A STUDY OF THE IMPACT OF TQM ON THE FINANCIAL PERFORMANCE OF FIRMS

David Benson, Electronic Data Systems (EDS)
Monte R. Swain, Brigham Young University

ABSTRACT

Total Quality Management (TQM) has been one of the most popular management philosophies of the last two decades. However, many have questioned whether TQM programs actually translate into bottom-line results. A number of studies have been conducted previously with mixed results. However, this research work presents several challenges, including 1) properly identifying a full TQM implementation, 2) defining appropriate criteria in order to evaluate effective process improvement as a result of TQM implementation, and 3) establishing a clear connection between process improvement and financial performance results.

This study examines Baldrige Award-winning companies to determine whether their TQM programs did, in fact, improve their financial performance. Focusing on Baldrige Award-winning companies provides some assurance of full TQM implementation that as result in measurable process improvement within the sample set. For this study, financial performance is evaluated on the basis of stock price returns. Specifically, we compared the performance of twelve publicly traded Baldrige Award winners to their industry index in the year of the award and subsequently at one and three year intervals. The results indicated that in the year of winning the award half of these companies outperformed their industry index. However, in the following year less than half of these companies outperformed their industry index. The literature suggests that TQM implementation results in superior management processes that enrich long-term, rather than short-term, performance. In fact, cumulative stock returns over a three-year period following receipt of the Baldrige Award seem to support this position. Nine of the twelve winning companies outperformed their industry index over this time period.

While there are important limitations to consider in a study such as this, our results indicate that long-term financial performance enhancements may exist for winners of the Baldrige Award. Nevertheless, we are concerned that the relationship between TQM status and financial performance is not stronger. Some recommendations regarding linkage of TQM investments to financial performance strategy are provided at the end of our report.

INTRODUCTION

Total Quality Management (TQM) is one of the most popular management philosophies in practice today. One survey found that over 74% of manufacturing firms have tried to implement a TQM program, with varying results (Conference Board, 1989). Some firms, such as Motorola, Harley-Davidson, Xerox, and Intel, have used TQM to become leaders in their fields. Other firms, however, have reported that their TQM initiatives have not significantly reduced costs, improved their

financial standing, or increased quality (Sharman, 1992; "The Straining of Quality," 1992; Jacob, 1993; Eskildson, 1994; Wiggins, 1995). For example, a survey by the consulting firm Arthur D. Little of 500 American manufacturing and service companies found that only one-third felt their total-quality programs were having a "significant impact" on their competitiveness ("The Cracks in Quality", 1992; Schaaf, 1993). In addition, a similar study by A.T. Kearney found that 80% of the firms surveyed felt that their TQM programs had not produced "tangible results" ("The Cracks in Quality", 1992; Schaaf, 1993). Sixty-three percent of firms that responded to an American Electronic Association survey stated that their TQM programs had failed to reduce internal defects by 10% or more, despite having been in effect an average of 2.8 years (1992). One firm (Wallace Company, Inc.) even went bankrupt following the implementation of a TQM program (Ivey, 1991; Wiggins, 1995). Analysts and other experts have differed over whether the problem is that companies have not been implementing TQM correctly, or if TQM, even when properly executed, does not improve financial performance (see, for example Goodman et al., 1994; Eskildson, 1995; Hoover, 1995). This paper will analyze whether a successfully implemented TQM program improves the financial performance of a firm.

DEFINING TQM

Before analyzing whether TQM improves financial performance, it is essential to understand TQM. TQM is a management approach that seeks to increase profitability by improving quality and increasing customer satisfaction, while promoting the well being and growth of the employees of the organization.

Much that has been written about TQM is based on the writings of W. Edwards Deming and Joseph M. Juran. They are considered the founders of the movement. Much of the theory of TQM is provided in Deming's book Out of Crisis (1986) and Juran's Managerial Breakthrough: A New Concept of the Manager's Job (1969). TQM is based on four assumptions focusing on cost, people, organizations, and the role of senior management.

First, Deming and Juran assume that quality is less costly to an organization than is poor workmanship. They point out that the costs of poor quality (such as inspection, rework, repairs, lost customers) are far greater than the costs of developing processes that produce high-quality products and services. Second, both Deming and Juran maintain that people naturally take pride in their work and will take initiative to improve it—if they are given the tools and training that are needed and if management pays attention to their ideas. Deming adds that organizations must remove all systems that create fear for the employees, such as punishment for poor performance, performance evaluations, and merit pay. The third assumption is that organizations are systems of highly interdependent parts, and that most of the problems within the organization cross traditional departmental lines. Hence, TQM emphasizes cross-functional teams since neither problems nor solutions generally can be isolated. Finally, Deming and Juran stress that, ultimately, top management is responsible for quality. Because senior managers create the systems that determines how products are designed and produced, the quality improvement process must begin with management's own commitment to total quality.

Based on these assumptions, Deming and Juran offer five ways to improve an organization:

1) Explicitly identify and measure customer requirements. TQM defines who a customer is very broadly. Customers can be internal or external to the organization. Essentially, a customer is defined as anyone further down the production line. To achieve quality, it is critical to know what customers want and to provide products and services that meet or exceed those requirements. With this data in hand, the organization can focus on improving those processes that will most affect customer satisfaction and retention.

2) Create supplier partnerships. Deming and Juran suggest that organizations should choose vendors on the basis of quality, not just on price. In addition, they recommend that organizations work directly with suppliers to ensure that their materials are of the highest quality possible. Ultimately, the goal is for suppliers to provide materials with zero defects so that the company does not need to waste time inspecting the goods, a non-value adding activity.

3) Establish cross-functional teams to improve processes and solve problems. These cross-functional teams serve to identify and analyze the "vital few" problems. Other teams, also cross-functional, are then formed to diagnose those problems and solve them.

4) Eliminate dependence on mass inspection. Too many companies attempt to inspect quality into products. TQM asserts that organizations must focus on building quality into their products. TQM maintains that goals of zero defects or "six sigma" (3.4 defects per million) quality are attainable.

5) Use statistical techniques to monitor performance. These techniques should be focused on two processes: first, statistical measures need to be used throughout the manufacturing process to ensure that quality standards are met. Second, these statistical tools can be used to monitor and analyze work processes to identify the points of highest leverage for quality improvement.

TQM RESEARCH CHALLENGES

Research of TQM involves at least three challenges. First, one needs to clearly define what a full-fledged TQM implementation would involve for a particular context; then determine if, in fact TQM has been implemented. It is not clear that an organization has completed a full TQM implementation if only one or two of the five TQM improvements listed above have been instigated. Further, does any significant redesign of a process, division, or organization qualify as a TQM implementation? These critical issues must be resolved before research on the effects of TQM can proceed. In fact, one study found that of 99 papers about the effects of TQM published in academic and practitioner journals between 1989 and 1993, only 4 percent attempted to determine whether TQM truly had been implemented (Hackman and Wageman, 1995).

The second assessment that one must make is the determination of process criteria of effectiveness. TQM focuses on improvement of processes and functions, resulting in reduced rework costs, fewer defects, increased customer satisfaction, fewer warranty expenses, etc. The degree to which the improvements in processes internal to the organization actually occur is indicative of the success of a TQM implementation. Much research of the effectiveness of TQM is focused on relating process improvements to TQM execution.

Finally, it is our position of this paper that research of TQM effectiveness must eventually focus on financial impacts of an implementation. One then must assess whether the TQM program (and its accompanying process improvements) improved the financial performance of the firm using

some bottom-line outcome criteria such as increased revenue, higher stock price, higher price-to-earnings multiple, etc. As Hackman and Wageman (1995, 320) explain, "It is important to examine both process and outcome criteria because, as scholars who study decision-making know all too well, a capricious environment sometimes can intervene between process and outcome in a way that turns behaviors that could not have been better into results that could hardly have been worse." Clearly, isolating the impact of a TQM program on financial results such as revenue or stock prices presents an additional set of challenges to the research.

In order to overcome the first two problems with analyzing TQM, research presented in this paper is limited to analyzing Baldrige Award winners. Because application for the award involves a rigorous review of actual quality practices by qualified judges, it is safe to assume that these award winners actually have implemented the full TQM package, and that they have documented substantial process improvements (United States Government Accounting Office, 1991; Eskildson, 1995; Hackman and Wageman, 1995; Malcolm Baldrige National Quality Award Consortium, 1996).

THE MALCOLM BALDRIGE AWARD

The Malcolm Baldrige National Quality Award is an annual award recognizing U.S. companies that excel in quality management and quality achievement. It is the highest honor that an American company can receive. The Baldrige Award is governed by the National Institute of Standards and Technology (NIST), a branch of the U.S. Department of Commerce. A consortium including the American Productivity and Quality Center and the American Society of Quality Control administers the award. According to the NIST's Malcolm Baldrige National Quality Award 1996 Award Criteria, the award has three purposes:

- To promote awareness of quality as an increasingly important element in competitiveness
- To recognize quality achievements of U.S. companies
- To publicize successful quality strategies and the benefits derived from implementing these strategies.

The award can be given annually to up to two companies in each of the categories of manufacturing, service, and small business. However, the standards for winning the award are absolute, not relative. This means that all winners must meet certain strict criteria, even if it results in fewer than six awards being presented in any one year. In fact, in the nine years since the award's inception in 1988, the NIST has only given out 28 awards, and never bestowed the maximum six awards in a single year.

The Baldrige Award examiners evaluate firms in seven areas: (1) leadership, (2) information and analysis, (3) strategic planning, (4) human resource development and management, (5) process management, (6) business results, and (7) customer focus and satisfaction. Up to 1,000 points are awarded across all seven categories. Exhibit 1 provides a list of Baldrige Award criteria along with the points awarded in each category. There appears to be significant overlap between the seven Baldrige Award criteria and the definitions and improvements that Deming and Juran use to delineate TQM. Therefore, the Baldrige Award appears to be a good surrogate for the full implementation of a TQM program within an organization.

LITERATURE REVIEW

A review of the TQM literature suggests that research of the relationship between TQM and financial results are mixed. The United States Government Accounting Office (1991) surveyed the 22 highest-scoring applicants of 1988 and 1989 for the Baldrige Award. They found that the majority of the companies achieved greater customer satisfaction, reduced errors and product lead-times, and improved employee relations. The study also found that the selected companies improved profitability, as measured by market share, return on assets, and return on sales. However, the results are not conclusive because less than half of the 22 firms in the study reported any information at all concerning financial measures. Specifically, seven of the nine reporting companies increased return on assets (ROA is measured here as a company's earnings before interest and taxes divided by average gross sales) by an average of 1.3 percent. Six of eight reporting companies increased their return on sales (Measured as earnings before interest and taxes divided by sales.) by an average of 0.4 percent. With such a small sample, and such marginal results, it is difficult to state definitively that the TQM programs of these companies significantly improved their financial results.

The American Society of Quality Control (1992) questioned over 600 executives to determine the effect that TQM was having on their firms. Seventy-three percent of the executives reported that their quality programs had achieved significant results. However, this study does not attempt to directly observe significant financial results of TQM implementation among this sample.

Hoover (1995) and Goodman et al. (1994) analyze why firms experience various financial results with their individual TQM programs. One focus of these two studies is to distinguish results of improper TQM implementation from the possibility that TQM is theoretically flawed. Both sets of researchers conclude that when properly installed, TQM improved financial performance. Hoover (1995) found that TQM, when properly applied, improves competitiveness and success in an organization. He contrasts two companies that implemented TQM. The program of one of the companies was very successful and the company was able to reduce scrap cost by 65%, rework by 64%, and customer service backlog by 41%. The other company's program produced few measurable results even after six years, and the program was eventually canceled. By contrasting the two programs, Hoover (1995) found that the successful programs differed from the unsuccessful program in several key areas, including the level of leadership from top management, the focus on the customer, and the amount of employee involvement. Nevertheless, Hoover does not directly connect successful process improvements to improvements in financial performance. Goodman et al. (1994) maintain that TQM programs fail because of poorly set priorities and the lack of rigorous measurement of results. They argue that too often companies focus on what management perceives are key customer problems (which often are wrong), and that "the results of TQM efforts are often not tracked in a way that allows companies to separate what does and does not work in the marketplace" (p. 46). However, they maintain that executed properly, TQM can dramatically improve an organization.

Garvin (1991, 80) asserts that the Baldrige Award "more than any other initiative. . . has reshaped managers' thinking and behavior." Garvin responds to critics of the award who fault the award because some companies have stumbled financially after winning the award. He points out that the award was never meant to measure short-term financial results. Garvin states that the award does not measure many things critical to financial success, such as effective marketing, innovative R&D, and sound financial planning. He points out that "Baldrige winners are as vulnerable as other companies to economic downturns, changes in fashion, and shifts in technology. But they are far

better positioned to recover gracefully because they have superior management processes in place" (p. 83). Therefore, the Baldrige Award is a good predictor of long-term success and future profitability. However, Garvin does not attempt to empirically demonstrate this assertion.

The NIST (1995, 1996, 1997) has conducted several different comparisons of the return on the stock of the Baldrige Award winners to stock market as a whole, as measured by the Standard & Poor's 500 index (S&P 500). In each study the stock returns of the Baldrige Award winners as a group have outperformed the S&P 500. However, the research methodology used by the NIST does not individually analyze each Baldrige Award winner, making it difficult to direct assess the impact of the award status on an individual company's financial performance. In fact, the results of our study reveal that a few firms in the group of Baldrige Award winners are responsible for this result. Other firms have had abysmal stock returns after winning the award.

Mahajan et al. (1992), on the other hand, maintain that the correlation between quality and financial performance is very weak. The authors studied 12 firms from the computer and office equipment industry. Half were consistently highly rated in Fortune's annual list of "most admired corporations," and half were consistent laggards on the same list. They then had industry analysts from investment firms rate these firms on the eight points of corporate. Finally, they tracked the financial performance of these firms over the next three years. For the first year of measurement, the authors found a statistically significant relationship between performance and quality ratings for four out of eight measurements: return on equity, return on sales, earnings before interest and taxes, and return on total capital. For the following two years, the strength of the relationship between financial indicators and the scores of company quality consistently decayed over time. In addition, none of these relationships are statistically significant in the second and third year. From these observations, the authors conclude that "although the relationship between the financial health of companies and excellence is positive, excellence of a firm is not an indication of its future performance" (p. 330).

Schilit (1994) sought to find out whether firms that produced top quality products outperformed other companies financially. In 1987, Fortune magazine, with the help of a group of quality experts, consultants, security analysts, industry representatives, academicians, and others, chose 100 products made by American companies that were judged to be the best of their kind in the world. From the 100 companies that made these products, 72 were publicly traded. Schilit tracked stock price for these 72 companies over a five year period beginning 1 January 1988. The quality firms' average five-year gain in stock price was 71.1%, or 14.2% per year. However, the S&P 500 gained 77.74% over this time or 15.55% per year. Schilit, also found that there was a wide discrepancy in the performance of the stocks in the group. Microsoft performed the best with a 608% increase in stock price. Meanwhile Digital Equipment Corporation's stock, the poorest performer, lost 75% of its value over the same time period. Overall, 20 companies also lost value between 1988 and 1993—a time in which stock prices were initially extremely depressed following the October 1987 crash. Again, like Mahajan et al. (1992), Schilit found that having a quality product was not a strong predictor of financial performance.

Eskildson (1995) argues that for many firms, TQM will not lead them to financial success. He reviewed more than 150 organizational downturns and found that high costs and excessive debt were the top two major causes of financial problems, while poor quality was ranked fifth as a major cause of financial problems. Eskildson also notes that many Baldrige Award winners have struggled financially after winning the award. For example, Federal Express lost $1.5 billion on its European

operation, the Wallace Company declared bankruptcy, and many the Ritz-Carlton hotels were losing money or become insolvent. Furthermore, GM, IBM, Kodak, and Westinghouse each had Baldrige-Award winning divisions, yet each incurred "substantial and sustained overall corporate losses that led to the replacement of their chairmen" (p. 26).

METHOD AND RESULTS

The intent of this study is to provide important illumination of the question of whether successful TQM programs result in financial improvement for the organization. Baldrige Award winners are used in our sample to overcome difficulties associated with determining if a program is indeed TQM. More specifically, Baldrige Award winners used in this study are limited to publicly traded companies in order to ensure access to information and to determine shifts in fair market values. Of the 28 company awardees, only 14 were publicly traded at the time of winning the Baldrige Award. However, three of the winners are divisions within one company, AT&T. Consequently, this study focuses on 12 different firms. For purposes of this study, we establish AT&T as a Baldrige Award winner in 1992. This decision on based on the fact that two separate AT&T divisions won the Baldrige Award in 1992, and that this year represented the first recognition of AT&T. Exhibit 2 lists the Baldrige Award winners by year and indicates whether the firm is publicly traded.

Exhibit 3 evaluates each Baldrige Award winner's stock price return against the stock price return of its industry index using Dow Jones data. Comparing stock price of each Baldrige Award company to its own industry index should isolate the financial effects of the TQM program from the effects of external economic forces. Annual stock return data are gathered in year of winning the award (year n), in the following year (year n+1), and cumulative over three years following the award announcement (year n+3), providing some measure of both short-term and long-term financial impact of TQM programs (Baldrige Award winners are announced in October of each year).

In order to provide some comparison with the NIST (1995, 1996, 1997) research, we also provide data comparing the return of the Baldrige Award winners to the S&P 500. This provides some measure of the performance of awardees to the market as a whole. As with the industry index comparison, annual stock price returns for the S&P 500 are gathered in year n, year n+1, and cumulative in year n+3.

In the year of receiving the Baldrige Award, stock price returns for six of twelve companies outperformed the industry index and six of twelve companies outperformed the S&P 500. In the year following the award, five of the twelve companies outperformed their industry index and five outperformed the S&P 500. Three years after the award, nine out of the twelve companies surpassed their industry index, while only four bettered the S&P 500.

These results appear to be consistent with Garvin's (1991) position that the Baldrige Award does not protect a company from short-term company specific and market corrections; however, over the long-term, the companies should be in a better position to recover and perform well because they have superior processes in place. Because more companies outperformed their industry after three years than after one year, the data in this study would tend to support that conclusion. The data contradicts the conclusions of Mahajan et al. (1992) in their study of firms that scored high on a separate set of quality attributes. They found that the relationship between the excellence of the firm

and its financial performance diminished over time. They predicted then that the Baldrige Award would not be a good predictor of a company's long-term performance. However, the comparisons in the current study of Baldrige Award winners to their market indices seem to indicate an opposite result.

On the whole, less of the firms in this study were able to beat the S&P 500 over any of the time periods. This could be due to extraordinary growth of the S&P 500 over the past several years, particularly in the areas of high technology, financial services, and health care—all industries that are not well represented among the Baldrige Award winners. Nevertheless, although companies were more likely to beat their industry index than the market as a whole, we reassert that impeding external economic influences makes it difficult to draw conclusions based on comparisons with broad-based market returns.

LIMITATIONS ON ANALYSIS

The results of this study appear to clearly indicate that successful implementation of TQM results in enhanced long-term financial performance. However, while the process of relating TQM implementation to financial performance seems to be a relatively straightforward process, this is actually a rather tenuous position to defend for several reasons. First, it is difficult to show a cause and effect relationship between process improvements due to TQM and financial performance results. Issues related to internal validity are rampant when one takes a position that all outcomes are the sole result of any single change in the environment. A host of other variables extraneous to the proposed relationship can be possible contributing factors. Nevertheless, some researchers of TQM seem to ignore this important fact of empirical research. The implication that, after TQM is implemented, any improvements in productivity or profitability must have been caused by the quality program is suspect. In fact, improvements could have been caused by other events that occurred at the same time, such as a natural streamlining that takes place when processes are scrutinized, or productivity gains caused by the famous "Hawthorne Effect." The Hawthorne Effect is the phenomenon that people work harder when they are being studied (Hackman & Wageman, 1995, p. 323).

Second, as mentioned earlier, outside disturbances can distort the outcome between work processes and organizational outcomes. Many times, even when a relationship does exist between process improvements and organizational outcomes, certain outside influences can overpower the effects of the program. For example, Wruck and Jensen (1994) studied the TQM program at Sterling Chemical. Even though many experts noted that the program was highly successful, the company's overall financial performance suffered due to industry and market factors. We attempted to compensate for intervening market factors by measuring the companies against their market indices. However, it is likely that a number of variables still exist within the industry comparison that intervene in the relationship between effects of the Baldrige Award companies' quality programs and long-term stock price performance.

Third, it is difficult to determine a satisfactory time frame in which to evaluate a TQM program's effect on an organization's financial performance. There is often a discrepancy between short-term and long-term organizational results, and experts differ as to how long after an intervention one should wait before analyzing outcome measures (Whetten and Cameron, 1994). The longer the research time frame, the more opportunity a TQM program has to realize results, but

the more those results are diluted by other factors. We attempt to compensate for this by taking multiple measurements across different time horizons. However, determining the appropriate time interval still remains a problem.

Finally, the Baldrige Award allows divisions of firms to win the award, which can make it difficult to determine that particular division's success. Typically, these divisions represent only a small part of the entire company. Therefore, the performance of the division may not be large enough to explicitly affect financial performance for the company as a whole and therefore is not reflected in stock price returns. A good example in this study is Cadillac, a division of General Motors. Cadillac won the award in 1990 and may have had a very positive performance financially as a segment. Nevertheless, its parent company reported overall losses on its 1992 and 1993 income statements.

CONCLUSION AND RECOMMENDATIONS

It seems logical that improving the quality of a product or a business process would improve the financial performance of a firm. As our analysis shows, this is often, but not always, the case.

Some scholars (Collier, 1992; Garvin, 1991) have pointed out that TQM does not analyze other areas of a firm that are vital to its financial success, such as marketing, research and development, and financial management. Since TQM does not score the financial structure of the organization, it is conceivable that a company may have a world-class quality system and even win the Baldrige Award, yet its decisions on how to finance the company could lead to its financial ruin.

Recent financial performance models recommended by Kaplan and Norton's (1996) Balanced Scorecard theory that process improvements must be linked to financial results support this idea. Others have argued previously that because the operational results drive a company's financial performance, companies should focus mainly on process and operational improvements and let the financial performance take care of itself (Johnson, 1992). However, as Kaplan and Norton suggest, focusing on operational improvements alone will not improve financial results unless they are somehow linked to the bottom line. They note:

> Many managers fail to link programs, such as total quality management . . . to outcomes that directly influence customers and that deliver future financial performance. In such organizations, the improvement programs have incorrectly been taken as the ultimate objective . . . . The inevitable result is that such organizations become disillusioned about the lack of intangible payoffs from their change program. (pp. 150-151)

In a separate publication, Kaplan and Norton (1992, 78) point out that companies that implement quality programs often experience disappointing financial results because "companies don't follow up their operational improvements with another round of actions." They note that some companies improve their business processes, but they don't use those improvements to either grow revenue or reduce costs. In other words, they don't go far enough in their TQM programs in order to link process improvements to improvements in financial performance. For example, a firm can reduce the number of defects, improve quality, and improve on-time delivery, but if they fail to leverage the improved quality to sell products to new customers, or if they do not release any new products to market, those process improvements will fail to produce the kind of financial success demanded by

the capital market. Since the Baldrige Award criteria does not focuses heavily on linking process improvements to financial performance, this may explain why there is inconsistent dominance of Baldrige Award winners in the stock market

Exhibit 1: Malcolm Baldrige National Quality Award 1996 Criteria

Leadership (90 points)
- Senior Executive Leadership (45)
- Leadership systems and Organization (25)
- Public Responsibility and Corporate Citizenship (20)

Information and Analysis (75 points)
- Management of Information and Data (20)
- Competitive Comparisons and Benchmarking (15)
- Analysis and Use of Company-Level Data (40)

Strategic Planning (55 points)
- Strategy Development (35)
- Strategy Deployment (15)

Human Resource Development and Management (140 points)
- Human Resource Planning and Evaluation (20)
- High Performance Work Systems (45)
- Employee Education, Training, and Development (50)
- Employee Well-Being and Satisfaction (25)

Process Management (140 points)
- Design and Introduction of Products and Services (40)
- Process Management: Product and Service Production and Delivery (40)
- Process Management: Support Services (40)
- Management of Supplier Performance (30)

Business Results (250 points)
- Product and Service Quality Results (75)
- Company Operational and Financial Results (110)
- Human Resources Results (35)
- Supplier Performance Results (30)

Customer Focus and Satisfaction (250 points)
- Customer and Market Knowledge (30)
- Customer Relationship Management (30)
- Customer Satisfaction Determination (30)
- Customer Relationship Results (160)

Total Points 1000

Firms successfully implementing TQM must, by definition, demonstrate improvements in management of processes and people, supplier relationship, or organization structure. The data is our study suggests that TQM improves the long-term performance of the firm, as indicated by stock price returns. However, the results are not overwhelming. Obviously, additionally research is required to better document the relationship between TQM and financial performance. Nevertheless,

based on our analysis, it is reasonable to recommend that both practitioners and theorists pay better attention to the need to strengthen the link between TQM investments and the organization's critical financial results.

Exhibit 2
Malcolm Baldrige National Quality Award Winners
(Italics indicates firms are publicly traded at time of winning the award)

1988	Westinghouse Electric Corp. Commercial Nuclear Fuel Division
	Motorola Inc
	Globe Metallurgical
1989	Milliken & Company
	Xerox Business Products Division
1990	*Cadillac Motor Car Division*
	IBM Rochester
	Federal Express Corp.
	Wallace Company Inc.
1991	*Solectron Corp.*
	Zytec Corp.
	Marlow Industries
1992	*AT&T Network Systems Group/Transmission Systems Business Unit*
	AT&T Universal Card Services
	Texas Instruments Inc Defense Systems & Electronics Group
	Ritz-Carlton Hotel Co.
	Granite Rock Co.
1993	*Eastman Chemical Co.*
	Ames Rubber Corp.
1994	*AT&T Consumer Communications Services*
	GTE Directories Corp.
	Wainwright Industries Inc.
1995	*Armstrong World Industry Building Products Operations*
	Corning Telecommunications Products Division
1996	ADAC Laboratories
	Dana Commercial Credit Corporation
	Custom Research Inc
	Trident Precision Manufacturing Inc

Exhibit 3
Stock Price analysis of Baldrige award winners

				Annual Return in Year N			Annual Return in Year N+3			Annual Return in Year N+1		
Company	Ticker	Industry Group	Award date	Firm	Index	S&P 500	Firm	Index	S&P 500	Firm	Index	S&P 500
Motorola	MOT	Communications	1988	-15.6%	-22.5%	16.5%	39.6%	37.3%	31.6%	55.4%	44.6%	66.2%
Xerox	XRX	Office	1989	-1.9%	.60%	31.6%	-39.1%	-31.6%	-3.1%	42.2%	38.4%	35.9%
Cadillac	GM	Auto Manuf.	1990	-18.6%	-28.3%	-3.1%	-16.0%	-7.4%	30.4%	114.3%	59.6%	54.4%
Federal Express	FDX	Air Freight & Courier	1990	13.2%	22.3%	-3.1%	1.5%	27.4%	30.4%	107.0%	90.6%	54.4%
IBM	IBM	Computers	1990	20.1%	4.0%	-3.1%	-21.2%	-6.4%	30.4%	-21.6	-50.0%	54.4%
Solectron	SLR	Electronics	1991	115.6%	21.4%	30.4%	3.1%	-2.6%	7.6%	5.1%	25.8%	20.0%
Texas Instruments	TXN	Semiconductors	1992	51.6%	65.9%	7.6%	36.2%	41.5%	10.1%	295.8%	10.5%	53.5%
AT&T	T	Telecomm.	1992	30.4%	6.7%	7.6%	2.9%	13.0%	10.1%	37.7%	27.0%	53.5%
Eastman Chemical	MEN	Specialty Chemical	1993	-18.2%	3.6%	10.1%	20.0%	-5.9%	1.3%	34.7%	24.5%	78.4%
GTE	GTE	Telecomm.	1994	-13.2%	-7.6%	1.3%	44.4%	-44.2%	37.6%	73.9%	41.4%	125.7%
Armstrong	ACE	Building Materials	1995*	61.7%	34.4%	37.6%	11.6%	17.0%	23.0%	20.1%	41.3%	64.0%
Corning	GLW	Diversified Technology	1995*	7.0%	33.3%	37.6%	44.6%	25.8%	23.0%	38.1%	41.2%	64.0%

*Because these two firms were Baldrige Award winners in 1995, cumulative stock data at the time of this study are available for two years rather than three years.

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