



Teaching Note - Eastman Kodak Implementation of TQEM at Kodak Park's Utilities Division

Suggested Courses and Audience

For more than a decade, WRI's Sustainable Enterprise Program (SEP) has harnessed the power of business to create profitable solutions to environment and development challenges. BELL, a project of SEP, is focused on working with managers and academics to make companies more competitive by approaching social and environmental challenges as unmet market needs that provide business growth opportunities through entrepreneurship, innovation, and organizational change.

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Kodak Park is the major U.S. manufacturing facility for Eastman Kodak and faces the environmental problems typical of most large chemical and manufacturing facilities. This case charts the implementation of Total Quality Environmental Management (TQEM) in the Utilities Division at Kodak Park in Rochester, New York

The case deals with the issues of implementing new programs in an era of downsizing, the problems associated with developing long-term preventive environmental programs, and the difficulties of determining the costs and benefits of environmental management programs.

The case can be used as a teaching exercise in a number of different types of courses. We have used it in two MBA courses -- a required course on business strategy and an elective course in business environmental management. The case has also been used in a graduate engineering course on pollution prevention. The case could also be used in a business or engineering course on quality management/TQM.

Suggested Approach and Assignment Questions

Prior to giving the case, we discuss TQM and TQEM in class and review the major environmental management programs currently being used in the US -- GEMI, TQEM, BCSD charter, and the ISO 14000 series of environmental standards.

We then assign the following questions which lead the students toward a rigorous analysis of the program implementation. The major points the students will probably mention are described later in the notes.

- Do you think Fisher's restructuring and downsizing efforts helped or hindered TQEM implementation?
- Was the Utilities Division a good choice for testing the TQEM program? Why or why not?
- Is the matrix objective? Does the matrix measure all the relevant criteria? How would you measure success?
- Has TQEM lived up to expectations in the Utilities Division? Has the TQEM system resulted in measurable and consistent improvements in environmental efforts and reduced costs?
- If Kodak decides to apply for ISO 14000 certification, should TQEM be the EMS implemented? Would you recommend implementing TQEM in the other divisions? Why or why not? Would you modify the matrix or the implementation process?

Additional Background Information on TQM and TQEM

In order to become more competitive, many US companies, such as Kodak, are organizing technology and production processes in new ways and rethinking management systems to incorporate quality management concepts such as Total Quality Management (TQM). At Kodak Park, the concept of environmental management and pollution prevention was a natural extension of the company's aggressive TQM philosophy. There are many similarities between environmental management efforts and TQM. In both situations, firms must look at their business operations, and production and manufacturing processes in considerable detail and attempt to continually improve quality and productivity. Both practices ultimately involve changes in measurement, accounting and information systems. Both processes involve detailed benchmarking exercises.

History of TQM and TQEM

TQM principles were first espoused by W. Edwards Deming and Joseph Duran in the early '50s. US companies were uninterested in the concepts, but Deming and Duran were successful in bringing their ideas to Japan. These new management principles were the basis for the revolution in the quality and competitiveness of Japanese products post -- World War II. Today, TQM has gained acceptance in the US and Europe. The basic foundation of the management system is a strong customer focus -- the provision of products and services that exceed expectations through a series of continuous improvements.

A growing number of companies are applying TQM principles to the management of

environmental issues -- TQEM responds to “customer” or stakeholder demands by conserving resources, reducing wastes and emissions, etc. Most of the classic TQM tools apply equally to TQEM (Table 1).

Table 1
Organizational aspects of TQM and TQEM

Factor	TQM and TQEM
Focus	Continuous improvement—zero defects, zero emissions etc.
Source of improvement	Quality and pollution prevention built into the production process
Goals	Increased efficiency and reduced waste
Measurement process	Benchmarking
Internal coordination	Cross-departmental cooperation/coordination
Decision process	Workers at all levels involved in decision making
Accounting systems	Activity-based and full cost accounting

Source: Modified from the Office of Technology Assessment, 1993

Potential Barriers to Successful TQEM

The potential obstacles and barriers to successful implementation of a TQEM program are similar to those facing TQM efforts¹:

- 1) Lack of understanding and participation by top management (must have top management participation).
- 2) Limiting responsibility for environmental issues to an environmental manager (everyone must be responsible for environmental quality).
- 3) Concentrating on slogans rather than methods (beware the trap of slogans alone).
- 4) “Program of the month” appearance.
- 5) Focusing on training and education without planning for implementation.
- 6) Establishing teams without specific charters and goals.
- 7) Limited resources.
- 8) Not collecting and analyzing the relevant data.
- 9) Use of accounting systems that do not measure environmental costs or values.

¹ Groeuborg, R.S. and Inger, C.A. (1991); President’s Council on Environmental Quality, (1993).

Incentives for TQEM

Potential incentives/advantages of implementing a TQEM (or other environmental management system) include:

- 1) Potential cost savings: As an example, several of the companies involved in demonstrating TQEM projects for the President's Council on Environmental Quality² showed cost savings after implementation of a TQEM framework (of course, detailed cost analyses are necessary to track these benefits).
- 2) Technological Innovation: Process changes resulting from TQEM implementation may result in technological advances for the firm.
- 3) Increased public acceptance.
- 4) Better relations with regulators.
- 5) Better recognition for individuals and teams.
- 6) ISO 14000 certification.
- 7) Safer working conditions.

Cost Issues and TQEM

As stated above, TQEM, like any good quality management program, has the potential to reduce costs. Business decisions are driven by costs, thus, determining the costs of environmental quality (and the changes in costs resulting from TQEM or other management systems) is critical to the acceptance of a TQEM framework.

Typical Environmental cost categories:

- 1) Costs of failure -- fines, cleanups, health effects, correcting, reworking, product failures, public perception, etc.
- 2) Prevention Costs -- costs of non-value-added activities to prevent failures, equipment, clothing, etc.
- 3) Appraisal costs -- inspecting, auditing, monitoring, reporting, etc.

Once environmental quality costs are determined, TQEM can be assessed in terms of financial gains or costs to the company. These costs are also useful management tools to highlight the costs of environmental failure, identify areas of poor quality, allow for prioritization of capital expenditures, and show cost-reduction efforts and successes.

Checklist for Implementing a Proactive Environmental Management Program³

According to Hunt and Auster (1990), the following components need to be in place for an environmental management program to succeed:

- 1) Secure top-level commitment and long-term funding
- 2) Develop a corporate environmental quality statement

² President Council on Environmental Quality, (1993).

³ Hunt, C.B. and Auster, E.R. (1990)

- 3) Assign a senior executive to champion the program
- 4) Assess areas of environmental exposure (conduct audits and legal reviews)
- 5) Appoint a manager with superior managerial skills and influence within the organization
- 6) Revise corporate organizational structure to maximize program's visibility, accessibility, and effectiveness
- 7) Develop formal reporting relationships within the department and across divisions
- 8) Identify key individuals in other divisions to serve as liaisons with the environmental department
- 9) Develop streamlined, comprehensive information and record-keeping systems
- 10) Develop formalized inspection programs
- 11) Develop training and education programs
- 12) Establish a career track for environmental professionals
- 13) Continually reevaluate program needs and design

Analysis of the Case

1) Do you think Fisher's restructuring and downsizing efforts helped or hindered TQEM Implementation?

This question tries to get the students to consider the employees' response to a new system in a time of downsizing and restructuring -- particularly a system which may result in reduced personnel needs. Profits have stagnated and jobs are on the line. Furthermore, implementation of such a program is expensive -- as stated in the case, 12% of HS&E staff time was diverted to the program over its first two years. This investment will be expected to boost revenues in the longer term.

The students will bring up the pros and cons of restructuring -- George Fisher's restructuring may have made TQEM implementation more difficult in the short run as downsizing put job security in employees' minds, and a program that results in reduced labor requirements would not be well accepted by many of the workers. However, the new era of faster decision making and delegation of responsibility would certainly help TQEM in the long-run.

2) Was the Utilities Division a good choice for testing the TQEM program? Why or why not?

This question aims to get the students to consider that the Utilities Division does not have much control over what comes to it. Although the division *incurs* a substantial portion of KP's environmental costs, it *controls* a smaller portion of these costs: waste is being generated elsewhere.

The Utilities Division is responsible for the bulk of KP's environmental expenditures, thus a cost-reduction in the division will significantly affect KP's environmental costs. Also, the division is responsible for keeping KP in compliance, thus error-free activities are a must. In this respect, Utilities is the ideal choice for TQEM implementation. Furthermore, the internal audience at the Utilities Division is in some respects open-minded when it comes to improving EH&S activities -- they realize the importance of competent and proactive EH&S management efforts. The division also has a relatively well-developed accounting system for tracking and monitoring the waste received from other divisions, which could potentially make environmental cost accounting efforts easier than in other divisions. Finally, as the centralized resource for waste disposal, the division has the opportunity to analyze relative divisional performances and

by to influence waste management in the Park.

Testing the program in the Utilities Division has its problems however. The Utilities Division can influence the waste management costs of the other divisions, but that effect is not direct or clear. The Division is organized as a cost center, but the real control of the costs resides with the waste generating departments and not the Utilities Division. In fact, the Utilities Division charges back both variable and fixed costs (fixed costs represent the majority of the costs) -- potentially creating misaligned incentives as the per-unit waste cost could actually increase with reduced quantities of waste volume. In this respect, it may not be the ideal choice for a test of the EMS system.

Another issue is that the Utilities Division lacks the authority to impact the strategic product and process planning efforts that could result in real changes in the way business is conducted at Kodak Park. The Utilities Division can increase the efficiency of its own operations, but has little influence over issues such as product design for the environment. In the case, we hear that the primary selection criterion for choosing an EMS was the “ability of the chosen EMS to support the site’s compliance efforts, while costs and less tangible benefits were secondary.” Overall, the Utilities Division has less ability to produce substantial, long-term savings and change at the Park.

3) Is the matrix objective? Does the matrix measure all the relevant criteria? How would you measure success?

This aims to get the students to consider the difficulties of developing a system that is objective and that can be used to compare different facilities and companies.

The TQEM matrix is a good tool for charting all aspects of an environmental management program. It is difficult for any such measuring system to be entirely objective -- the matrix cells need to be modified to fit the needs of the user, and the priority/weights attached to each section of the matrix will probably vary among companies. But as an internal measurement and tracking system it is fairly objective (i.e. it is objective in terms of intraunit/group temporal analyses). Once the matrix is used by different units, groups, or divisions, comparisons are difficult. A way around this problem would be to have external auditors review scores and interpretations of matrix cells at suitable intervals -- such as is done in the Baldrige Awards process.

The students will also probably discuss the weighting scheme used and arrive at their own suggestions for weights. There is no “correct” weighting factor, but opinions will vary on where the emphasis should be placed. For example, the “Strategic Planning” column is given a weight of 7.5% -- many students mention that it is only through strategic planning that the high fixed costs of the Division could be lowered and this section needs greater attention.

One area that the matrix does not address is the incremental cost of moving from one level to the next. While such information is difficult to obtain, the cost effectiveness of the program, and of additional improvements in matrix score, is powerful information for prioritization and justification of efforts.

4) Has TQEM lived up to expectations In the Utilities Division? Has the TQEM system resulted in measurable and consistent Improvements in environmental efforts and reduced costs?

The case outlines the expectations of TQEM prior to implementation. In this question, the students need to look at the *a priori* expectations and then the results to date. Has the system lived up to expectations? Is it too early to tell? Can results from TQEM efforts be differentiated from results generated through the other environmental programs that were initiated? Costs and environmental performance are mentioned frequently as important drivers for TQEM implementation. Are there cost savings? Have there been improvements in environmental performance?

During our development of the case, management at Kodak Park mentioned the following hopes for the program:

- demonstration of the necessity for excellent environmental management
- demonstration of the possibility for reduced environmental costs
- demonstration of improvement and progress
- demonstration of leadership
- demonstration of the need to provide resources for meaningful programs despite the climate of downsizing

Additionally, the case explicitly states that the expectations for TQEM in the Utilities Division were to:

- Improve environmental performance, not only compliance
- Result in reasonable internal/external audits
- Allow the division to be good, not just look good
- Improve cost management for environmental issues
- Achieve corporate and site environmental goals
- Satisfy customers
- Provide on-going quality check
- Provide documentation
- Provide accountability
- Allow a shift of responsibility from staff groups to line management
- Provide better focus
- Provide a lasting program and culture for environmental management

The students can look at this list and see whether the aims were met -- for example, the TQEM matrix did provide an on-going quality check, documentation, focus, accountability, etc. However, cost management was not significantly improved -- in fact, costs were not tracked in detail. Improvements in long-term environmental performance throughout the Park will be difficult without strategic planning and changes in product and process design, although improvements in the performance of the Utilities Division are apparent.

In addition, personnel cost savings have begun to appear. The HS&E personnel cost savings are long-term changes, but are only a small percentage of the potential savings possible (these can be very roughly estimated using the estimated time spent on implementation).

The results of the 1996 audit provide the strongest evidence that the implementation of TQEM resulted in the type of long-term changes that can indeed reduce costs and reduce the likelihood

of environmental accidents. Utilities had no repeat findings from previous audits (the only division for which this was the case), and the new findings were small and easy to rectify, requiring 5% of the response hours needed for previous audits. Gomperts stated, “it really worked”.

The students may mention that it is difficult to separate the effects of TQEM from the effects of other environmental management/pollution prevention programs. Kodak Park has had a number of such programs in place over the past decade, many of which may just be resulting in improvements today. Similarly, the results of the TQEM program, particularly longer-term cost savings and reduced incidents, will probably not be fully evident until some time in the future.

5) Would you recommend Implementing TQEM in the other divisions? Why or why not? Would you modify the matrix or the Implementation process? If Kodak decides to apply for ISO 14000 certification, should TQEM be the EMS Implemented?

This question attempts to push the students to consider TQEM versus other EMS systems and to consider how they would proceed to implement the system. Would they consider costs and benefits to a greater extent? How would they persuade senior management that TQEM provides benefits? What would they measure (costs, activity changes?) What information is needed to justify the program and to persuade other divisions that implementation is worthwhile?

Many of the students will comment that implementation in a manufacturing division may result in more obvious benefits -- reduced emissions, process changes, etc. changes that cannot be effected by the Utilities Division. Thus the program may be easier to justify in such a setting. The students will also come up with various ways to personalize the program for different types of divisions.

In terms of ISO 14001 certification, the CGLI TQEM matrix addresses most of the criteria and provides a good scoreboard for continuous improvement efforts. The matrix used does not meet all the ISO 14001 categories (listed in Exhibit 4A of the case) such as “structure and responsibility, and control procedures” but the matrix can easily be adjusted.

In this final question, we also discuss the question of continuing to improve TQEM score past the 400 level if 400 is sufficient for ISO 14001 certification.

References and Additional Readings:

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