building
Coral Gables, FL 33124
kchinander@miami.edu
(305) 284-4200
Fax: (305) 284-3655

Abstract

This study assesses internal drivers of a firm's level of environmental awareness, including methods for incorporating environmental objectives into the strategic planning of operations, communication of objectives throughout the organization, and deployment of accountability to operating personnel and managers for environmental performance. Challenges firms may encounter in motivating and holding employees and process owners accountable for environmental performance are discussed, as well as a potential for inconsistencies between management's espoused theories and theories in use. A case study of a steel manufacturer is used to determine how accountability for and awareness of environmental objectives can be operationally implemented.

1. Introduction

Due to increased environmental regulations and costs of non-compliance over the past two decades, corporate expenditures in the area of environment, health and safety have increased substantially. By the mid-1990s, expenditures in pollution control alone in the United States totaled over \$125 billion per year, a level which represented more than 2% of GNP (Jaffe, Peterson, Portney, and Stavins 1995). As a result of the large amount of capital expenditures required for environmental compliance, and the potential for substantial fines or criminal penalties for non-compliance, environmental concerns have become a key factor in a firm's level of competitiveness (Jaffe, et al. 1995; Post and Altman 1992). It is thus important for a firm to incorporate environmental objectives into its overall strategy, and to hold management accountable for environmental performance. To do so requires a clear definition of objectives in operational terms, a commitment by management to monitoring performance against these objectives, and an awareness by all employees of expectations. Perhaps the most difficult aspect of this process is promoting awareness of the company's policies and objectives at all levels.

Several studies have investigated the external drivers that cause firms to increase awareness of environmental issues (i.e., regulations, industry trade associations, consumers, etc.) (Schmidheiny 1992), however research is limited in how this awareness gets implemented, or articulated internally throughout the firm. While new procedures and policies have been implemented to reduce waste and pollution as well as operating costs, the new procedures and policies raise new challenges in keeping operating personnel aware of a firm's environmental policies and strategies. Prior studies have not addressed how the level of awareness of the operational personnel about a firm's environmental strategy impacts their motivation to improve environmental performance. Research is also lacking in understanding whether stated management strategies are actually in place. Argyris's (Argyris 1990, 2000; Argyris and Schon

1974) claims that inconsistencies, or gaps, between management's espoused theories and theories in use often exist, which may result in counterproductive results.

The objective of the current study is to assess the internal drivers of environmental awareness, including how firms are incorporating environmental objectives into the strategic planning process, and how they are communicating these objectives and deploying accountability for environmental performance to operating personnel. This is of particular interest to both researchers and practitioners because environmental decisions typically exhibit high degrees of ambiguity or uncertainty and a low priority relative to other issues in a typical firm, which all increase the challenge in holding operating personnel accountable for environmental performance.

Also discussed is a case study of a steel producer's approach to aligning environmental performance and accountability. To study these alignment issues in the context of the case study, interviews and a written survey were conducted at the firm. The survey was developed based on a "gaps assessment" methodology similar to that of SERVQUAL, developed by Zeithaml, Parasuraman, and Berry (1990) in the area of service quality. SERVQUAL measures gaps in management and subordinate perceptions about expected service quality objectives and provides a measure of the gap between customer expectations of quality and the ability of a company to fulfill these expectations. We extend their work to measure the potential gaps that exist between perceived objectives and accountability standards for environmental performance between managers and operational personnel.

2. Model Development

To study internal motivators for employee compliance and accountability for environmental performance, we draw on Vroom's Expectancy Theory of work motivation (Vroom 1964). This theory predicts that individuals make decisions based on the outcomes that they anticipate will result from their actions, i.e. their *expectancy*. Their judgments are also based on their perceived reward or punishment for the results that will occur from their actions, known as *instrumentality*. The final part of Vroom's model is *valence* – the value a person gives to the reward or punishment expected under various outcomes.

Applying this framework to the environmental context requires an understanding of a worker's perception of 1) the link between his actions and environmental performance, 2) the environmental performance factors evaluated, and 3) rewards and punishment for a given environmental performance level. Figure 1 provides a modified framework of Vroom's Expectancy Theory as it relates to the current study.

See Figure 1

While this is an individual motivational model, we connect it to the organizational theories of the firm by studying if a gap exists between the managers' perception of standards to which they are holding workers accountable, and the workers' perception of these standards. This is in line with Argyris' conclusion (Argyris 1990, 2000) that there is often a gap between espoused theories, and what management actually implements in practice. In essence, Argyris claims that management does not "walk-the-talk", and sends mixed messages to employees without being aware of the gaps in their own thinking and action, and thus, unintended and counterproductive consequences often result.

Given the above motivational framework along with the unique characteristics of environmental decisions and performance, we can see why a challenge exists in aligning

accountability for environmental performance at the operational level. Environmental decisions may involve consequences that are realized far into the future. Because of the latent period between an action and the environmental harm it is difficult to evaluate and communicate the expectancy of actions. In addition, the lack of immediate feedback about an action's effect on performance makes it difficult to hold people accountable for their actions, particularly if their tenure in a position is short. This characteristic affects the instrumentality portion of the model. Finally, the uncertain connection between actions and environmental consequences makes it difficult for management to reach a consensus on how to implement the corporation's environmental policy. Thus, alignment of strategy, measurement systems and accountability procedures is important in assuring environmental performance.

3. A Diagnostic Case Study

To study the above research questions, an in-depth analysis was conducted of a steel manufacturer (which we fictitiously name SteelCo) concerning its policies and results in communicating, monitoring and rewarding environmental performance. Because this is a case study of one firm, the purpose is to *develop* a theory, or set of propositions, regarding environmental management implementation, rather than *test* a theory, or set of hypotheses.

The case study consisted of two parts – an interview and a survey instrument. Six individual interviews were first conducted with top management, followed by ten interviews with senior management at one of the firm's more profitable business units, a major plant site. These interviews lasted approximately 1 – 1 ½ hours each and focused on the following four areas regarding environmental management, and corresponded with the four segments of the motivational framework above: 1) communication strategies (expectancy), 2) performance evaluation (monitoring), 3) accountability and responsibility (instrumentality), and 4) learning and feedback. The purpose of the interviews was to investigate the degree of alignment in accountability and awareness for environmental performance.

The second part of the study consisted of a survey, similar to SERVQUAL, to assess environmental awareness levels, drivers of awareness at the operating level, and the existence of gaps in perception of accountability for environmental performance between management and subordinates. Areas assessed regarding environmental awareness included 1) overall assessment, 2) communication, 3) training, 4) performance measures, 5) accountability and responsibility, 6) rewards, and 7) knowledge. Respondents answered multiple questions in each section according to a seven-point Likert scale, ranging from strongly disagree to strongly agree.

The questionnaire was distributed to 48 of the business unit's foremen, six to each of the eight departments involved in the manufacturing of steel. To determine if there were any differences between what management believed the foremen perceived and what the foremen claimed to perceive, the same questionnaire was distributed to the ten senior management interviewees at the business unit. They responded to each question by providing the response they believed would be the average foreman's response, not their own beliefs.

4. Summary of Results of the Case Study

Interview Segment

Overall, the responses from all participants regarding SteelCo's environmental policy were very much aligned. There was a belief from all respondents that top management had a clear and strong commitment towards the environment, but several commented that it was less clear than the firm's commitment to safety. Almost all believed that it was more difficult to

attract attention and motivate interest in the environmental area due to the fact that some environmental impacts 1) may be hard to see, 2) have lagged effects with long latency periods, and 3) are possibly less visible than effects due to poor safety performance. In reference to Vroom's model, this comment indicates that a clear understanding between an individual's action and environmental consequences, i.e. expectancy, will be hard to achieve, especially compared to safety. Several managers believed that there is a lack of rewards (punishment) for good (bad) environmental performance, and this is the main gap between organizational levels. Several interviewees stated that they did not believe that "our actions back up our talk when it came to environmental issues. For example, one manager indicated that nothing really happens to a worker for failure to comply with regulations. Workers have not seen negative consequences to people for not doing something, "we only 'talk' - there is a lack of accountability in this area." This behavior is what increases the gap between management and employees beliefs about the firm's environmental strategy. This gap was also evident in the survey portion of the study.

Summary of Survey Results

Of the 48 surveys distributed to foremen, 37 (77%) were returned. Eight of the ten senior managers returned surveys, however one survey was not used due to a set of responses that indicated that his own beliefs were given, rather than beliefs about the foremen's responses.

Given the large number of questions on the survey (a total of 57 questions across the seven sections), a factor analysis was performed on the data for *each* section using only the foremen's responses to determine if any of the questions could be reduced into a more general construct within each section. Due to the small sample size, a factor analysis on the entire survey was not possible. The factors were computed using the principal components analysis method and a varimax rotation. See Table 1 for a list of factors along with their eigenvalues.

See Table 1

Gaps in management versus worker perceptions of environmental policies

To determine if any gaps existed between the average responses by the subordinates (foremen) for each factor and what management believed would be the average response by the subordinates on each question/ factor, a two-tailed t-test was performed on each factor. The differences in means are listed in Table 1. A positive (negative) difference indicates that management believed that the subordinates would have a higher (lower) response on the factor than they actually did. Three statistically significant gaps existed: Rewards to self/ any employee due to environmental performance and profitability improvements, and understanding of the importance of compliance to regulations to SteelCo. Management thought that workers would believe that pay and career advancement are more directly linked with both environmental performance and profitability than they actually believe it to be. Given that the only significant gaps occurred in two of the seven sections, the rewards and knowledge sections, it appears that there is alignment under most factors. However, the misalignment of personal consequences for environmental performance indicates that a clearer understanding of the reward and incentive structures needs to be articulated throughout the organization. Thus, as of the date of the survey, management's espoused level of environmental commitment has not reached all employees.

Overall Awareness/ Assessment Indicators

The survey data was also used to determine what influences a worker's overall assessment of SteelCo's environmental strategy and perception of importance of environmental

performance for business success. Pearson correlation coefficients were calculated using the standardized factor scores to determine the relationship between these two overall assessment factors and the other 18 factors. The correlations are reported in Table 1.

Only two factors were significantly correlated with a worker's understanding of environmental strategy; clarity and regularity of communication was positively related, while rewarding profitability was negatively related. Four factors were significantly positively correlated with a worker's perception of importance of environmental performance for business success: 1) belief that a worker is able to control environmental performance measures, 2) a worker's understanding of his or her responsibilities for environmental excellence, 3) understanding the impact of environmental regulations on his or her job, and 4) the level of reward for profitability. Each of the elements of the motivational model is associated with one of these factors, which may provide a blueprint for successful implementation of internal commitment to environmental performance. However, reward for environmental excellence appears to be the missing positive indicator to complete the implementation.

Influence of Adequacy of Training and Departmental Environmental Intensity

Pearson correlations were calculated to determine the influence of training on each of the factors. The level of training factor was significantly and positively related to six factors: the clarity of communications as well as performance measures, the belief of the level of environmental commitment as well as environmental reporting and importance of regulatory compliance by SteelCo, and finally the level of rewards for environmental performance.

To test whether the department a foreman worked in influenced his or her responses, possibly due to different levels of environmental regulation and impact, a one-way analysis of variance was calculated for each factor. The eight departments were ranked from lowest to highest potential for environmental harm and level of regulation of operations. The foreman's assigned department significantly influenced responses to six factors. The perceived level of SteelCo's environmental reporting and commitment to the environment, along with the amount of training, control over environmental performance measures, and individual priority placed on the environment, were affected and seem to increase by departmental environmental intensity, while reward level for profitability seems to decrease by departmental environmental intensity.

5. Discussion and Development of Propositions

Based on the interviews at various levels of the operation, and the survey data, it appears that SteelCo has a strong commitment to environmental performance, but it has not yet developed strong connections between a worker's actions, environmental consequences, and resulting recognition or punishment. Plant operations with higher potential environmental impact appear to have somewhat better alignment of knowledge, accountability standards and environmental priorities than overall plant operations. Nonetheless, both survey and interview data indicate that communication (expectancy) and accountability (instrumentality) for environmental performance is more challenging than for areas such as safety where employees have a direct stake in the outcome. The findings also point to the difficulty in aligning accountability and objectives for environmental performance; in particular, significant gaps between management and foremen's perceptions about rewards for environmental performance exist. These results suggest that traditional incentives used to motivate operating personnel in areas such as safety are not likely to succeed in the environmental area, due in part to potential delays between action and consequences.

Research Propositions

Given the above results along with the motivational and gaps assessment framework, we develop a set of propositions regarding the challenges a firm may have in implementing an environmental policy that may be tested in future research. The basic premise of these propositions is that top management commitment to environmental performance is not enough to obtain desired environmental results. Rather, the appropriate organizational infrastructure is also needed to achieve better environmental performance.

Proposition 1: The extent to which employees engage in the level of environmental protection desired by top management depends on the extent to which they understand a) the link between their actions and environmental performance and b) which environmental measures are evaluated and c) the extent to which they are held accountable for a given environmental performance level.

Proposition 2: The firm's environmental performance will be better if employees have more accurate perceptions of the link between their actions and environmental consequences and if they are held more accountable for those environmental consequences.

Proposition 3: Communicating the importance of environmental protection to employees is more difficult for firms than communicating the importance of safety. Firms will need to put more effort into communication and training for employees to understand the connection between their actions and environmental performance than for safety performance. Firms that have better communication in this area will also have better environmental performance.

Proposition 4: Holding individuals accountable for environmental performance is more difficult for firms than holding them accountable for financial or safety performance. Firms in which individuals face a higher accountability for environmental performance will also exhibit better environmental performance.

Proposition 5: The use of an integrated management system will assist a firm in implementation of their environmental strategy by creating a higher level of accountability for environmental performance, as well as a higher alignment between management and employee beliefs regarding the environmental strategy.

6. Conclusion

This case study indicates that in addition to the role that external drivers have in influencing a firm's environmental performance, internal drivers such as communication and accountability also influence a firm's environmental performance. Clear communication of values and alignment of rewards and punishment with these values will influence the actions of employees in day-to-day operations, which will impact environmental performance. Furthermore, given the level of ambiguity and uncertainty in values and feedback in the environmental area and the potential long-term latent effects, firms need to pay special attention to promoting feedback, education, and quality improvement in this area.

The case study illustrates the value of Vroom's Expectancy Theory as a behavioral foundation for operations, as well as the need to link it to espoused organizational theories. This is especially important in improving environmental performance where traditional incentives and feedback mechanisms may not be adequate to create the motivation to improve performance.

Insights were obtained by using a survey instrument based on the SERVQUAL model to evaluate potential gaps in alignment across levels in the company. This approach has been used successfully in service companies to improve service quality, and it appears to be useful as a tool for determining alignment, awareness, and accountability in the environmental area. The

techniques described can be replicated elsewhere to identify significant gaps in alignment and associated challenges in setting and communicating management priorities. Such replicated results could lead to a sufficiently large statistical base to allow comparative studies across firms on the overall impact of internal accountability and communication levels on environmental performance. However, even the present modest approach has the ability to identify problems in the desired coherence between knowledge, action and anticipated consequences. This coherence is fundamental to operational excellence in any arena, and not least in the area of achieving environmental excellence.

References

Argyris, C.. *Flawed Advice and the Management Trap: How Managers Can Know When They're Getting Good Advice and When They're Not*. Oxford: Oxford University Press, 2000.

Argyris, C.. *Overcoming Organizational Defenses*. Needham, MA: Allyn & Bacon, 1990.

Argyris, C. and D. Schon. *Theory in Practice*. San Francisco, CA: Jossey-Bass, 1974.

Jaffe, A. B., S. R. Peterson, P. R. Portney and R. N. Stavins. "Environmental Regulation and the Competitiveness of U. S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 33, No. 1 (1995). pp. 132 – 163.

Post, J. E. and B. W. Altman. "Models of Corporate Greening: How Corporate Social Policy and Organizational Learning Inform Leading-Edge Environmental Management," in *Research in Corporate Social Performance and Policy*, JAI Press, Greenwich, CT, 13, 3 – 29, 1992.

Schmidheiny, S.. *Changing Course: A Global Business Perspective on Development and the Environment*. Cambridge, MA: MIT Press, 1992.

Vroom, V. H.. *Work and Motivation*. New York, NY: John Wiley & Sons, 1964.

Zeithaml, V., A. Parasuraman, and L. Berry. *Delivering Quality Service: Balancing Customer Perceptions and Expectations*. New York, NY: The Free Press, 1990.

Figure 1: Decision Processes/ Motivational Framework for Environmental Performance

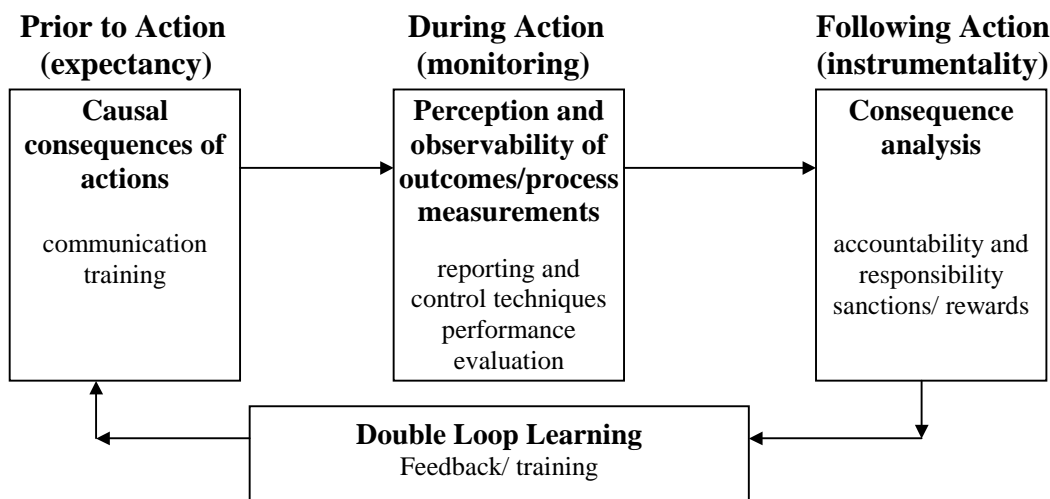


Table 1: Factors within each section and results of survey analysis

| <u>SECTION</u> | <u>FACTORS¹</u> | <u>T-TESTS²</u> | <u>PEARSON CORRELATIONS³</u> | | | <u>ANOVAS⁴</u> |
|---|---|---------------------------------|---|---------------------------------|-------------------------------|------------------------------|
| | | Mgmt/ Worker Mean Difference | Understanding of strategy (1.1) | Importance for success (1.2) | Adequacy of Training (3.1) | Department Env. intensity |
| 1. Overall Assessment | 1.1 Understanding of SteelCo's environmental strategy (1.776) | - 2.328 (.106) + | 1.000 | 0.000 | 0.075 (.714) | 0.49 (.832) |
| | 1.2 Importance of environmental excellence for business success (1.487) | - 0.031 (.910) | 0.000 | 1.000 | 0.113 (.582) | 0.34 (.928) |
| | 1.3 Level of environmental reporting (1.174) | 0.122 (.760) | 0.000 | 0.000 | 0.412 (.036) ** | 2.29 (.061) * |
| 2. Communication | 2.1 Clarity and regularity of communication (3.439) | - 0.022 (.956) | 0.334 (.082) * | 0.234 (.231) | 0.555 (.004) *** | 0.43 (.874) |
| | 2.2 SteelCo's commitment to the environment/ what is communicated (2.177) | - 0.531 (.188) | 0.161 (.413) | 0.245 (.209) | 0.453 (.023) ** | 2.33 (.061) * |
| | 2.3 Amount of communication with supervisor regarding environment (1.747) | 0.544 (.177) + | 0.311 (.107) + | -0.035 (.860) | 0.051 (.808) | 0.84 (.569) |
| 3. Training | 3.1 Adequacy of training to own job (1.658) | - 0.314 (.360) | 0.075 (.714) | 0.113 (.582) | 1.000 | 0.53 (.804) |
| | 3.2 Amount of training (1.015) | - 0.202 (.645) | -0.111 (.590) | 0.123 (.548) | 0.000 | 2.96 (.027) ** |
| | 3.3 Relevance/ usefulness of training to own job (1.002) | 0.108 (.796) | 0.229 (.260) | 0.000 (1.00) | 0.000 | 1.59 (.196) |
| 4. Performance Measurement | 4.1 Clarity of performance measures (2.071) | - 0.130 (.781) | 0.186 (.395) | 0.253 (.296) | 0.473 (.023) ** | 0.77 (.624) |
| | 4.2 Control over environmental performance measures (1.992) | 0.218 (.615) | 0.201 (.358) | 0.515 (.024) ** | -0.246 (.259) | 2.19 (.092) * |
| 5. Responsibility and Accountability | 5.1 Control over environmental performance through action on job (2.158) | - 0.170 (.558) | -0.095 (.673) | 0.000 (.998) | 0.047 (.836) | 1.39 (.280) |
| | 5.2 Ability to meet environmental objectives/ resources available (2.136) | - 0.513 (.266) | 0.263 (.237) | 0.102 (.661) | -0.202 (.367) | 1.09 (.417) |
| | 5.3 Conflict with environmental responsibilities and other objectives (2.042) | - 0.131 (.788) | 0.315 (.154) | 0.408 (.835) | -0.004 (.987) | 0.65 (.710) |
| | 5.4 Individual priority placed on environmental performance (1.815) | - 1.246 (.128) + | 0.102 (.650) | 0.244 (.287) | 0.297 (.179) | 2.38 (.075) * |
| | 5.5 Understanding of responsibilities for environmental excellence (1.650) | 0.037 (.938) | 0.147 (.514) | 0.666 (.001) *** | 0.026 (.909) | 1.88 (.144) |
| 6. Rewards | 6.1 Rewards to self/ any employee due to environmental performance (5.842) | 0.488 (.070) * | -0.052 (.823) | 0.316 (.163) | 0.495 (.022) ** | 0.54 (.793) |
| | 6.2 Rewards to self/ any employee due to profitability improvement (2.425) | 0.635 (.029) ** | -0.469 (.032) ** | 0.390 (.081) * | -0.216 (.348) | 2.93 (.038) ** |
| 7. Knowledge | 7.1 Importance placed by SteelCo/ self on a safe work environment (2.175) | - 0.034 (.932) | -0.067 (.720) | 0.071 (.720) | 0.018 (.922) | 0.81 (.586) |
| | 7.2 Understanding of importance of regulations to SteelCo (1.807) | - 0.771 (.063) * | 0.173 (.352) | 0.248 (.202) | 0.501 (.004) *** | 1.10 (.392) |
| | 7.3 Understanding of Environmental Regulations regarding own job (1.730) | - 0.044 (.918) | -0.075 (.690) | 0.540 (.003) *** | 0.190 (.305) | 1.41 (.244) |

Note: *** = significant at the .01 level
 ** = significant at the .05 level
 * = significant at the .10 level
 + = marginally significant result worth noting

1 – The eigenvalue for each factor is in parentheses
 2 – T-scores for a two-tailed t-test are reported with p-values in parentheses
 3 – Pearson Correlations are reported with p-values in parentheses
 4 – F-scores for each ANOVA are reported with p-values in parentheses