NBER WORKING PAPER SERIES

CHARACTERISTICS OF TQM: EVIDENCE FROM THE RIT/USA TODAY QUALITY CUP COMPETITION

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Working Paper 7241
http://www.nber.org/papers/w7241

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1999

We are grateful to the 15 companies we visited for permitting us to interview their employees. We thank participants at the NBER pre-conference (Cambridge, MA, July 1998) and NBER Organizational Change and Performance Improvement Conference (Santa Rosa, CA, April 1999) for valuable comments. We especially thank David I. Levine (the discussant) for useful input, and Donald Siegel and David Waldman for additional suggestions and background material. All opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

This paper reports the results of a field study examining the use of TQM at 15 firms. The sample is drawn from winners and finalists of the RIT/USA Today Quality Cup. The authors interviewed 75 employees (5 per firm) including 14 executives, 44 middle managers, and 17 front line workers. The interviews elicited information on the motives for adopting TQM, the role of leadership, the use of monitoring, the use of rhetoric, the extent and type of training, the basis for employee evaluation, compensation, and promotion, the use of teams, reallocation of authority, and the results of the TQM program. We use the data to provide a description of how TQM works in practice, including factors that determine patterns of use across firms. A major result is that team-based problem solving is used about twice as frequently as devolution of authority in our sample. We attribute this result to the higher costs of monitoring and corporate change associated with devolution relative to problem solving.

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1. Introduction.

The purpose of this paper is to construct a portrait of a firm committed to Total Quality Management (TQM) and to describe and explain the variations observable among such firms. The firms selected for this study were among fifty-six firms that nominated teams that were winners or finalists in the RIT/USA Today Quality Cup Competition in the years of 1992 through 1998. These represent what were judged to be the best out of over 2,200 nomination received by the Quality Cup over the first seven years of its existence. Richard Rosett's position as founder, director and judge of the Quality Cup put us in a position to use this unique database and gain entry to participant firms. Joshua Rosett has familiarity with the competition and twice has served as a judge.

Our interest in the topic was stimulated by the broad set of examples of TQM team-based performance improvements represented in the nomination archives of the RIT/USA Today Quality Cup. Between the two authors, we have read well over half of the Quality Cup nominations. The topics we chose to pursue in this paper reflect this wealth of knowledge, but our findings are based on field studies of some of the best performers from the Quality Cup archives. We conducted interviews with employees of fifteen Quality Cup winners (6) or finalists (9). We spoke to five employees at each firm, ranging from senior executives to front line employees. This approach allowed us to obtain details, from several perspectives, about the history of the TQM initiative at each firm.

Our goal in this paper is to provide evidence on how and why TQM works. Significant research suggests that TQM improves quality and efficiency (e.g. Easton & Jarrell [1998]; Powell [1995]; Hendricks & Singhal [1996]; Hendricks & Singhal [1997]), but few papers provide an internal view of what drives these improvements. In contrast, our paper follows Wruck & Jensen [1994], which develops a theory of TQM and then illustrates the theory with detail drawn from observation of a single firm. In this paper, we trade off some richness of detail in order to obtain a larger sample that allows us to see patterns unavailable from examination of a single firm.

A major objective of this paper is to distinguish between two potential sources of improvement associated with TQM; namely, delegation of authority vs. team-based problem solving. We find that different factors drive the costs and benefits from each method, and that though some firms engage in both behaviors, problem solving is more prevalent. We attribute this to the fact that problem solving and related activities (providing an atmosphere conducive to employee input) provides significant improvements without some of the costs associated with delegation of authority. Though this is one of our principal findings, we also examine several other aspects of TQM.

Section 2 provides a background for this paper including links to other research and more detail regarding why we examine the questions raised here. Section 3 describes the Quality Cup competition. Section 4 explains how the fifty-six firms in the original panel of winners and finalists were reduced to fifteen. Section 5 describes the interview procedure and explains how

we processed the data. Section 6 discusses motives for adopting TQM, the role of leadership, the extent of empowerment, monitoring, the use of rhetoric, training, and evaluation, recognition, and compensation. Finally, section 7 provides a composite portrait of the TQM firm and discusses variations in the portrait. This section also focuses on an important distinction between the two manifestations of TQM: operational empowerment and problem-solving by teams that include members with specific knowledge. It argues that problem-solving is inexpensive, does not require significant organizational change, and can provide relatively swift returns. Because the advantage of exploiting specific knowledge through operational empowerment may be outweighed by training and monitoring costs, problem-solving alone may be far more widely practiced that full-blown TQM because it entails few such costs.

2. Background.

The introduction notes that researchers have shown linkages between TQM and performance improvements in several dimensions. For example, Easton and Jarrell [1998] provide empirical evidence that successful adoption of TQM does, in fact, improve both accounting measures of a firm's performance and its market valuation. The improvement is greater for firms with mature, well-established quality programs than for the less mature. Easton and Jarrell use Malcolm Baldrige assessment criteria and develop measures of the extent of use of TQM as driving variables in their analysis. Similarly, Black and Lynch [1997] show that adoption of practices such as TQM, by allowing increased employee input, improves productivity. Helper [1997] shows that both customer and employee inputs lead to reduced costs, and that higher wages increases the effect. Other research provides evidence on the efficacy of practices such as quality circles and ESOPs. Levine and Tyson [1990] provide an extensive review of this literature.

Though these papers provide evidence on the efficacy of TQM, they generally provide analysis based on establishment- or firm-level data, so they are not able to provide much insight into how the adoption of TQM practices translates into improvements. Wruck and Jensen [1994] provide both an economic rationale for TQM-based efficient use of information, and a specific example of how this translates into value. Their central thesis is that employment of TQM organizational principles can increase the firm's efficiency and productivity by exploiting available but previously untapped human capital. At every level in the firm, employees gain experience and knowledge that could be used to improve performance by reducing errors, increasing quality, or enhancing efficiency. Employees must be trained in methods of scientific reasoning so that they can make rational use of their specific knowledge on behalf of their employers.Trained employees must be given authority to make performance-improving decisions based on results of their reasoning. This entails empowerment: transferring decision-making authority to employees lower in the hierarchy than is customary. Empowerment increases agency costs because an empowered employee may use enhanced decision rights for personal gain at the expense of the employer. In balancing the monitoring costs against the advantages of exploiting the firm's untapped pool of specific knowledge, some firms will find that by reallocating decision-making

authority they can improve performance.

This reallocation of decision-making authority often imposes substantial costs. Both those whose authority is reduced and those whose authority is increased may resist the change. Because employees' interests and the firm's are not identical, devolution of authority increases the cost of monitoring. The cost of overcoming resistance to change and the increased monitoring costs may outweigh the advantage of accessing valuable specific knowledge through devolution. The Wruck and Jensen model encompasses problem-solving as another manifestation of empowerment. The costs of problem-solving comprise mainly training and the opportunity cost of time spent in the problem-solving process. The use of problem-solving teams need not involve significant organizational change or increased monitoring costs. This raises the question of whether firms' successful use of problem-solving is necessarily associated with more general reallocation of decision-making authority. In extending empowerment to the point where the marginal cost equals the marginal benefit, a firm might find that it pays to emphasize problem-solving. Are the efficiency gains attributed to TQM achieved through widespread devolution of authority or are they largely due to problem-solving?

The Quality Cup archives contain more than two thousand of examples of value gains achieved through team-based problem solving. The rules of the Quality Cup Competition practically insure that successful teams will be problem-solving teams, not individuals or teams necessarily empowered in ongoing operations. While the teams nominated for the Quality Cup have been enabled and encouraged to apply their specific knowledge to problem-solving, they are seldom given authority to implement solutions without permission from higher authority. The delegation of authority is limited to a well-defined set of decisions and it is temporary. The gains from this sort of empowerment can be substantial and the cost can be low because it does not require large scale organizational change. If this were its only manifestation, TQM would still be a significant contribution to efficiency improvement. Some of the larger firms in the Quality Cup archives annually submit multiple nominations, suggesting broad use of problem-solving teams, to good effect.

Three examples, drawn from the Quality Cup competition, illustrate the nature of problem-solving and its power to improve efficiency.

1. A team of five hard-hats employed at U.S. Steel's Gary Works eliminated defects that threatened the plant's survival. They were trained in simple problem-solving techniques and charged with determining why 2.6 percent of the steel shipped to Detroit automobile manufacturers was rejected as defective. The big three had announced their intention to switch to Japanese competitors and the largest U.S. manufacturer of sanitary cans had already switched. The team found that much of the damage occurred in shipping and that it could be reduced through the use of inexpensive plastic devices that protected the coils of steel from damage done in securing them to the flatbed trucks on which they were shipped. They also found that good steel was being rejected because the customer wrongly believed that a

powdery white residue was a defect. Elimination of these sources of customer dissatisfaction reduced the defect rate to .6 percent, won quality awards from the customers, recaptured the can manufacturer, and saved the plant, which is still operating.

2. The United States Navy, an early practitioner of TQM, was driven by its leadership to minimize the effects of force reductions. A Navy depot responsible for production of travel orders reduced its turnaround time from about six weeks to about three days. A team of clerical employees found that the chief cause of delay was incorrect data entry. It also found that more than 80 percent of the data being entered were already available in their own data base. They simplified the request form. As they reduced the turnaround time, they found that the number of requests fell dramatically. Because the turnaround time was so long, Navy personnel submitted requests even when the likelihood of travel was low. They had been reserving places in the queue.

3. Federal Express formed a team to improve the sorting of parcels that needed to go out of Memphis on commercial passenger flights because they had missed the regular Federal Express flights. The sorting is done largely by casual part-time labor. The winning team comprised workers who sorted the packages: a full-time employee, who led the team, and several casual part-timers. They developed a system in which numbered squares on the floor corresponded to numbered instruction posters on the wall. The rule was, when you are standing in square one, follow the instructions on poster one, etc. This reduced the need to instruct workers unfamiliar with the process and also reduced the number of errors. The first year savings, of refunds for late delivery, amounted to $600,000. Assuming this gain is perpetual and the discount rate is 10%, the value of solving this problem was six million dollars. It is unlikely that the opportunity cost of time for those on the problem-solving team amounted to even a small fraction of this value.

In all three of these examples, the results were achieved by applying specific knowledge available to front-line employees. Team members were trained in simple problem-solving techniques, assigned a specific problem to solve, and produced solutions subject to ratification my management. Federal Express won a Malcolm Baldrige National Quality Award, suggesting that empowerment went far beyond problem-solving, but none of these examples contains evidence of a general reallocation of decision-making authority. The resistance to general reallocation and the cost of overcoming it tends to discourage the implementation of TQM, but this need not deprive a firm of significant TQM benefits. It is possible that many of the TQM gains can be obtained simply through problem-solving. To gain some insight into whether this is so, we conducted a series of interviews with a sample of Quality Cup winners and finalists. Our results shed some light on the extent to which problem-solving alone, reallocating authority, or both practices provide the benefits observed be associated with TQM initiatives\

3. The Quality Cup

The Quality Cup Competition was created in 1991 as a partnership between USA Today and the Rochester Institute of Technology College of Business. It honors teams making exceptional contributions to the quality of their employers' products or services, or to the efficiency of their processes and it publicizes exemplary applications of Total Quality Management. Nominees are asked to submit three brief essays dealing with: the process which led to the accomplishment (400 words), how the accomplishment was measured (200 words), and a description of the accomplishment (400 words). They are scored on ten attributes, six having to do with process, two having to do with measurement, and two having to do with accomplishment:

- Process (six attributes, each weighted .067 for a total of .40): level of empowerment, the use of quality tools, customer-driven goals, quality leadership , reproducibility of the process, and continuous improvement

- Measurement (two attributes, each weighted .10 for a total of .20): appropriate data and appropriate statistical methods

- Accomplishment (two attributes, each weighted .20 for a total of .40): impact on the organization and exemplary value[1].

Awards are made in six categories: Education, Government, Health Care, Manufacturing, Service, and Small Business. Judging is as follows:

- In each of the five categories, groups of about twenty-five nominations are assigned to two judges each. In each pair, the two judges score independently. Their scores are standardized and combined into a composite score. The top scorers in each category are designated semifinalists. Depending on the number of nominations in each category, and the quality of the nominations, these number from six to fourteen

- In the second round of judging, each of the categories is assigned to a panel of three judges. These judges score the semifinalists without knowledge of the original scores and, in each category, select up to three nominees for site visits.

- In the third round of judging, each nominee is visited by two of the second round judges. On the basis of the site visits, one nominee in each category may be named a winner, and the other two may be named finalists. A winner has been named in each category every year, but occasionally a nominee, after a site visit, has failed to

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[1]Appendix A contains the RIT/USA Today Quality Cup 1999 nomination form.

be named a finalist.

More than four hundred nominations were received in the first year of the competition. The number decreased annually and has stabilized at about 180. The merit of the semifinalists has not deteriorated. Altogether, the Quality Cup archives contain more than 2,200 nominations, representing more than 1,800 separate organizations. About 500 nominees have been named semifinalists by first round judges, indicating sufficient merit to warrant consideration by second round judges. This does not imply that none of the others possessed similar merit. We regularly receive correspondence, after each annual competition, providing additional data which would have raised the nominee's score significantly, had it been included in the original nomination.

Several characteristics of the nominees suggest that they have been caught up in the quality-oriented organizational change that has swept through much of U.S. industry over the past two decades

- Some nominations come from organizations that have won other quality awards: the Malcolm Baldrige National Quality Award, state quality awards, or quality awards presented by industrial customers to exceptional vendors.
- Some of the nominees have won internal competitions sponsored by their employers.
- Many of the nominations are submitted by managers with responsibility for their employers' quality programs. While quality control managers preceded TQM, the nature of the nominations they submit suggests that these managers are committed to TQM.
- In describing the processes that led to the nominees' accomplishments, a majority of the nominations use terms typical of the quality revolution (i.e., Pareto charts, brainstorming, benchmarking, fishbone diagrams, six sigma, seven-step problem-solving) and in particular those favored by famous TQM consultants (i.e., Crosby, Deming, Juran).

4. The Sample

From 1992 through 1998, there were sixty-three Quality Cup winners and finalists in the three for-profit categories: Manufacturing, Service, and Small Business. Because several firms had submitted multiple nominations, these represented fifty-six individual firms. All of the firms were invited to participate in the Quality Cup Research Project. The responses to these invitations were as follows:

Category	Invited to participate	Accepted invitation	Interviewed
Manufacturing	21	10	6
Service	18	6	3
Small Business	17	10	6
Total	56	26	15

Firms declined to participate for a variety of reasons: change of control, contact person no longer employed, too burdened with similar requests, no reason given, and no response to the invitation, even after several attempts by letter and telephone. Time constraints made it impossible for us to schedule interviews with all twenty-six of the firms that volunteered to participate. Of the twenty-six firms, interviews were conducted with fifteen. The table above shows how these were distributed.

Since factors unrelated to the nature of the firms determined the sites we were unable to visit among the twenty-six willing to participate, we believe the patterns we observed are likely to be representative of all twenty-six. It is also likely that firms declining on grounds of too many such requests, have persisted in their TQM programs. Thus we believe our findings apply to at least half of the winners and finalists. For those that opted out for other reasons, our conclusions may be inappropriate.

5. The Interviews

At each of the fifteen firms, interviews were conducted, usually with five employees, including high level executives (14, including 9 executives who were either CEOs or the highest ranking manager at the site visited[2]), middle management (44), and front line workers (17). The distribution across ranks within each establishment allowed us to derive a reasonably complete picture of the effects of TQM policies from both the perspective of the policy maker and the employees affected.

The interviews were conducted as conversations dealing with respondents' own responsibilities, the nature and extent of change in the organization, and the impact of change on the respondent. The interviews generally lasted between 45 minutes and one hour. We did not use an extensive questionnaire, but rather asked a fairly limited set of open-ended questions. We obtained the questions by starting with an extensive set of questions designed to get at the details of adoption and implementation, costs and benefits of TQM, the impact on individuals in terms of

[2]One additional firm scheduled an interview with the top manager at the site, but he was called away for an emergency the day of the site visit.

compensation and changes in work patterns, and a number of other factors. We then categorized these and narrowed them down to find a smaller set that would provide openings for respondents to talk about the main issues we were interested in. In brief, these questions asked respondents to discuss the motives for adopting TQM, the role of leadership, the use of monitoring, the use of rhetoric, the extent and type of training, the basis for employee evaluation, compensation and promotion, the use of teams (examples and description of the process), reallocation of authority (extent and examples), and to provide characterization of the results of these measures and specific examples of how they work and what they produced.

All interviews were recorded and transcribed. We then processed the interviews in three stages. We first read each interview and created a hyper-linked index (using the Corel® WordPerfect® index tool) with index terms including both the main subject areas we wished to examine, and any themes which appeared in the texts themselves (which varied from site to site). This both created systematic data for use in subsequent processing steps, and allowed us to verify the internal consistency of the interviews from each site. In general, we found that almost all respondents had something to say about the main subjects of interest, and, within firms, their responses were consistent. For example, all respondents would name the same person as responsible for the adoption of TQM at the site, or similarly describe the process for choosing teams at the site.

We next examined the indexes across firms to find patterns in the data to help flesh out the use and value of TQM. Finally, we used the indexes to go back through the texts of the interviews and cull quotes which we believe are both representative of major patterns of behavior and provide value in understanding what we found. Based on this methodology and our reading of the interviews, we believe the data we elicited provide a solid basis for generalizations, within the fifteen firms in our sample, about the sources of value from TQM, especially team-based problem solving and reallocation of authority, and a number of supporting factors including the motives for adoption, the role of leadership, the use of rhetoric, training, and compensation and promotion policies among firms in our sample. Though our data are not adequate for the purpose of rigorous statistical analysis, they do provide valuable insights, pointing the way toward future research.

6. Characteristics of the sample

6.a. Adoption of TQM

Full implementation of TQM entails transferring decision rights from one group to another, generally to lower positions in the organizational hierarchy. A firm implementing TQM must be prepared to transfer of decision rights from middle managers to front-line employees. Reducing the authority of middle managers is likely to meet opposition from those managers, who may feel that their jobs are diminished or possibly threatened. Consequently, they may oppose or obstruct the adoption of TQM as they perceive that it is not in their interest, though it may be in the interest of owners who want to tap into the specific knowledge available to employees at

lower levels in the organization. Front line employees also have incentives to resist adoption, as TQM often requires additional effort on their part while exposing them to new risks. Making the judgment calls associated with increased authority requires effort, and may lead to situations in which they are criticized or punished for their judgments. Simply doing what you are told is both easier and less risky. Consequently, resistance is also encountered from front line employees.

Despite these obstacles, a decade ago several major U.S. firms adopted serious TQM programs because they were threatened by Japanese competition. The best-known examples were Motorola, U.S. Steel, and Xerox. In each case top leadership committed itself to implementing TQM. The CEO, himself, received TQM training which then cascaded down through the ranks. To counteract the problems outlined above, opposition from managers at any level was severely discouraged. One top executive asserted that in addition to the usual training, empowerment, and rhetoric (vision, mission, values) an essential ingredient for successful implementation of TQM is "weeding out" executives resistant to change Among firms less threatened, half-hearted efforts were made to implement TQM. These included Eastman Kodak, General Motors, and IBM. In these cases, the CEO's commitment was limited. TQM was viewed as one alternative for management of individual business units, not an imperative for the firm. Resistance was tolerated. In each of these cases, individual units were successful in implementing TQM, but the larger organization failed to reap the potential benefits. IBM's Rochester, Minnesota site, for example, won a Malcolm Baldrige National Quality Award while its parent was struggling. G.M. and its Cadillac division had a similar experience.

In our sample, we observed a few cases where resistance to the adoption of TQM clearly existed and had to be overcome by strong leadership from the top. It should be noted that nominees for the Quality Cup come largely from firms that have succeeded in implementing TQM, at least to some degree. An example of opposition is a sales manager whose authority was diminished by this change. Though he ultimately supported the change, he admitted initial reluctance:

- *Going back to before we had all these sales people and before we had the way we are doing things now, shall I say, the efficient way we are doing things now. It got to the point where I wasn't getting back to customers... From that point of view, somebody had to do something, or the customers weren't simply going to get satisfied. They weren't going to get the service. So then, what happens from there is an idea is, you know, badgered around. J., myself, some of the other sales people maybe, maybe even some of the input came from G., for all I know. The meetings I had with J. was that there had to have been a way to do things. One of the things that came out of it through the necessity of just simply empowering the sales people to make some of these decisions. Why should... I mean I am going crazy. I am very busy. J. was certainly very busy. So something had to be relinquished. In the beginning it is not an easy thing to do because you are always afraid that someone is going to make a real drastic mistake. Then, you know, that's how people learn. I had to just... A real blunt*

way of putting it, but I had to basically just throw up my hands and say, 'Let them make mistakes. That's how they're going to learn. Let them do their thing. Eventually, over time, they will learn what the correct way is of doing it or what we would like to see as a company, and so forth. Again, it's not going to happen overnight.

Not surprisingly, his objection is cast in terms, not of injury to himself, but of injury to the firm. In fact, before the outside salesmen were empowered to provide prices and delivery dates without consulting the sales manager, they were trained in how to do it.

We have documented some of the primary reasons for adoption of TQM. The categories we selected reflect both general knowledge and our experience with the Quality Cup archives. In particular, we looked at threats to survival, competitive advantage, customer requirements, and ISO certification. Our classifications summarize our reading of the transcripts.

Of the fifteen, only two claimed that survival was the issue. Both were firms that had adopted TQM early, one in response to ruinous foreign competition and the other, a U.S. government contractor, in response to a catastrophic reduction in demand. Of the rest, seven cited competitive advantage as the motive for change. These were either successful start-ups whose founders implemented TQM at the beginning as a way of breaking into an existing market, or firms trying to pull ahead of the rest of the pack in highly competitive markets. Two of the seven no longer have active TQM programs. Six firms in the sample adopted TQM at the urging, and in one case, with the help, of their customers. Eight of the fifteen mentioned ISO 9000 certification among the reasons for implementing TQM. These observations suggest that TQM has graduated from an emergency treatment to a standard management technique, supported by market forces.

6.b. The Role of Leadership

Of the seven Malcolm Baldrige criteria, Leadership is number one. The introduction to the criterion says:

> An organization's senior leaders need to set directions and create a customer orientation, clear and visible values, and high expectations. The directions, values, and expectations need to address all stakeholders. The leaders need to ensure the creation of strategies, systems, and methods for achieving excellence, stimulating innovation, and building knowledge and capabilities. The strategies and values should help guide all activities and decisions of the organization. The senior leaders need to commit to the development of the entire work force and should encourage participation, learning, innovation, and creativity by all employees.

> Through their ethical behavior and personal roles in planning, communications, review of organizational performance, and employee recognition, the senior leaders serve as role models, reinforcing values and expectations and building leadership and initiative throughout the organization..

Acknowledgment of the importance of leadership was pervasive in the interviews we conducted. Asked to name the individual responsible for initiating the firm's quality program, almost every respondent immediately provided a name. The answers were consistent within firms. Even in the case of the two firms that seem to have given up on TQM, the individual responsible for its implementation was named, and his departure from the firm appears to be associated with the lapse. The following quotes, chosen from many similar examples, provide elaboration:

- *Having senior leadership and middle leadership deal, actually be leaders and promote this stuff is... You cant just hang it on the wall, because that becomes a slogan and not a culture.*

- *The key was D. S.. [senior site manager]. A couple of them [senior management] were invited to a major semiannual quality symposium or something. They got to hear some CEOs and some other folks, who were using SQC/SPC. They got turned on, what that would be like and it makes sense. It fit with the philosophy on how we wanted to manage this mill and that's sort of how it started.*

- *All I can say is that working here for me has been an experience that has been, as I say, innovative and exciting. I am very enthusiastic every day that I come in. I think that a lot of people that I work with, the associates here down to the people in the warehouse get enthused because they see that I am enthused, and then I explain to them that I am enthused because people like G. D., the CEO, is enthused and J., the President, is enthused. So we get it from higher corporate management all the way down. So it sort of cascades down. If you talk to anybody here, you will understand that there is an enthusiasm, a vigor that you won't find in a lot of companies today. I think that's important. If* [leadership is] *not there, forget about it.*

- *At this plant had there not been a commitment by the General Manager, and I am sure his commitment was reinforced by his superior, it would of taken longer and would not have been done.*

- *The way I feel is... I attributed to one man, J., he wasnt the original General Manager here. B. was and I am sure he was a fine individual. He left shortly after I started. J. is the General Manager that I attributed all to. He came with that attitude. I think he trained all of us. This is something that he insisted upon*

and he built the structure that we now maintain. We may have deviated a little from J's approach, but the basic culture, the concepts that he taught us, we carry with us and pass it down to, not only our employees, that... I didn't start out by being responsible for shipping or receiving, I started out in a totally different setting... that through my years I've taken his teachings with me and pass them through. Now I have supervisors that I am responsible for. I try to give them the benefit that I got from him. So I attribute it to J. I really do, as the beginning. And then I credit all of us for helping to maintain that.

- *Basically, what sums up our mission here is the vision that C. has. He is just an honest, caring individual, and I think that reflects down from everybody that reports to him right down the chain. I think everybody supports his ideas, thinks they are great ideas, and it's something that we talk about at every level. I really think leadership has a lot to do with where we are at now.*

- *I think it was largely because it was J's view that in order to maintain the quality he wanted which was just infinite quality...*

  Rosett: J. is your CEO?

  A: Right. He believed in it and because of that, he started on this program. Because he believed in it and at his level, it became fairly easy to implement. It is easy to get buy-in when is starts with J.

The last few words provide a key to understanding the almost universal belief that strong commitment by top management is essential to successful implementation of TQM[3]. Any major change in an organization requires commitment by leadership if it is to succeed. What distinguishes TQM is the ongoing need to maintain the focus of all employees on issued that transcend their own immediate responsibilities. To focus on continuous improvement, an employee must not only do his job, he must be alert to ways in which efficiency might be improved by changing the way he does it. To focus on customer satisfaction, an employee must attempt to view the transaction from the customer's viewpoint. If satisfaction calls for departure from an ordinary practice, the employee must exercise judgment as to the appropriateness of such departure and decide whether to risk it. Training, monitoring, and frequent reminders, backed up by leadership's commitment, all help maintain direction and focus.

6.c. Extent of empowerment: reallocation of authority vs. problem solving

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[3]These results are consistent with findings elsewhere that leadership is a key to success in using TQM. For example, see Waldman [1993] and Waldman, Lituchy, Gopalakrishnan, Laframboise, Galperin, and Kaltsounakis [1998].

All of the seventy-five respondent were given an opportunity to describe their own experiences with devolution of decision-making authority, both in terms of reallocation of authority and participation in problem-solving teams, as well as through less formal methods such as suggestion programs. We reviewed the transcripts in order to classify each site on the basis of its use of the each of the primary methods. Overall, we found that problem-solving was used at roughly twice the rate of reallocation of authority. This is summarized in the table below:

Devolution of Authority and Problem-solving	6
Problem-solving alone	7
Neither	2

In one of the two cases in which neither is employed, the initial effort to establish a TQM program seems to have failed and in the other a change of control ended the TQM program.

Devolution is the strongest form of empowerment and it is the most expensive and difficult to implement. Resistance to the transfer of decision-making authority from higher levels within the organization to lower needs to be overcome. Empowered employees need to be trained, both in the scientific disciplines that enable them to use their specific knowledge effectively, and in aspects of their new responsibilities, previously left to their supervisors. Finally, empowered employees need to be monitored to insure that their authority is used in the interest of the employer.

The most obvious factors determining how far to carry empowerment to employ are costs and benefits. Both of these may be difficult to measure. Consistent with this, we found a broad range of approaches to estimating the cost/benefit tradeoff. With respect to empowerment of front line employees, we found that several interviewees could cite estimates of dollar savings associated with granting specific rights to front line employees. Examples of this are yearly savings due to stopping production when the employee knew faulty product was being produced, and cost reductions due to saved supervisory labor by allowing front line employees to deal with dissatisfied customers without supervisory intervention. In these cases, management frequently also could cite specific means of monitoring to minimize agency costs. For example, a service firm that authorizes front line employees to grant exemptions from normal service charges tracks the total dollar value of exemptions. A manufacturer that authorizes front line employees to stop a production line monitors lost output.

In some cases the benefits from extending authority are difficult to measure, but it is extended anyway because management simply believes that the benefit outweighs the cost. For example, a service subsidiary of a larger service firm empowers its employees so as to provide high quality service to both its own and its parent's customers. They believe, but cannot explicitly demonstrate in dollar terms, that the quality of the subsidiary's service attracts business to the parent, and that the benefit to the parent helps justify the cost to the subsidiary. In another case,

employees are allowed to placate dissatisfied customers at cost to the firm. The lifetime loyalty this policy is expected to inspire is difficult to document.

With respect to team-based problem solving, at the hard-nosed end of the scale, at least one firm, a manufacturing site, requires each problem-solving team to supply estimates of all costs and benefits of implementing a new process, including the opportunity cost of time the team spent examining the problem at hand. These estimates are required to be conservative on the benefit side. The actual results are then tracked following implementation and present values of expected future gains are calculated. This same firm has a fairly complex scheme for awards based on both the efforts made by teams and the success of their suggestions. It has numerous teams solving problems on a regular basis, and apparently has significant data on the value of teamwork in their plant. Other sites gave at least some examples of estimated dollar value of solved problems. Still others either do not or cannot estimate such values, but act as though they justify the costs of empowerment. All of the firms we interviewed stressed their focus on customer satisfaction. Even in the absence of information about the effects of process changes on revenues and expenses, most employees at all levels implicitly accept the idea that improving customer satisfaction benefits owners.

Three of the six firms that employ both devolution and problem-solving have mature, well-established TQM programs. In each case the interviews elicited consistent and detailed accounts depicting TQM programs strongly supported by leadership, and including customer focus, training, continuous improvement of processes, and devolution of decision-making authority.

- *Integrated product teams are empowered to the level of cost structure and schedule structure for that team. If they're putting out product X, they have a budget for product X and they have a schedule for product X that's going to flow up to a master schedule and a master work break down structure for that cost. They are empowered within that scope of cost and schedule. Now, if they want to go outside those empowerment boundaries, they can do so as long as they don't affect someone else's grand scheme of things, costs and schedules. So you may have five integrated product teams, with five products, cost structures and schedules. You need to get approval from the leadership team, if you will, in order to affect someone else's cost and schedule, and that team has got to give approval to that. You need to be able to justify that for the greater good of the program this makes sense.*

- *Typically here, a lot of our integrated product teams have customer representation and supplier or partner representation. They key there is to have customer and supplier representation and have those people be strong decision makers.*

- *We have team launches. We have a regular process by which we form teams. We do it both during the proposal phase, and we have contract launches....They are*

usually a one day session facilitated generally by two people. There is some prep work before it with proposed subintegrated product teams on a program, and then we teach them the tools to be a team. We let them determine the team norms. One of the most effective modules we will take them through for both a proposal and a program is a risk module whereby the team members will identify the risk and categorize it and prioritize it. We will as a team work several... We will pick the high probability, high impact risk, which would be a very high risk and aggregate. As a team we will work some risk mitigation strategies just to teach them the tools for working as a team in areas like risk management, intergroup coordination, and our proposal launches will actually determine strategies, themes, and discriminators to produce a winning proposal. We will do something similar on contract as to what it would take to perform brilliantly on a contract.

- *So this SEI (Soft ware Engineering Institute)is actually an institute within the bounds of the aegis of the Carnegie-Mellon University. There are very formal ways to determine where you are on their maturity scale. Our customers increasingly use this scale, this evaluation to determine to whom they will award contracts. So large contracts to the military that have measurable software content, the customer will send a team in to examine your software maturity against this set of criteria with the award going to the... Well there is no one single criteria that says if you do well on this, you get the award, but it's just a big swinger in picking who will do it. So in 1996 we were judged a level 3, which not a lot of people were at that time. The SEI has a lot of data that says the world at large is less than a 2. The next year we got ISO 14,001, which is the environmental health and safety, and we did that on the trial run. We used that as an example again of the strength of our processes. We called the registrar in to take a look at us so that he could tell us what we were going to have to fix to get ready for running for the roses. He looked at us on the trial run and registered us on the spot. Then the crown jewel was in December of 1997 to get recognized at SEI level 5. At the time we did that there were only three or four other companies in the whole world that had achieved that level, so it's a pretty rare atmosphere to be an SEI level 5. It's just the latest in what we view as where you can go when you cast your lot with process management. Since I've talked so much about processes, the next chart shows the process view that we have of how this place runs. It starts with this leadership process which drives a strategic planning process which drives a business acquisition process, and then after you have acquired the business, you turn it over to the performance management process to now manage that which you have won.*

- *M: We came up with what we call RLO [regional lending officer] position and that was revolutionary at that time, because the business traditionally was very functional. You had simply on a front end to take applications, people then will process that application, then people who close the loans and there are other*

people who did other functions and services. We said we had to change this. You have five points of contact there and as you hand off the file to the next functional process, you could lose something that was told by somebody else to that customer. So, we said let's just do something better and let's have 1 point of contact and let's have a regional landing officer, who has most of those responsibilities. And by doing that, we said to the customer, here's your ...brand .

- *J: So my goal was that everybody can tell you what's important to their business, you know, how well they answer phone calls, and cash flow, and so on and so forth. Everybody can tell you their quality indicators. Our goal is 100%, everything done within X amount of days. I want everybody to know their compliance rules, same way. Once I got to that point, I felt that I made it. So step one is identify what the compliance regulations were. Two, identify the owners. Three, is put a team together to look at the areas and identify what compliance processes had to be in place to meet those regulations. I used to joke. I used to say that unit level quality is one of my biggest competitors for good compliance. The reason is that everybody in the company has the power to sit there and look at the work flow process. They see this little loop in there, and they are like, 'What's this loop in this process? It doesn't make sense. Let's get rid of it.' Many times it is a compliance requirement that is in that little loop, and they get it out of there, and all of sudden we are doing the right process, it's very systematic, it's high quality, but at some point regulations said you had to sign your name right here, and we got rid of it because we thought it was a waste of time*

The following three examples illustrate empowerment in relatively new smaller firms. In each of these, the front line is directly visible to the CEO who founded the firm and was, himself, the instigator and author of the TQM program. It seems likely that direct monitoring of employees by top executives is less costly in these cases. Hence empowerment in terms of reallocation of authority is a more feasible option in these cases. All three involve devolution of authority.

- *V: In other words, if I empowered the inside sales person to start making decisions on pricing and that person could then give the customer on the other end an answer within the matter of a few seconds, all of the sudden it would feel pretty good to them. The better they felt, the more they did it. The more they did it, the more they got involved in doing everything, whether it be better efficiency in writing up paper work, paying more attention to what the needs were of the customer, and doing that whole thing... As you can imaging, when somebody makes a change if something happens, it's not like turning off a light switch where one day it's this and the next day it's, you know... It's a gradual change .*

Every employee of this automobile dealership has the authority to spend up to $100

satisfying a customer's complaint.

- *In any company, especially in a customer service industry, when a guest* [customer] *pulls in with their car and they have a problem, the service advisors are the closest link we have with our guest, because they are the person that sees the guest time and time again. They may have the same technician work on their car, but the advisor is the person that greets the guest and that calls the guest when they have to spend money. They have constant contact. That guest wants that advisor to be allowed to do whatever he needs to do to take care of them. They don't want to have a disagreement or misunderstanding, then have it have to come to me, then go to K., and then whomever it has to go to in order for it to be taken care of. They want the person standing in front of them to take care of it. That is the person they trust the most.*

  I mean, we lose one guest for $100, we're losing thousands and thousands of dollars over the next so many years in lost business.

- *A: When I first started, we had a supervisor and we took directions from the supervisor. Whatever jobs were required to be done that morning, we did them. When we were done, we were to go on to our next job. Now we are working as teams where we have a team leader for each line along with all the employees that are working along with that team leader. That's basically where we are at now. We are not totally supervised. We have our project coordinators where we get our jobs from and then we work as team leaders. As a group in the morning we'll meet to find out what we are running for that day. We will all get together and assign the people we think will do the best job on that job. In the middle of the day it may change too. We may have to stop one job and start another one.*

  Rosett: What's the difference between having a supervisor and having a team leader?

  A: The supervisor will give you directions on what to do and you'll do it. Working as teams, we direct ourselves.

In contrast to these, five of the sample firms, instead of providing examples of devolution when asked, described management's receptiveness to suggestions from below. These firms encourage employees to suggest improvements and to help solve problems, but they are not empowered in ongoing operations. These are typical responses:

- *A good manager always listens to the guys that are running the machines, doing the jobs.*

- *The days are over with management saying, 'No. We are going to go with this.'*

We have to do that sometimes because it is a matter of running the business. Some of the ideas that are out there are not really feasible, but they are never forgotten. Some of these things are actually written down because I do the minutes at the meetings, and I keep track of all these ideas whether they're good or bad.

- *Well, we have a suggestion box. Besides that, the guys would come in and talk to the dispatcher and then he would go to his manager and let them know. They would sit down and talk about it with this guy. Also, they have meetings for the drivers on a regular basis. The executive board meets regularly, and then the advisory board. Usually, most of the departments... The sales department has a meeting every Friday and they all get together and exchange their ideas. I work in the accounting department. We try to get together every week, if not every other week and discuss what's going on and anything that we can do to help each other out.*

- *We have drivers' meetings. We have an open door policy where if someone has a situation, problem, concern, question, or a way to do something differently, they are welcome to come in and see anyone [in management]. We welcome... We don't confess to knowing everything. Sometimes we get people who come from other moving companies also. Different people do things different ways. We are not that egotistical where we think everything we do is the correct way. We hope it is, but we will take suggestions. Our drivers and helpers come to us all the time with that type of stuff.*

These firms invite advice and suggestions from employees at all levels, train them in scientific reasoning, and grant them the authority to develop solutions to problems and improvement to processes, subject to ratification. The cost of this problem-solving practice is low relative to the costs associated with devolution. It seems likely that these firms find that the costs of devolution outweigh the benefits, but that the problem-solving from of TQM pays.

The next two examples deal with empowerment that does not entail devolution of authority. In one case, the employees are support technicians who handle customers' problems on the telephone, in the other they are software programmers. The nature of these jobs demands that the employees use their specific knowledge in ongoing operations. In each case, a time constraint was relaxed to, increasing the quality of performance, but also increasing the labor cost. In neither of theses cases was it necessary to overcome resistance from middle management, nor was there an increase in monitoring cost.

- *So there is the balance of quality and quantity. So, we ask that you* [a support technician] *average four calls an hour* [industry standard is between seven and eight], *but if you don't make four calls in any given hour , we are not going to come down on you. It's just at the end of the week when you total up your calls if*

you've been here 40 hours, then hopefully you've done around 160 calls.] Most people hit that metric. It's not a difficult goal to achieve. Some days you might walk out of here and may have only done 20 calls, but tomorrow you might come in and do 40 calls. It all comes out in the wash. If somebody has a very high quantity rating, I mean if they have an absurdly high quantity rating, I am going to check their quality scores and be certain that they are not just churning calls. So that's the check and balance that we have between the two.

- *F: I think that what principally happened was that it became okay to withhold completing a task or delivery of a task if it didn't meet the quality standards that were required.*

  Rosett: Became okay for whom to withhold?

  F.: For the N. people doing the work for... It became okay for those people to recognize that there were circumstances where quality demanded that more time be spent and so forth as opposed to being slavish to the schedule at the possible expense of quality. That was something that happened not only at N., but it was also recognized as being an acceptable thing by our customer at the site.

In these seven cases, benefits of TQM are realized through problem-solving teams, but not through devolution of authority. Our judgement, based on reading the transcript, is that cost benefit considerations, however imprecise, led to this result, and that in each case factors including the firm's industry, technology, age, and size explained the decision not to devolve decision-making authority.

6.d. Monitoring

Employees in all firms, whether or not they are practicing TQM, are monitored to insure that they are doing their jobs properly and that they are not acting against the interest of their employers. TQM, by broadening the allocation of decision-making authority, calls for intensified monitoring on both grounds. Empowered employees can further the firm's interest by putting their specific knowledge to good use, but they can also misuse or abuse their enhanced decision-making authority. The examples and commentary below illustrate how monitoring is used with TQM in our sample.

One theme we found was that when failures are detected, they must be handled in a fashion that does not degrade the environment of communication and trust required for TQM to produce results:

- *Rosett: Do you keep track of how many mistakes they make.*

V: Yes.

Rosett: *What do you do if somebody makes a lot of mistakes?*

V: Go back and determine why, is number one. Rather than point the finger and say, 'rarararararar' with this person. Sit down and talk to them, and it may even have involved going over the procedure and finding out that in me teaching them the procedure, that they may not have understood it completely. A pricing issue as an example, maybe we gave them a guideline as to how to price, but maybe in my teaching them, I wasn't getting my point across. So I would sit down and ask them to explain to me what the procedure was. If I am hearing something that's totally over here when I know it should be over there, then I know something is... I have to then find out why they think that way. If they come back and say, 'Well, you told me that,' then I would have to stop, without arguing, and go over the procedure all over again, and this time obviously getting the point across. Then we'd go from there. Usually it works.

In several cases, we observed that when authority is reallocated increasing lower-level employees ability to use resources, that specific resource usage is monitored. For example, with respect to the authority to spend up to $100 to satisfy a customer's complaint:

- *L: We have individual accounts. So I can see whose account on a monthly basis is high or low, or whatever.*

  Rosett: So if something was out of line, you would recognize that.

  L: Certainly.

  Rosett: $100. Is that hard and fast, or can they go beyond that?

  L: Oh, if its $119, it's not a problem. It's just kind of a guideline that Keith put out there for everybody to make sure that... Up to $100... You know, if it's $120 or $130 usually they come get me and run it past me. I'll get the details and go from there.

This example is representative of many similar instances of such monitoring. This pattern suggests that monitoring is specifically tied to enhancements in authority, and the ability to monitor may determine the types of authority that can be allocated. In fact, we found evidence that employees are encouraged to monitor themselves to see if their actions agree with both specifics and the "culture" of TQM in place at their site.

- *K: If you look at our mission, it talks about a trustworthy, flexible, and responsive organization who are highly qualified people at handling the customer's product.*

Cleanest and safest in the industry. Highest qualified employees who are knowledgeable and trustworthy. So how do you take this and make it real to people? So what we've done is... and I can show you the actual score card. We've established a score card where they measure themselves every day on quality, on safety, on cleanliness, and with cleanliness it's an objective way of measuring cleanliness. They have an actual list saying did you empty the trash bins? Did you do this? If you did all these things, then you get ten points. So it's an objective measure for cleanliness. With respect to knowledge as a part in their score card, they must read a procedure every single day. One person in each cell needs to read a procedure. With respect to knowledge as well, you get bonus points for certifying a person. Actually it will be easier if I show you a score card..

- *Rosett: So if I teach you how to do something, then I get some points for having done that.*

K: Right. If you look at the score card, and if you look at the mission statement, there is a direct correlation between the two. They score themselves every day on that, and they get rewards and reinforcements for scoring high. So that's the way we've driving the mission statement.

Rosett: They score themselves. What keeps them from cheating?

K: Well, we've done different things. There was some cheating with the cleanliness. And when that happens, which is normal, because if you reward them for scoring high, you're going to see unless you're managing.... That's what I was saying with respect to... It takes more management a lot of times to have a team based environment, because if you're not paying attention to it, then it will slip. So with cleanliness what we did is people were putting 10 points when they didn't deserve it, so I sat everyone in a room and said 'What do we want to do about this?' They decided to come up with a clean team - where there is a different group of three people who would go around at the end of the day and measure people, and that group would change. But then over time, that doesn't become an issue, and maybe what happens or what's not working as well as our continuous improvement process, or maybe are filling out the forms but they're not putting a lot of thought into it. So then we'll put more of an emphasis and get everyone together and say 'What are we going to do about this?' So it takes reinforcement. If you just have a score card and 1) you don't reward people for scoring high, it's not going to mean anything, and 2) if you have a score card and if you don't go out and recognize that people are doing on a daily basis, not that I have to walk up to every team every single day and say 'Great job for doing the score card,' but if the management doesn't pay attention to it, it wouldn't work

Where empowerment consists of relaxing, but not eliminating, the time constraints, there is no change in the need for monitoring. If a service technician is allowed an average of fifteen minutes to solve a customer's problem, a system for monitoring the length and quality of the call, is no more necessary than it is for a service technician who is expected to average eight minutes per call

- *Rosett: You have given the people who answer the phone more to do and more latitude in deciding how much they are going to do. How do you keep track of whether they are overdoing it or not doing enough?*

  G: Well, there are couple systems in place. We do have tools that we can use, like realtime, to see if the technician is taking a call and how long of a call they are already on. It's part of the responsibility of a coach to keep an eye on this tool. Let's say a technician has reached a 15 minute mark or maybe a 20 minute mark, it's usually a good sign for the coach to walk over and say, 'Hey, how are things going? Do you need some help?' If not, okay. If they are working towards a solution, no problem. If they do need some help, the coach is there to help them out. So we can track up to the minute. What we can also do is we track weekly. We get reports basically on how many calls our techs can answer. The quality, we send out surveys to customers. We track the quality. We have a weekly average of these surveys, and we provide that feedback to our techs so they know where they need to be or if they're doing great, 'Hey, here's the results. You're doing great.' So there are a lot of tools in place. Even as far as like our call boards... We have call boards up here on the floor so each tech knows how many calls are in queue. They can gauge how to handle the call. Let's say we have a customer who's pretty computer savvy and is willing to receive an E-mail for support, we will send an E-mail out to them, if they are willing. If there are no calls in queue, why don't we just go ahead and walk him through the process and give him that extra wow, you know. So it gives each of our techs a gauge too, by looking at the call boards.

Finally, external organizations may monitor the efficacy of monitoring monitoring. This appears to be a natural outgrowth of TQM's incorporation of suppliers and customers into internal activities such as product and process design. In addition to improving the quality of product and reducing problems, this provides benefits in the form of additional monitoring from outside parties.

- *In SEI level 4 you would be a part of a large organization that had a very, very well articulated process for the development of that software, and that those would be processes that were company wide, that were religiously followed and respected throughout the entire organization, and were monitored on a regular basis to ensure that those processes were being followed, and so forth, and rewards and punishments, if you will, were based on adherence to those processes*

and to that philosophy. In a level 1 organization you would be doing business as usual. Business as usual, whatever that is. It might even be very similar, but if I couldn't show you that we are doing it, and if you couldn't go from software developer to software developer and get the same answer, and that person couldn't show you that he or she was using the same process, then you would rate me down because I hadn't instituted those processes on a broad basis.

- *As far as exceeding customers' expectations, on all our moves we have questionnaires that go out to all our customers that get sent back to us so we can monitor the customers' opinions of our crews and our office staff and the whole move in general.*

6.e. The Use of Rhetoric

The use of rhetoric (vision, mission, values) and the belief in its importance is pervasive in all thirteen of the firms that are still practicing TQM. To be effective, the rhetoric needs to reflect leadership's commitment. Employees in our sample identify the rhetoric with leadership, and frequently credit the ideas embodied in the rhetoric for the firm's success. A few of the quotes illustrate the employees' understanding of the role of rhetoric:

- *There are nine core values and beliefs that our founder and chairman of our board, C. B. sat down and penned out one day before he even knew what he was going do. [He] was working for a company. He achieved a certain amount of success and became somewhat disillusioned with the corporate environment that he was working in. He left and took a year off, and had this idea that he wanted to start a company. Before he even had a business plan for the company, he sat down and said these are going to be the guiding principals for whatever company I form.*

  Rosett: To what extent are your employees familiar with those guiding principals and how does it affect the way they work?

  C: They are familiar with them from day one. The first day of training we go over the core values and beliefs and talk about the core values and beliefs. When I have the opportunity to sit on it an early training... It's getting harder to do now with four facilities and hiring at the pace that we do, but we have a training group right now that I will sit with tomorrow. I will get them to talk about the core values and beliefs. I want them to understand that... From the outside they can appear hokey, but in discussing them, I like to try to get people to understand that there's nothing hokey about them. We take them very seriously. They really are meant to be your guiding post as you're making your decisions.... We never had all the information we needed to make certain important decisions... In the lack of information, you just kind of look at the core values and beliefs and say, 'Does

this decision fit these guiding principals?' If it does, then it is likely a good decision for the company and let's just go ahead and make this decision even though we don't have all the information we'd like to have. We recite the core values and beliefs at every company meeting.

- *A: We all helped write our mission statement three years ago when we started. We set those values ourselves. We all had a part in it is some way. I guess everything we do is based on... We try to stay within whatever our mission... And that's in our quality, our trustworthiness, and I guess those are all our values. They're good. I don't think we would have said them if we didn't think they were important. They are just things we try to do on a daily basis.*

The rhetoric is far more than a mere collection of slogans. Each of the following ideas, reflected in the above quotes, applies in some degree in each of the firms in our sample that practice TQM:

- training includes emphasis on the rhetoric and leadership's commitment to it,
- rhetoric serves as a constant reminder of important aspects of training,
- adherence to the chief ideas embodied in the rhetoric is enforced by monitoring, and
- evaluation relies on and compensation is based, at least partly, on compliance with the rhetoric.

6.f. Training

Implementation of TQM requires substantial training. Employees must be taught methods of scientific reasoning so that they can make rational use of their specific knowledge on behalf of their employers. Often, they must be cross-trained so as to facilitate contributions to process improvement. In many of the firms we interviewed, training is continuous. This is necessary partly because employees are expected to become familiar with processes in which they themselves are not engaged, partly because continuous improvement often changes the processes in which they are engaged. TQM firms that emphasize problem-solving, rather than devolution, train their employees to apply the solutions that problem-solving teams develop. Finally, since TQM involves an intense focus on customer satisfaction, they must learn, in addition to the ordinary responsibilities of their jobs, what it takes to satisfy customers.

The following quotes suggest the extent of training:

- *M.: We started having classes, big formal classes where you'd go off for two days with your team, and you would learn this intensely. You would stay overnight and*

kind of have a fellowship and everything like that, and then you would go off with your team and solve a problem. Then it was publicized widely - what was solved, how was it solved, and how we would not have come up with this if we didn't have this team, and that's pretty important, and again, backed by J continuously. Then it just kind of grew. People sponsor more teams and more teams, and so it's pretty much a household word now.

- *J: We brought a professor from a local community college here to train our people.. I believe the name of the course was the Transformation of American Industry, it was from one of our Michigan universities, I am not sure which... heavily into the problem solving techniques and SPC. He started out by training executive staff and some of the higher level managers and then we, eventually over time, depending on the position of the company, determined who needed what and then accommodated that individual for what they needed.*

  Rosett: Did you send them to the community college over here or you had someone coming in?

  J: We had a classroom on site. He was using it all the time. He was just like one of us except he worked for a college.

  Rosett: He really trained everybody here... how long did that take?

  J: It took about 2-3 years. He would still deal with new people. Id say it was at least 2-3 years to get everybody.

- *M. A seasoned quality manager from another plant came here to start quality systems. But I see a huge difference in our expectation an operator or a ... for that matter, materials manager or a plant manager than it was maybe back in 1980. I knew quality meant something, but I did not know it meant near what it means. I didnt think it meant what it means today. Back then my training program pretty well consisted of .. there is a part coming down this line here, a lady put clips on it and theyll give it to you and you put a rod in it and you pass it on to the next person. That was about it, which is fine. I had worked there in summers before since I was 16. So I knew some of what they were doing when I went into full time. It was not that difficult, but now we instill a very aggressive training program here. If you are a new employee coming in, you spend about 4-5 days just understanding what we are about and the expectation you are going to be as an operator.*

  Rosett: What do they talk about in those 4-5 days?

  M: It sounds simple, but it really isnt. We explain to people what the difference

is between molding, press and assembly area. We go through the safeties of them: what does this mean, what does that mean... We go through the forms of them. If you have an accident, this is what will happen. If you have issues, this is who you can see. Here's your supervisor. They meet their supervisors. They meet me, they meet D [the plant manager]. *They put a name to a face or a face to a name. Even down to where the bathrooms are.*

The training often involves cross-training. This is necessary because of TQM emphasizes and uses cross-functional tasks. Problem solving teams are frequently cross-functional, and in general employees are encouraged to take a bigger view of the firm and act accordingly.

- *H: Well, it used to be as a packer, compared to now, you'd come in and have one job. That's it. Don't worry about what anybody else is doing, or so what that line wasn't going to make it. Where now, as a packer, you have just as much responsibility as say the team leader because you should know what's going on on other lines in case we need to shut down a line to go help another line. If you're taping here, you should know as a team member to go up and help somebody else if you're caught up. But before, who cared? You were put there, that's where you stayed.*

- *We are right now in the midst of training our crews that go out on the jobs. The training covers anything from... We go over our employee handbook and show guys how we want them to go. When they meet a customer, how to introduce themselves. What to do, that type of thing. We go through all the paperwork. We have hands on as far as packing, loading, and that type of situation. Basically go through everything that they can encounter on a job and tell them how we want them to do it, the correct way to do it. Again, this is for people who are brand new employees through people who have been with us 25-30 years. They all go through it.*

Firms use both internal and external resources for training. A common pattern seems to be to obtain external training early in the TQM initiative, and to then move it in house as internal expertise is developed.

- *K: My first real exposure to the quality movement was with Qualpro. At that point, I think we've trained all the superintendents. At some point, in my reflection of when we did what, is kind of foggy. I know we have trained all the superintendents and all the foremen. We have trained all the operators internally.*

  Rosett: *Qualpro trained the people who were higher up in the structure and then they internally trained the other people?*

  K: *Right. We formed a group, which we call PDQs (people devoted to quality),*

which are typically our engineers from all the areas. But each department basically has represented in the PDQ group.

Rosett: *Are you a PDQ also, because of your... ?*

K: I was a PDQ as an engineer and that's pretty much how I ended as a total quality manager, because I played a big role as a PDQ. I believe in a process and I let the charge a lot of times. That's how I ended up where I am now. So, we used PDQs to do the internal training to train all the operators. So, we have... but that really took place after the 3 big teams and one of which one is the Quality Cup.

Finally, as in the case described above where TQM activities are linked to monitoring, training is explicitly linked to TQM objectives, and may be tailored to suit the individual's role in the organization.

- *D: Your evaluation depends how many procedures you've been trained on, how many procedures you've trained other people on, and they just add those up. That actually goes on record. When you train somebody, it goes on your training record, and it is all tallied up.*

  Rosett: You can only train people on things on which you are certified.

  D: On which you are certified, yes.

- *This is our training plan. Each individual has their own plan. These are the training records for each individual. This is a list of all of our procedures that we have. Everyone has a plan. There is a date in there that they are going to plan on trying to get that procedure done, and these are the dates that they have been accomplished. Everyone also puts in a plan on what they want to learn, and it also is based on your review. The more procedures you know, the better your pay rate is. For each line there is a team leader. Each team leader is certified on all the procedures. This enables them to teach other team members, train them on it, and certify them on it.*

6.g. Evaluation, compensation and promotion

All well-managed firms, TQM or not, link evaluation, compensation and promotion with well-defined firm objectives. We summarize the patterns we observed in our sample with respect to these issues here. One interesting finding is that TQM may provide a superior method of identifying employees eligible for promotion. This is because a distinguishing characteristic of the TQM firm is that empowered employees have numerous opportunities to demonstrate initiative,

judgment, and in problem-solving teams, qualities of leadership.

Our findings with respect to explicit pay-for-performance incentives appear consistent with the incentives literature. For example, Prendergast's [1999] review article suggests that, as generalities, more complex tasks are more likely to receive subjective performance evaluation, rather than explicit bonus plans. Interviewees frequently said that there was no direct connection between specific features of the TQM program and pay, but that evaluations and pay reflect overall conformity with the TQM objectives:

- *V: It may take them three, four, five or a half dozen instances of dealing with a customer of the phone and learning about what the customer is and what they're like, and so forth, but it may take another person only two or three. So, I can't hold that against them, because that's just how the person is.*

  Rosett: Do those differences affect their compensation at all?

  V: No, not generally.

  Rosett: So they are all compensated the same?

  V: Yeah, actually pretty much. We have a bonus plan that the owner has kindly given people. It is very clear. It is based on your efforts and what you do, but the sales people do pretty similar, I mean within a few dollars.

  Rosett: I see.

  V: You know, there is a reason for that too. If I catch wind that something doesn't quite seem right to me. Maybe I heard something or overheard something that the sales people were talking about, and I say, 'Geez, what's going on here?' Then I find out that maybe that particular instance was not handled quite right. What I will do is I will take that sales person, we will sit down, and we will discuss it so that the next time, I feel at least, that it is handled in a more professional or a better way. I think that is probably why they are pretty similar. There isn't a day that goes by that that's not done. The girls, and there is one other gentleman in there... There's always things that come up. You know, 'How do I do this? How do I do that?' After a while it's everybody singing from the same page.

- *Rosett: Do you think that the mission statement guides M in what to look for when he does your evaluation?*

  C: I am sure it does. It's a company goal.

- *Rosett (questioning P, a front line employee of the same firm): When your performance is evaluated, what kinds of things do they look at to see whether*

you'd get a raise, get a promotion, or get fired or whatever?

P : I guess the biggest thing would just be how you treat the customer. I mean, if you're rude, snappy, or you don't do your job right, you don't solve the problem... That's the biggest thing. They understand things like sick days and maybe being tired because traffic is crazy, and things like that, but if you're just not taking care of the customer, then it's just not going to work out.

Rosett: How do they find out whether you are taking care of the customer?

P: *Well, in tech support they have surveys. After you take a technical support call, they'll send out a survey asking how that person did. They keep a rating of your surveys of the percentage on how well you did. If it's constantly low, I mean, they are going to confront you about it and talk to you about it and see if they can help you. Of course, they are not going to be like, 'You're fired.' They are going to see if they can help you to help improve that and work on maybe specific issues. I mean, if it's just constantly low and you're just not taking care of the customer, then that's pretty much how they would pretty much know is the surveys. Plus, some of the coaches, they can monitor the calls and things like that.*

Consistent with these views, few of the firms appeared to have any direct scheme linking successful problem-solving team participation to individual pay. In only a couple of cases were cash bonuses or prizes associated with successful process improvement suggestions. More commonly, successful teams were given public recognition for their achievements. In many of these cases, it was clear that the team members placed great value on the recognition. But most of the examples of cash incentives actually were small bonuses for useful input contributed through suggestion boxes.

Despite the difficulties with linking pay to the TQM program, incentives appear to come in at least three forms. First, several plants had bonus schemes tied to productivity at the team or plant level. A second method of motivation is positive feedback, with rhetoric and continual education reinforcing the importance of the firm's mission. This was commonly mentioned. A third, and closely related motivation is to avoid discouraging employees. Several interviewees indicated that positive reinforcement becomes useless if employees are reprimanded or punished for decisions made in good faith, but which have negative consequences. Several managers said it is more effective to take a problem-solving approach to such situations to see how the mistake can be avoided in the future. The following quote touched on several of these issues and is broadly representative of what we heard across the sample:

- *T (Plant manager): That's right. It doesn't happen in all facilities, but in some facilities. Most people will know, ball park anyway, how they are doing. At the strip mill they can calculate it down to the penny if they want. The number is up*

there. On that closed circuit TV communication system we have our stock price rolls every five minutes or so. Although it doesn't change as much as their incentive, they can still monitor the company's performance as well. Along with that productivity performance, there are different systems across the plant that all of our employees have some sort of productivity incentive program in place. We have a performance improvement program but mostly related to quality customer service in our manufacturing cost, which is another incentive that's paid out every month to our employees. So that's another form of compensation. So over and above productivity, they are rewarded for other performance. There is also a profit sharing program put in that is an annual payout if the company is profitable. Beyond that formal compensation, the recognition of dinners, jackets, world record performance sweatshirts, you know, pride things, the hats. That's important too.

Another potentially important incentive is promotion. Several employees indicated that successful participation on problem solving teams was an important means of gaining promotion. Front line employees who otherwise have little opportunity to display managerial abilities are placed in a setting where they can contribute. Their efforts are directly observable to managers who attend team presentations. In cross-functional team settings, these employees have the opportunity to make contacts and learn about the operations of the firm outside of their immediate area. Several employees believed they had been identified for promotion through this process. The following was typical:

- *A lot of our senior management at the corporate level had said that to be promotable, you need to have spent some time in the total quality processes. You need to have a good understanding of it, you need to be able to lead teams and facilitate teams. It's a good developmental experience to be involved in it, because it's not easy. If you can facilitate teams and get people working on this stuff, it's says a lot in a leadership abilities.*

Finally, as in the cases of training and monitoring, there may be opportunities for direct linkages between the TQM and evaluation. Though this was not common, in at least a couple of instances, employees jointly agreed with their managers regarding the criteria that would be used for their evaluations. In these cases, employees specifically figure out how to fit their individual behavior with the overall corporate vision or mission and expect feedback to reflect whether they have achieved their own objectives. This appears to be taking TQM methods to the highest level.

- *E (senior manager): The company develops its plans, senior leaders develop the overall plan. Champions define what it really means show it to those departments throughout the organization, which is call the core and support processes. They develop their plan in support of the company's goals and objectives and once the plans and budgets are finalized at that point, individual partners* [employees] *will*

develop their individual what we call "partner performance management plans" in support of accomplishing their department's objectives. Each person does that. But the neat thing about it is that PPMP is how we evaluate performance on the individual level and it ties the accomplishment of goals and objectives to compensation. So, everybody's linked to and aligned to the goals and objectives of the company. The neat thing about it is when you create these plans in January, then no surprises in November, when your performance evaluation takes place.

Management and front line employees generally recognize the link between important elements of the TQM rhetoric on one hand and evaluation, recognition, and compensation on the other. Even the manager who explains why all his reports are paid the same does so in terms his ability to bring them all into compliance with the rhetoric.

7. A Portrait

The thirteen firms still practicing TQM have the following four characteristics in common:

- Strong, committed leadership: Leadership ranges from the founder, unfamiliar with the TQM, but determined to found a business that will succeed by delighting customers, to a senior executive of a large firm who comes away from a TQM conference, convinced that success lies in that direction.

- A well-articulated vision that includes a focus on customer satisfaction: The vision may be the product of a leader's unshakable commitment to a particular goal or it may be shaped by input from employees. It may consist of a single declarative sentence like, "We are the best because our customers say we are the best," or it may be an elaborate structure starting with an overarching statement pertaining to a large corporation, with subsidiary statements, each tailored to a single unit within the firm, sometimes with employee input, sometimes not.

- Training that includes indoctrination to the vision: Training practices range from relying heavily on its own trained employees to train others, to employment of professional TQM trainers.

- Communications reinforcing the vision: Statements reminding employees of the vision appear on posters and on the reverse of business cards. They are recited at meetings of employees and they are a component of monitoring and evaluations practices. Most significant, they create an environment in which employees tend to be guided, not only by their own immediate responsibilities, but to larger objectives of the firm as well.

The variation in these characteristics from firm to firm is inconsequential. A fifth characteristic, central to TQM varies far more from firm to firm than these four: the level of employee involvement in decision-making. Seven of the firms in our sample have devolved decision-making authority in ongoing operations. Two patterns are discernible: employees who deal with external customers, and who are empowered to make decisions previously requiring supervisory approval (for example, giving regional lending officers authority to approve loans which had previously required central office approval, allowing telephone sales representatives to quote prices and delivery dates without consulting the sales manager), and those who deal with such a wide variety of issues, that some level of empowerment is inescapable (in our sample, software programmers and ISP technicians who provide technical support on the telephone), the question being, how much.

The software programming team that succeeded in the Quality Cup competition reduced the number of programming errors from between seventy-five and a hundred per hundred thousand lines of code to zero by relaxing time constraints and increasing redundancy in the programming process. The resulting elimination of errors eliminated the need for ex-post patches. The result was an improvement in quality at no increase in cost. The Internet service provider's technical service representatives, were allowed to handle far fewer service calls per hour than the industry standard, increasing their latitude in deciding whether more time spent on a customer's problem would result in a solution. Empowerment in both these cases consisted of relaxing a time constraint, enhancing existing empowerment.

In all these cases, the variety of issues confronted by the employee is too great to be dealt with by a rule book. Judgment is called for. The question is whether it will be a superior's judgment or the subordinate's. In the case of these firms, it is the subordinate's.

Interviews with the remaining six firms elicited no evidence of devolution of authority in ongoing operations. These firms are especially interesting because they have successfully adopted one manifestation of TQM, but without incurring the costs associated with the major organizational change. They seem to have derived sufficient benefit from it to persist, To those firms, TQM consists of training employees to solve problems, readily accepting employees' suggestions as to problems needing to be solved, and, to solve them, forming teams that draw on specific knowledge. Problem-solving may have called for an increase in monitoring in these firms, but, if so, it was not evident in any of the interviews. These firms, like the other seven, exhibit evidence of strong leadership and admiration for leadership's vision. These firms, too, employ TQM-type rhetoric, but it is less prominent and less immediately recalled by the employees.

While our sample of fifteen firms is not necessarily representative of the larger universe of all firms, the fact that almost half of them have adopted, at low cost, an element of TQM that seems to be both profitable and self-sustaining, raises a question worth examining in the larger universe: how important has this phenomenon been in contributing to the recent dramatic improvement in U. S. productivity growth? Full-blown TQM is not for everyone. In some cases

the cost of training and monitoring is prohibitive because the prospective gains are too small. The technology may not offer profitable opportunities for much exercise of judgment by low level employees. For example, the operation of a steel mill may impose an iron discipline that almost always favors strict adherence to rules over the exercise of judgment. TQM implementation can be disruptive and expensive. Its payoff is unlikely to be immediate. Failure in the effort to implement TQM is not uncommon.

Compared with all this, problem-solving is easy, inexpensive, and likely to produce reasonably prompt results. It would be surprising if this manifestation of TQM were not increasingly popular. Research directed at determining the extent of TQM-type problem-solving, because of its narrow focus, could be conducted using a survey technique rather than face-to-face interviews. For example, a survey of a sample drawn from the membership of the American Society for Quality, though it would represent only the universe of firms that employ members of that society, would provide a far broader picture than has been possible with the sample used in this paper.

The interviews we conducted with the fifteen firms that participated in this research revealed significant variations attributable to differences in functions and technologies, but they also revealed strong similarities in the approach to TQM. In the words of one of the individuals interviewed:

> *I think I would like to recap it though. You asked me... One of your first questions was what makes it successful? If you were going to do this again, how would you drive this? In my opinion, it's creating... and again I don't want to use quotes in these words, but you have to create a means of telling people where you want to go. I will call it vision just because of that. People need to know. They need to know where the organization is going. Once you do that, you have to communicate it. The next three points are that you have to communicate it, you have to communicate it, and you have to communicate it. Then you have to measure it and show them. Once you do that, you have to recognize them and recognize their performance. In my opinion, you have to inject a little bit of fun into that. You have to challenge them, you have to train them... but overall you create the vision, you communicate it, you measure it, and then you follow-up. If you continue to do that... It doesn't matter how formally you do that, as long as you are doing it. You talked about the continuous improvement process, it's identified. If you don't have it identified, but you're still doing it, that's much more important. It's not what you call it, it's how you're doing it.*

References

Black, Sandra E. and Lisa M. Lynch, "How to Compete: The Impact of Workplace Practices and Information Technology on Productivity," National Bureau of Economic Research Working Paper 6120, August, 1997.

Easton, George S. and Sherry L. Jarrell, "The Effects of Total Quality Management on Corporate Performance: an Empirical Investigation," *Journal of Business*, Vol.71, No.2 (1998), 253-307.

Helper, Susan, "Complementarity and Cost Reduction: Evidence from the Auto Supply Industry," National Bureau of Economic Research Working Paper 6033, May 1997.

Hendricks, Kevin B. and Vinod R. Singhal, "Quality Awards and the Market Value of the Firm: An Empirical Investigation," *Management Science*, Vol. 42, No. 3 (March 1996), 415-436.

Hendricks, Kevin B. and Vinod R. Singhal, "Does Implementing an Effective TQM Program Actually Improve Operating Performance? Empirical Evidence from Firms That Have Won Quality Awards," *Management Science*, Vol. 43, No. 9 (September 1997), 1258-1274.

Levine, David I. and Laura D'Andrea Tyson, "Participation, Productivity, and the Firm's Environment", in Alan S. Blinder, ed., *Paying For Productivity*. Washington, D.C.: The Brookings Institution, 1990.

Powell, Thomas C., "Total Quality Management as Competitive Advantage: A Review and Empirical Study," *Strategic Management Journal*, Vol. 16 (1995), 15-37.

Prendergast, Canice, "The Provision of Incentives in Firms," *Journal of Economic Literature*, Vol. 37, No. 1 (1999), 7-63.

Waldman, David A., "A Theoretical Consideration of Leadership and Total Quality Management," *Leadership Quarterly*, Vol. 4, No. 1 (1993), 65-79.

Waldman, David A., Terri Litychy, Mohan Gopalakrishnan, Kevin Laframboise, Bella Gelperin and Zefi Kaltsounakis, "A Qualitative Analysis of Leadership and Quality Improvement," *Leadership Quarterly*, Vol. 9, No. 2 (1998), 177-201.

Wruck, Karen H. and Michael C. Jensen, "Science, Specific Knowledge, and Total Quality Management," *Journal of Accounting & Economics* 18 (1994), pp 247-287.

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Appendix A

1999 RIT/USA TODAY QUALITY CUP NOMINATION FORM

Before completing this nomination form, please read through the entire form. Note the instructions and follow them carefully.

Nominations must be postmarked by Monday, December 7, 1998.

Thank you for requesting a Quality Cup nomination form. We wish you good luck in the competition. Whatever the outcome, the fact that so many enter each year is good news for our country.

1. Name of the **team** you are nominating: _____

2. Name of the **organization** submitting the nomination: _____

1. **Person** who can respond to questions about this nomination:

_____
Name (typed or printed): _____
Title: _____
Company: _____
Address: _____
City, State, Zip: _____
Telephone number: _____ FAX number: _____

4. **Nomination Category**: Check the category in which the nomination is submitted. The category is determined by the principal activity of the organization which employs the nominees.

_____ a. **Education Institutions**: All educational institutions, including K through 12, two and four year colleges, universities, and technical institutes. Not-for-profit, government operated, and proprietary institutions are all eligible.

_____ b. **Government**: All units of federal, state and local government. It does not include for-profit firms devoted to providing services or manufactured goods to government units.

_____ c. **Health Care Organizations**: All providers of health care, including, but not limited to, hospitals, nursing homes, HMOs, and health care practices. Not-for-profit, government

operated, and proprietary organizations are all eligible.

_____ d. **Manufacturing Industry**: All for-profit manufacturing firms with over 500 employees. Subsidiary service firms, wholly owned by manufacturing firms and offering services to external customers, should be submitted in the service category.

_____ e. **Service Industry**: All for-profit services with over 500 employees. Subsidiary manufacturing firms, wholly owned by service firms and offering manufactured products to external customers, should be submitted in the manufacturing category.

_____ f. **Small Business**: All for-profit manufacturing and service firms with 500 or fewer employees. In counting the number of employees, include those employed by any parent company and all divisions and subsidiaries.

The sponsors reserve the right to reclassify the nomination if doing so will place it in competition with a significant group of similar nominations.
*To help us verify the category you have chosen, please describe briefly the products/services offered by your organization.

_____
_____
_____
_____
_____

The sponsors reserve the right to reclassify the nomination if doing so will place it in competition with a significant group of similar nominations. Donna Slavin, at 716/475-2199, can help if you are uncertain about which category to check.

5. **List** the names and job titles of the team members, with the team leader first. A team may include members who are not employed by the nominating organization, such as employees of a supplier or customer. There is no limit to the number of team members you may nominate. Use an additional sheet of paper, if necessary, to list them all.

Name	Job Title
_____	_____
_____	_____
_____	_____
_____	_____

In answering questions 6, 7, 8 and 9, please:

1. **OBSERVE THE WORD LIMITS**
2. **PROVIDE A WORDCOUNT FOLLOWING EACH RESPONSE**

These are included in the criteria the judges consider. Additional exhibits, amounting to as many as six 8 1/2 x 11 pages, may be used to supply supporting statistical evidence in tabular or graphic form. It is expected that statements made in response to these questions are verifiable and that nominees will be prepared to provide verification if it is requested.

6. **Brief description**: In no more than **one hundred words**, summarize the quality improvement for which this team is being nominated.

7. **Process** (400 Points): In no more than **four hundred words**, describe the process that led to the quality improvement. In scoring this section, judges consider the appropriateness of team composition and its empowerment, the appropriate employment of quality tools, customer-driven goals, the role of leadership, reproducibility of the quality improvement process, and commitment to continuous improvement. (Four hundred points)

8. **Measurement** (200 Points): In no more than **two hundred words**, describe the data and the method of analysis you used to measure the magnitude of improvement, and explain your choice of data and method. The judges will consider the relevance of the data and the appropriateness of the method of analysis. They will not expect more complexity than required for good measurement. (Two hundred points)

9. **Result** (400 Points): In no more than **four hundred words**, describe the improvement, its impact on the organization, the customers who benefit, and the magnitude of the benefit. (Four hundred points)

10. **Briefly**, is there anything else we should know about this team?

11. **Release**: Quality Cup nominations provide valuable illustrations of processes for achieving and measuring quality, continuous improvement, and customer satisfaction. Please indicate whether you are willing to allow such use of your nomination.

    _____ a. Information in the nomination may be used for the purpose of teaching and research.

    _____ b. Information in the nomination may be used for the purpose of teaching and research, but only after I have had an opportunity to review the use to which it will be put.

    _____ c. Information in the nomination may not be used for teaching or research.

12. Signature of an officer or executive whose span of authority includes the nominee.

    Signature: _____ Date: _____

    Name (typed or printed): _____

    Title: _____

    Company: _____

    Address: _____

    Telephone number: (_____)

    Fax number: (_____)

    E-mail address: _____