

Linking Firm Performance to the Malcolm Baldrige National Quality Award Implementation Effort Using Multiattribute Utility Theory

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Key Words: multiattribute utility theory, quality, ROI

Abstract

Executives are searching for ways to deliver consistent improvements in productivity and profitability while addressing economic realities. One initiative that has been discovered by many organizations is the integration a quality process into their organization that is based on the Malcolm Baldrige National Quality Award (MBNQA). Many studies have been done showing that award winning companies tend to outperform peers and competitors, yet many managers are reluctant to undertake the large initiative required to work toward the award. This reluctance may stem from the belief that the reported benefits are not those that are important for managers to justify the effort. The purpose of this research is to begin an exploratory study that examines the expectations of company managers, executives, and other professionals regarding the types of firm performance and returns that would be needed to justify undertaking the MBNQA process. The results showed that while financial performance of the firm is the strongest justification managers consider, and that while their expectations for improved financial performance are somewhat high, the financial returns are certainly not out of the realm of normal expectations for returns from other projects.

Introduction

In difficult economic times, organizations must be very creative in identifying initiatives to help improve performance and support economic stability. Responding to pressure from shareholders, market analysts, and corporate boards of directors, executives are searching for ways to deliver consistent improvements in productivity and profitability while addressing economic realities. One initiative that has been discovered by many organizations is the integration a quality process into their organization that is based on the Malcolm Baldrige National Quality Award (MBNQA). Whether the organization plans to eventually be considered for the actual Award or not, there appear to be dramatic benefits from just going through the self evaluation process provided by the Award criteria. While the journey leading up to consideration for the award can be long, arduous, and sometimes costly, many organizations are convinced that the benefits have greatly outweighed the costs. The cost side of the equation can for the most part be quantified, but the benefits are sometimes intangible. This makes the decision as to whether to pursue the award a very difficult one.

The MBNQA was established in 1987 as an amendment to the Stevenson-Wydler Technology Innovation Act of 1980. Much of this quality initiative was driven by the intense competition being experienced from Japanese companies. According to H.R. 812 as enacted by the Senate and House of Representatives of the United States, the stated objec-

tive of the award was to encourage American businesses and other organizations to practice effective quality control in the provision of their goods and services. The Congressional document listed four ways that the award would improve quality and productivity: (1) by helping to stimulate American companies to improve quality and productivity for the pride of recognition while obtaining a competitive edge through increased profits; (2) by recognizing the achievements of those companies which improve the quality of their goods and services and providing an example to others; (3) by establishing guidelines and criteria that can be used by business, industrial, governmental, and other organizations in evaluating their own quality improvement efforts; and (4) by providing specific guidance for other American organizations that wish to learn how to manage for high quality by making available detailed information on how winning organizations were able to change their cultures and achieve eminence.

The program is administered by the National Institute of Standards and Technology (NIST) in the U.S. Commerce Department in cooperation with private industry. Originally, three awards were to be available annually for manufacturers, service providers, and small businesses. In 1998, the President and Congress approved legislation that allowed education and healthcare organizations to be eligible to participate as well. The basic criteria established for the national award have served as a template for the creation of similar quality awards in nearly 90 percent of the states across the country. Many organizations choose to compete for state quality awards before the national award.

Even through the MBNQA is a federal program, it is not free to companies. At a minimum, there are costs associated with the award submission process. For large organizations (500 or more employees) in the manufacturing, service, for-profit education, and health care business, the basic application fee is \$5,000 and if one is selected to receive a site visit, there is an estimated additional \$20,000 to \$35,000 cost. For small organizations (less than 500 employees) in the same business environments, the application fee is \$2,000 with an estimated \$10,000 to \$18,000 cost for the site visit. For education not-for-profit organizations, the application fee is \$500 and the estimated site visit cost is \$1,500. So clearly, there are costs associated with the application process, but there are many other less visible costs as well. The costs incurred by an organization working toward the application process will often be much greater than the cost of applying or a site visit. These costs would generally result from many sources including training, process improvement, lost productivity, and consulting services.

With these obvious and some not so obvious costs associated with the quality process, there must be something in it for the organizations to justify these expenses. Benefits reported by many organizations include improvements in sales volume, operating margins, on-time delivery results, return on assets as well as dramatic improvements in customer service and employee satisfaction. The question of course is whether these benefits are significant enough to result in bottom-line improvements for the organizations' stakeholders.

The purpose of this research is to begin an exploratory study that examines the expectations of company managers, executives, and other professionals regarding the types of firm performance and returns that would be needed to justify undertaking the MBNQA process. Many studies have been done showing that award winning companies tend to outperform peers and competitors, yet many managers are reluctant to undertake the large initiative required to work toward the award. This reluctance may stem from the belief that

the reported benefits are not those that are important for managers to justify the effort. In other words, there may be other factors of primary concern to managers that either are not addressed in the literature or not a reported benefit of the quality award process. Another possible explanation for the reluctance is the issue of causality. Some managers may not agree that the reported benefits of winning quality awards are directly attributable to the award itself. In which case, managers would not perceive that working toward a quality award would be the most direct route to such improvements.

This study is designed to explore managers' logic process prior to committing to the quality process that may lead to an award. The focus is on determining what type of justification managers would require before deciding to embark on the quality journey. The research methodology will be multiattribute utility (MAU) theory. Academics, business organizations, the NIST, and other government agencies have conducted a considerable amount of research on the Baldrige Award and MAU theory. In the following section, some of this research will be described.

Literature Review

The Baldrige Award is based on a framework that is quite specific and well documented and provides value to the winning organization as well as others in its supply chain (Vokurka and Lummus, 2003). Taylor (1997) also suggests that there are other winners beyond those who have won the Award. Thousands of companies have benefited by information shared by the winners and by doing business with them. It is suggested many companies have benefited from the award criteria by simply utilizing them as internal assessment tools. Babicz (2002) points out the value to organizations that apply for the Award of getting feedback from the Baldrige examiners who provide a detailed external review of the organization. But, what are the returns to the winning organizations in addition to being able to promote themselves as elite MBNQA winners and being able to use the well recognized symbol of excellence on their promotional campaigns?

Starting in 1995, NIST has been conducting annual comparisons of common stock prices between groups of award winners and the Standard & Poor's 500 (NIST, 2002). Also included in the studies are "site-visited" companies which did not win the award. In seven of the last eight years of the study, the Baldrige Award winners outperformed the S&P 500 by margins as great as 4.2 to 1 which occurred in the 2001 study. Driven by the recent volatility in the stock market, the 2003 NIST study reported for the first time that the S&P 500 performed better than the Baldrige Award winners. The NIST results were the basis of several other research studies including Helton (1995) and Kosko (1999). Tai and Przasnyski (1999) improved the early NIST studies by the addition of consideration for risks and market movements. Their overall conclusions were similar to the NIST study results, but not as significant.

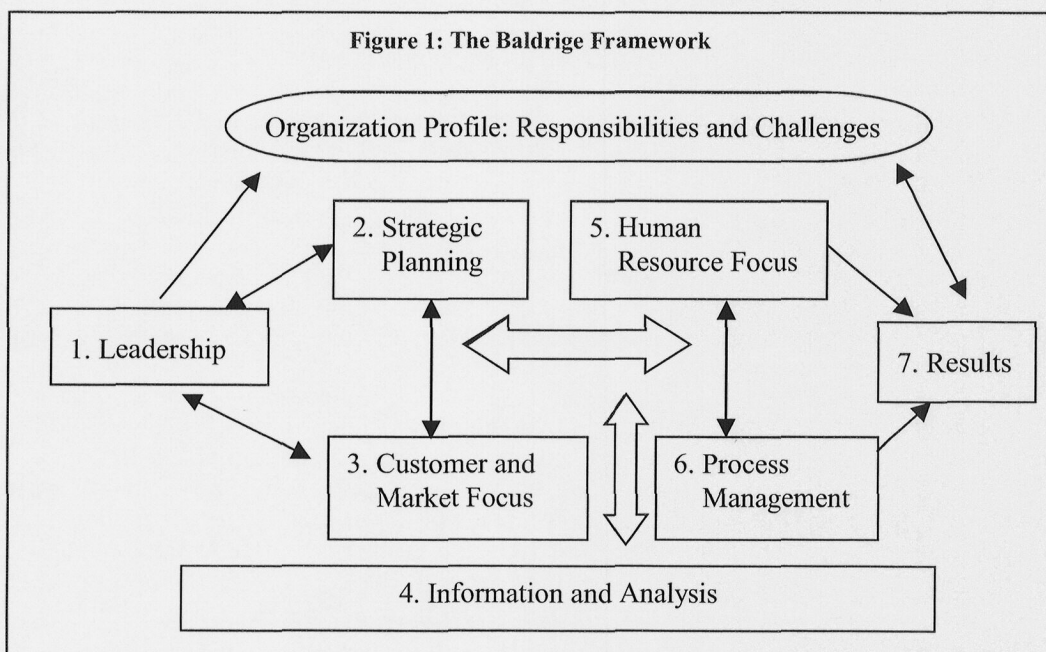
Several other studies have been conducted independent of the NIST studies that address the stock price of quality award winning companies. For example, Hendricks and Singhal (1996) conducted an event study addressing issues related to a firm's market valuation. They looked at the stock market's reaction to the announcement about a firm winning a quality award, whether the risk of the firm changes after winning a quality award, and the abnormal stock price behavior from three years before to one year after winning a quality award. Their study concluded that the stock market reacts positively to quality award announcements especially in smaller firms and firms that won awards from

independent organizations such as the MBNQA. Winning quality awards also had the effect of reducing the equity and the asset betas. For larger firms, there tended to be a decrease in stock price performance in the second year prior to winning the award followed by a year of positive performance. Overall for the award winning firms, they reported a 44 percent higher stock price return, 48 percent higher growth in operating income, and a 37 percent higher growth in sales than the control group of firms.

The conclusions drawn by Hendricks and Singhal were later challenged by other researchers (Adams, et. al., 1999) who questioned the significance of their findings. These researchers supported the value of quality programs in organizations, but questioned the abnormal returns that had been earlier reported. Hendricks and Singhal (1997) later published findings from a separate study that found for quality award winning companies, operating incomes and sales growth increased over the study period.

In another study commissioned by the NIST to evaluate the societal benefits of the MBNQA program, a 207 to 1 benefit to cost ratio was estimated (Link and Scott, 2001). It was estimated, through mail survey to American Society for Quality (ASQ) members, that the net private benefits associate with the program were \$2.17 billion. Assuming that the entire economy benefits the same as ASQ members, it is estimated that the overall net social benefits of the program to be \$24.65 billion. The social costs associated with the Program to date were estimated at \$119 million giving the 207 to 1 benefit to cost ratio. Results of this study were later described by Daniels (2002).

The Baldrige Award framework consists of seven major categories: (1) Leadership, (2) Strategic Planning, (3) Customer and Market Focus, (4) Information and Analysis, (5) Human and Resource Focus, (6) Process Management, and (7) Results. These seven categories plus an organizational profile create what is known as the Baldrige criteria. The framework and linkages between the criteria can be seen in Figure 1 below.



The linkages between categories have been formed in an evolutionary fashion using hundreds of quality experts and consensus of expert opinions (Wilson and Collier, 2000). As is seen in Figure 1, the Baldrige framework has several double headed arrows implying a recursive causal model or a model that contains systems of equations not containing reciprocal causation (double headed arrows) or circular feedback loops (Bollen, 1989). Since then, starting with Wilson and Collier (2000), others have tried to assess the direct affects of the first five Baldrige systems (Leadership, Process Management, Human Resource Management, Strategic Planning, and Information and Analysis) on the measured results categories (Results and Customer and Market Focus).

Previous research in this area tends to cite aggregate numbers for the types of performance improvements companies can expect to realize. These numbers are usually aggregated composites of many companies that have implemented MBNQA efforts. These numbers are often reporting outcomes, that is, the types of returns these firms have realized without any indication of the upfront expectations of firm managers. This study attempts to begin to fill that gap in the literature. This study begins to look at what types of returns managers would expect to see from a MBNQA implementation effort in order to justify the expense.

A multiattribute utility function (MAUF) was used in this research to gather the opinions of an assembled team of managers. This methodology utilizes the additive utility function most widely used in MAU theory because it averages the weights of the single attribute utility assessments (Moskowitz, Tang, and Lam, 2000). The model is shown below in equation 1.

$$S_n = \sum_{i=1}^n W_i U_i \quad (1)$$

In this model, S_n is the weighted average of the single-attribute utility assessments. In the MAUF, there are n attributes, and W_i is the relative weight assigned to the i th attribute such that $\sum W_i = 1$ and $0 \leq W_i \leq 1$. U_i is the assessed utility of the i th attribute. The U_i 's will also have values between 0 and 1, otherwise, a one-to-one transformation is made.

Hypotheses

The stated purpose of this paper is an exploratory study that examines the managerial expectations regarding the types of firm performance and returns that are required to justify undertaking the MBNQA process. With this in mind, the following two hypotheses are proffered.

- H1: Since a MBNQA project implementation is essentially a quality management initiative, the quality related measures such as improved customer satisfaction are just as important for justification purposes as are financial rate of return measures.

The second hypothesis is as follows:

- H2: The major Baldrige systems of Leadership and Strategic Planning, Human Resource Management, Process Management, and Information and Analysis all equally contribute toward affecting the returns expected from the implementing the MBNQA initiative.

The first hypothesis is designed to test the strength of the justification for implementing a project toward achieving the MBNQA. While implementing a quality related project may suggest improvements in indirect financial return measures like improved customer satisfaction or stock prices, the reality is that executives are likely to expect more direct financial paybacks like improved cash profits or a direct return on their investment (ROI). This hypothesis is designed to test this notion. The second hypothesis is designed to test the strength of the five Baldrige systems (as hypothesized by Wilson and Collier, 2000) for each of their independent contributions toward achieving both direct and indirect financial returns. These hypotheses combined should provide a clearer picture of what executives and managers may be expecting prior to engaging in an effort the size of that required to achieve the MBNQA.

Results

A group of managers and executives were assembled to evaluate perceived financial and customer satisfaction benefits. They were evaluating if the benefits of pursuing the Baldrige Award outweigh the costs of pursuing the award in terms of direct and indirect time lost and the financial costs of such an endeavor. The MAUF methodology was used to pursue professional opinions in evaluating the costs against the benefits of implementing the systems needed to pursue the Baldrige Award.

Of the various firm performance measures that have been shown in research studies to be improved through implementation of the Baldrige process and similar quality management initiatives, the top six performance measures were presented to the managers and executives on the panel to evaluate as preferential alternatives. These measures included improvements in cash position, profitability improvements in the form of return on investment and return on assets, improvements in market share and improvements in customer satisfaction and customer warranty cost. A seventh performance alternative was added that addressed the importance of keeping implementation costs low. This alternative is not always considered a performance measure, but it is an important consideration in the managerial thought process (Powell, 1995). The results of the MAUF analysis on each of the alternatives from the managers and executives are presented in Table 1 below.

Table 1 MAU Ranking of Criteria for Justifying the MBNQA

Criteria	Avg. MAU Preferential Score (1 is lowest)	Std. Dev.	MAU Rank (1 is highest)
Increased ROI	4.0392	2.0137	2
Increased Market Share	4.0244	2.2975	3
Increased customer satisfaction	3.5092	2.3287	4
Increased cash flow or profit	4.1421	1.7110	1
Increased ROA	2.6816	2.0514	6
Reduced customer warranty costs	2.6040	2.0631	7
Low cost of implementation	3.2737	2.5769	5

As can be seen from the results in Table 1, MAUF preferential ranking from the group shows that profit and increased cash flow provide the strongest justification for going for the Award. Other financially related performance criteria follow closely. These include in rank order increased return on the investment of going for the award and increased market share. Improved customer satisfaction ranked number four and keeping the cost of

the project low was the fifth consideration. Reducing warranty costs and improving return on assets were lower considerations. Due to the tendencies of the various responses in a MAU study to centralize around an average, preferential differences in the alternatives are not apparent from the p-values, nor would the differences be expected. The follow up question considers whether or not the MAU rank ordering results are significantly different from the raw rank ordering provided by the respondents as a reliability check. The comparison of ranks used in calculating Spearman's rank correlation coefficient is presented in Table 2 below.

Table 2 Comparison of Respondent Rank Ordering and MAU Rank Ordering Results

Criteria	Avg. Score of Respondent Ranking (1 is highest)	Std. Dev.	Rank (1 is highest)	MAU Rank (1 is highest as is seen in Table 1)
Increased ROI	4.0000	2.2804	4	2
Increased Market Share	3.1667	0.7528	2	3
Increased customer satisfaction	3.3333	2.5820	3	4
Increased cash flow or profit	2.2667	2.2509	1	1
Increased ROA	5.8333	1.3292	7	6
Reduced customer warranty costs	4.8333	1.9408	6	7
Low cost of implementation	4.1667	1.4720	5	5

The results in Table 2 show that when the respondents were asked to rank the justification alternatives, the resulting rankings did differ slightly from those rankings that were produced from the MAU results. The two alternatives that were not ranked differently included (1) generating cash and profits which was the highest consideration in justifying the Baldrige effort using either ranking and (2) keeping costs low which was the fifth ranked alternative using either methodology. The remaining alternatives differed slightly. Spearman's rank correlation coefficient was used to test if differences were statistically significant (Black, 1994). Spearman's rank correlation coefficient is given by the following formula.

$$r_s = 1 - \frac{6 \sum d^2}{n(n^2 - 1)} \quad (2)$$

Here, Spearman's rank correlation coefficient (r_s) is a function of the differences in the ranking (d) between the MAU rank ordering and the respondent raw rank ordering methodologies as well as the sample size (n). Spearman's rank correlation coefficient was calculated to be: $r_s = 0.85714$ with a 0.0137 p-value indicating that ranked results from these two methods are not statistically different and that they do have a strong correlation.

MAUF methodology requires measuring the respondent's indifference curve. The method for collecting this data resulted in having the respondent's provide the percentage of return on each of the alternatives that they would require in order to justify the project of implementing the Baldrige effort. The stand-alone responses from this part of the study provided some insight as to financial return expectations from the firm respondents participating in this study. The respondents were asked to provide the percentage of return an

MBNQA implementation would be needed to justify the project. The results of this portion of the study are presented in Table 3 below.

Criteria	Percent Return Required
Increase in ROI	11.8%
Increase in market share	14.0%
Increase in customer satisfaction	15.0%
Increased in cash flow or profit	14.4%
Increased ROA	6.5%
Reduced customer warranty costs	10.8%
Implementation cost (as a % of sales)	4.3%

Table 3 provides a benchmark for the magnitude of returns respondents would like gain from undertaking the MBNQA implementation. They would like to see almost a 12 percent return on investment and 6.5 percent return on assets with an increase of cash income and profits of 14.4 percent. They suggest that cost of implementation should run about 4.3 percent of sales, but it should be noted that several respondents made statements while completing this experimental exercise that they would not want these costs to be above 1 percent of sales.

The expected rates of return on profitability responses were further evaluated by running a series of partial regression models of certain grouped attributes against the percentage of returns expected from the MBNQA effort (Jones and Sharma, 2001). The model for each of the regressions is of the following form:

$$ROR = \alpha + \sum_{i=1}^k \beta_i X_i + \sum_{i=1}^k \gamma_i X_i X_{i+1} + \varepsilon \tag{3}$$

where X_i represent the attributes being tested, $(X_i X_{i+1})$ represent attribute interactions, α_i , β_i and γ_i , are the estimated regression parameters, and ε is the error term. The attributes were grouped by characteristics of similar areas of organizational responsibility to evaluate how the respondents viewed these effects against expected rates of returns. The first regression sought to evaluate how expected rates of return related to leadership and strategic planning, the second related rates of return to information and data analysis (both internal and external capabilities), the third to human resource initiatives, and the fourth to product and process development. The results of these regressions are presented in Table 4 below.

R Square	Adjusted R	Standard Error	F	Significance
0.6587	0.1467	2.9342	1.2865	0.4654
Variables	Coefficients	Standard Error	t-statistic	Significance
Constant	31.155	37.960	0.8207	0.4981
Leadership	-25.748	47.992	-0.5365	0.64530
Strategy Dev.	-15.113	57.927	-0.2609	0.8186
Lead * Strat. D.	20.188	67.362	0.2997	0.7927

Table 4b Regression Results of Internal Data and Competitive Data Information Analysis to the Expected Rate of Return

R Square	Adjusted R	Standard Error	F	Significance
0.7867	0.4669	2.3193	2.4595	0.3022
Variables	Coefficients	Standard Error	t-statistic	Significance
Constant	13.802	26.629	0.5183	0.6559
Internal Data	18.423	44.299	0.4159	0.7179
Comp. Data	-17.998	33.571	-0.5361	0.6455
Int.*Comp. D.	-3.3788	50.506	-0.0669	0.9527

Table 4c Regression Results of the Human Resource Initiatives of Education and Employee Involvement to the Expected Rate of Return

R Square	Adjusted R	Standard Error	F	Significance
0.8982	0.7456	1.6022	5.8844	0.1487
Variables	Coefficients	Standard Error	t-statistic	Significance
Constant	24.798	7.9846	3.1058	0.0899
Education	-62.589	26.970	-2.3206	0.1461
Employee Inv.	35.328	18.162	1.9451	0.1912
E*E	13.477	30.154	0.4470	0.6986

Table 4d Regression Results of Product Development and Process Management to the Expected Rate of Return

R Square	Adjusted R	Standard Error	F	Significance
0.6725	0.1812	2.8743	1.3688	0.4485
Variables	Coefficients	Standard Error	t-statistic	Significance
Constant	9.0151	28.853	0.3124	0.7843
Product Dev.	23.903	43.671	0.5473	0.6391
Process Mgt.	-19.540	36.953	-0.5288	0.6498
Pd*Pm	-2.8237	50.444	-0.0560	0.9604

The regressions sought to evaluate how certain groups of attributes related to the rates of return expected by the panel of respondents in this study. The attributes are fully listed in the Appendix, but the groups of attributes evaluated for their contribution toward the expected rates of return can categorically be listed as Strategic Leadership, Information Data Analysis Capabilities, Human Resource Initiatives, and Product and Process Development. The adjusted R² for each of these regressions are leadership and strategy development: 0.1467, internal data and competitive data analysis: 0.4669, education and employee involvement: 0.7456, and product development and process management: 0.1812. Several of the respondents commented that product development and process management were keys to providing good products to the market thus sustaining profitability. It is interesting, then, that the human resource initiatives of education and employee involvement were so strongly correlated to the rates of return.

Discussion of Results

Tables 1 and 2 together show that financial performance of the firm is the strongest justification managers consider. The performance criteria that are weighted heavier than the others include an improved cash inflow position, an improved return on investment, and a

growth in market share. The customer satisfaction criteria were slightly lower considerations, and the cost of implementation was of lower importance to the managers. However, in evaluating the reliability test, the question was put forth to the managers, that as a percent of sales, how much cost would be prohibitive for the project. While the managers viewed the cost of implementation as a lower consideration, the validity test showed that it is important for the managers to keep the cost of project implementation low, maybe even lower than is expected or is reasonable.

The responses from the study of managerial indifference curves provided some interesting insight into the financial return expectations. The respondents were asked to provide the percentage of return an MBNQA implementation would be needed to justify the project. The types of returns respondents expected included almost a 12 percent return on investment and 6.5 percent return on assets. The managers and respondents expected on the average an increase of cash income and profits of around 14 percent. They thought that costs should run about 4.3 percent of sales, and that customer satisfaction indexes should show improvements of around 15 percent. It should come as no surprise that while implementing a quality management system as is espoused by the MBNQA criteria that the expectations for increased customer satisfaction was the top rated return expected by the study participants.

The regressions were used to evaluate how certain groups of attributes related to the rates of return expected by the panel of respondents in this study. The attributes categorically listed as Strategic Leadership, Information Data Analysis Capabilities, Human Resource Initiatives, and Product and Process Development showed interesting results. While each of the categories were somewhat correlated to achieving expected rates of return, the human resource initiatives of education and employee involvement were the most strongly correlated to rates of return indicating the importance of infrastructural attributes required to achieve the MBNQ award.

Conclusion

The results showed that financial performance of the firm is the strongest justification managers consider. Secondary considerations include customer satisfaction criteria and the costs of implementing the programs. This is consistent with the evolution of the MBNQA criteria. Over time, heavier emphasis has been placed on financial performance by the examiners in order to win the Award. These results however, suggest that, while there is increased effort to emphasize financial rewards for implementing the program, that even more direct linking is needed between the financial results and the effort of undergoing the process of implementing the award in order to justify the process.

While managerial expectations for improved financial performance are somewhat high, the financial returns are certainly not out of the realm of normal expectations for returns from other projects. In fact, many capital projects have higher expected financial returns than those stated by the respondents of this study. The somewhat unexpected but intuitively obvious result was that managers did expect to see a significant rise over current levels of customer satisfaction.

The regressions evaluated related rates of return expected by the panel of respondents in this study to certain groups of attributes. The groups of attributes evaluated for their contribution toward the expected rates of return showed the strongest correlations in-

volved the human resource initiatives of education and employee involvement. This was an interesting result, in that individually, the respondents appeared to value the other attributes more strongly for their contribution towards achieving the expected rates of return.

The largest limitation of this experiment is that it needs further investigation. The focus group that participated in this experiment is too limited in size to allow a generalization of the findings. This work was exploratory attempting to identify which of the hypothesized alternatives executives would tend to favor for financial justification of undertaking the large effort of implementing a MBNQA movement in the firm.

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Appendix

The Questionnaire

The participants were asked to rate on a 0 to 10 scale each of the following performance alternatives to indicate their influence in deciding to apply for the MBNQA.

(0 indicates low influence and 10 indicates high)

- _____ Increased profits/cash flow
- _____ Increased return on investment (ROI)
- _____ Market share growth
- _____ Increased return on assets (ROA)
- _____ Improved customer satisfaction
- _____ Reduced customer warranty costs
- _____ Project costs to implement within reason
- _____ Other (please list):

The participants' indifference curves were assessed by asking them the percentage improvement in each of the following performance criteria their company would need to justify efforts toward applying for the MBNQA?

- _____ Increased profits/cash flow
- _____ Increased return on investment (ROI)
- _____ Increased market share
- _____ Increased return on assets (ROA)
- _____ Improved customer satisfaction
- _____ Reduced customer complaints _____
- _____ Reduced customer returns _____
- _____ Reduced customer misshipments _____
- _____ Improved customer retention rates _____
- _____ Others (please list) _____
- _____ Reduced customer warranty costs
- _____ Other (please list)

The participants were asked as a validation exercise to provide as a percentage of sales, at what level would the MBNQA be cost prohibitive?

_____ % cost of sales

A second validation question assessed the amount of time (in years) required to prepare for an application and a visit from the auditors that would make the MBNQA to be prohibitive?

_____ 1 year or less

_____ Between 1 and 2 years

_____ Between 2 and 3 years

_____ Between 3 and 4 years

_____ Between 4 and 5 years

_____ 5 or more years

The next three sets of questions asked the participants to assess to what level the major MBNQA systems listed below contribute toward achieving increases in each of the following performance criteria.

- Financial performance criteria: Profits, ROI, ROA and cash flow targets.
- Market performance criteria: Market share and market share growth.
- Customer satisfaction performance criteria: Customer satisfaction and customer warranty improvements

(0 indicated low contribution and 10 indicated high contribution)

_____ **Leadership** system.

_____ System to analyze and use **internal data**.

_____ System to analyze **competitive comparisons** and benchmarking.

_____ System for **strategy development**.

_____ System for **education and training** programs.

_____ Systems of **high performance work and employee well being** programs

_____ Systems for **product design**

_____ Systems for **process management**

_____ Systems for **supplier management**

A final reliability question assessed the participants choices by asking them, using the letters (A – G), to rank order the following criteria in order of relative importance for influencing the decision to apply for the MBNQA.

(A is the most influential, B the next most influential with G being the least influential)

- _____ Increased profits/cash flow
- _____ Increased return on investment (ROI)
- _____ Market share growth
- _____ Increased return on assets (ROA)
- _____ Improved customer satisfaction
- _____ Reduced customer warranty costs
- _____ Project costs to implement