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Thomas C. Powell

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TOTAL QUALITY MANAGEMENT AS COMPETITIVE ADVANTAGE: A REVIEW AND EMPIRICAL STUDY

THOMAS C. POWELL
Management Department, Bryant College, Smithfield, Rhode Island, U.S.A.

Total Quality Management (TQM) has become, according to one source, 'as pervasive a part of business thinking as quarterly financial results,' and yet TQM's role as a strategic resource remains virtually unexamined in strategic management research. Drawing on the resource approach and other theoretical perspectives, this article examines TQM as a potential source of sustainable competitive advantage, reviews existing empirical evidence, and reports findings from a new empirical study of TQM's performance consequences. The findings suggest that most features generally associated with TQM—such as quality training, process improvement, and benchmarking—do not generally produce advantage, but that certain tacit, behavioral, imperfectly imitable features—such as open culture, employee empowerment, and executive commitment—can produce advantage. The author concludes that these tacit resources, and not TQM tools and techniques, drive TQM success, and that organizations that acquire them can outperform competitors with or without the accompanying TQM ideology.

INTRODUCTION

Over the past 10 years, the emphasis in strategic management thinking has shifted away from industry structure and competitive positioning, and toward internal, firm-specific, 'within strategic group' factors (Cool and Schendel, 1988) such as culture (Barney, 1968a; Fiol, 1991), capabilities (Lawless, Bergh, and Wilsted, 1989; Stalk, Evans and Shulman, 1992), administrative skills (Powell, 1992), reputation (Weigelt and Camerer, 1988), know-how (Hall, 1992), learning (Senge, 1990; Garvin, 1993), process improvement (Stalk and Hout, 1990), and organizational climate (Hanson and Wernerfelt, 1989). The resource theory of the firm has accelerated this shift, asserting that economic rents may stem from any strategic factor—internal, external, economic, behavioral, tangible, or intangible—that meets the tests of value, scarcity, and imperfect imitability (Wernerfelt, 1984; Barney, 1986b; 1991; Peteraf, 1993).

By no coincidence, the past 10 years have also witnessed the remarkable spread of Total Quality Management (TQM). A recent *Industry Week* article (Benson, 1993: 48) claimed that, 'In 10 short years, TQM has become as pervasive a part of business thinking as quarterly financial results', and a recent Arthur D. Little study reported that 93 percent of America's largest 500 firms had adopted TQM in some form (Arthur D. Little, 1992). Analysts have credited TQM with leading Japan to global economic prominence in the postwar years (Grayson and O'Dell, 1988; Imai, 1986) and, more recently, with restoring America's economic competitiveness (Juran, 1993). To reward exemplary TQM initiatives, the U.S. Department of Commerce instituted the Malcolm Baldrige Quality Award in 1987, and TQM has brought public

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recognition to such gurus as Joseph Juran, Philip Crosby, and the late W. Edwards Deming (after whom Japan's esteemed Deming Award is named).

TQM is an integrated management philosophy and set of practices that emphasizes, among other things, continuous improvement, meeting customers' requirements, reducing rework, long-range thinking, increased employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers (Ross, 1993). Its adherents claim that managers can implement TQM in any organization—manufacturing, service, nonprofit, or government—and that it generates improved products and services, reduced costs, more satisfied customers and employees, and improved bottom line financial performance (Walton, 1986).

The latter claim is controversial. Although many adherents openly praise TQM, others have identified significant costs and implementation obstacles. Critics have suggested, for example, that TQM entails excessive retraining costs, consumes inordinate amounts of management time, increases paperwork and formality, demands unrealistic employee commitment levels, emphasizes process over results, and fails to address the needs of small firms, service firms, or nonprofits (Naj, 1993; Fuchsberg, 1992a; 1993b; Schaffer and Thomson, 1992). Indeed, the Wallace Company, a Houston oil-supply firm, filed Chapter 11 bankruptcy soon after winning the Baldrige Award (Hill, 1993), and TQM exemplar and Deming Award winner Florida Power and Light virtually eliminated its program over employee complaints of excessive paperwork. Moreover, empirical studies have not shown that TQM firms consistently outperform non-TQM firms (Mathews, 1992; Fuchsberg, 1993a).

Nevertheless, TQM has become an irrepressible, globally pervasive strategic force in today's industrial economy. And, because TQM requires firms to coordinate a wide range of behavioral, tacit, intangible resources, its dissemination stands as both support and a challenge to the new emphasis on firm-specific resources in strategic management research.

TQM's impact on strategic management research and practice remains unclear and underexamined, and the existing empirical studies of TQM performance—intended to help managers implement TQM more effectively—lack rigor and theoretical support. This article attempts to redress these problems, examining the implications of TQM for strategic management research and practice, evaluating TQM from the resource and other theoretical perspectives, and presenting an empirical test of TQM performance impacts.

TQM AND FIRM PERFORMANCE

Origins and elements of TQM

TQM's origins can be traced to 1949, when the Union of Japanese Scientists and Engineers (JUSE) formed a committee of scholars, engineers, and government officials devoted to improving Japanese productivity, and enhancing their postwar quality of life. Influenced by Deming and Juran, the committee developed a course on statistical quality control for Japanese engineers, followed by extensive statistical training and the widespread dissemination of the Deming philosophy among Japanese manufacturers (Walton, 1986).

In Japan, TQM produced such managerial innovations as quality circles, equity circles, supplier partnerships, cellular manufacturing, just-in-time production, and hoshin planning (Ishikawa, 1985; Akao, 1991). However, as quality control programs became more widely implemented and sophisticated, it became clear that some aspects of the TQM philosophy could also be applied to nonmanufacturing functions such as product development, purchasing, and billing, with potential applications in service organizations and nonprofits.

American firms began to take serious notice of TQM around 1980, when some U.S. policy observers argued that Japanese manufacturing quality had equaled or exceeded U.S. standards, and warned that Japanese productivity would soon surpass that of American firms (e.g., Hayes and Abernathy, 1980). Productivity trends supported these assertions, leading some opinion leaders to predict that—barring a radical change in American management practices—Japan and other Asian countries would soon dominate world trade and manufacturing, relegating the U.S. to second-tier economic status (e.g., Gray-

son and O'Dell, 1988). In particular, these analysts decried traditional American managerial practices such as elitist leadership, autocratic authority structures, short-term thinking, financial orientation, lack of innovation, declining product quality, adversarial supplier relationships (including employees), inadequate training, and, in general, living off past successes (Hayes and Abernathy, 1980; Pascale, 1981; Grayson and O'Dell, 1988; Jacobs, 1991).

Some high-profile American firms—such as Ford, Xerox, and Motorola—were easily convinced, having already lost market share to more efficient, higher quality Japanese producers. These firms, under the guidance of Deming and other quality consultants, benchmarked Japanese practices and were among the first American TQM adopters. Based on their widely-publicized successes, other large manufacturers soon jumped aboard, and by the end of the 1980s, a significant proportion of large U.S. manufacturers had adopted TQM (Arthur D. Little, 1992). By that time, many large service firms had also expressed interest, and some—due in part to pressures from customers that employed TQM—had adopted full TQM initiatives.

Table 1 lists the major TQM features promoted by Deming, Juran, and Crosby, along with the categories used to evaluate Baldrige Award candidates. Although different TQM proponents emphasize different features (e.g., Deming focuses on statistical quality measures), an exhaustive review and integration of the TQM literature suggests that complete TQM programs tend to share the 12 factors shown in Table 2.

The economic value of TQM

TQM has disseminated widely among *Fortune* 1000 firms, presumably because managers believe TQM improves performance. However, both the anecdotal evidence and the empirical studies suggest considerable variability in TQM's performance impacts, ranging from unprecedented successes to bankruptcy and abandonment of TQM. Can TQM act as a source of sustained competitive advantage? If not, why is TQM disseminating so rapidly? If so, why the mixed results and high-profile failures?

Resource theory provides a useful perspective on these issues, beginning with the notion of resource heterogeneity, i.e., that different firms hold different resource portfolios, and that these differences produce variability in performance across firms (Wernerfelt, 1984; Barney, 1986b; Peteraf, 1993). Although firms may attempt to imitate resources held by successful competitors, or at least to replicate their benefits, resource bundles remain heterogeneous due to imperfect imitability, created by 'isolating mechanisms' (Rumelt, 1984) such as: (1) *time compression diseconomies*—the resource may require long-term accumulation before attaining value (e.g., learning, experience, or proficiency in a skill); (2) *historical uniqueness (first mover advantages)*—the resource may have been originally acquired under unique, nonreplicable conditions; (3) *connectedness of resources*—a firm may acquire a competitor's valuable resource only to find that its success depends on some complementary resource that the firm cannot acquire; (4) *causal ambiguity*—firms may be unable to determine the link between another firm's resources and its success; and (5) *social complexity*—a firm's success may result from social phenomena too complex for managers to understand or manage (Lieberman and Montgomery, 1988; Dierickx and Cool, 1989; Barney, 1991).

Under the resource view, success derives from economically valuable resources that other firms cannot imitate, and for which no equivalent substitute exists. Is TQM such a resource? According to TQM advocates, TQM does produce value, through a variety of benefits: improved understanding of customers' needs; improved customer satisfaction; improved internal communication; better problem-solving; greater employee commitment and motivation; stronger relationships with suppliers; fewer errors; and reduced waste (Juran, 1988; Schmidt and Finnigan, 1992; Spechler, 1991). But the evidence also suggests that some employees resist or even subvert TQM, finding it ideological or faddish. Furthermore, TQM entails substantial time investments from managers, it is expensive (especially for training and meetings), it rarely produces short-term results, it demands intense CEO commitment, and it makes unrealistic assumptions about most organizations' capacities to transform their cultures (Bleakley, 1993; Naj, 1993; Fuchsberg, 1992, 1993a, 1993b; Mathews, 1992).

Table 1. Popular perspectives on TQM

DEMING'S 14 POINTS[1]

1. Constancy of Purpose
2. Adopt the Philosophy
3. Don't rely on mass inspection
4. Don't award business on price
5. Constant improvement
6. Training
7. Leadership
8. Drive out fear
9. Break down barriers
10. Eliminate slogans and exhortations
11. Eliminate quotas
12. Pride of workmanship
13. Education and retraining
14. Plan of action

THE JURAN TRILOGY[2]

I. *Quality Planning*
Set goals
Identify customers and their needs
Develop products and processes

II. *Quality control*
Evaluate performance
Compare to goals and adapt

III. *Quality improvement*
Establish infrastructure
Identify projects and teams
Provide resources and training
Establish controls

CROSBY'S 14 QUALITY STEPS[3]

1. Management commitment
2. Quality improvement teams
3. Quality measurement
4. Cost of quality evaluation
5. Quality awareness
6. Corrective action
7. Zero-defects committee
8. Supervisor training
9. Zero-defects day
10. Goal-setting
11. Error cause removal
12. Recognition
13. Quality councils
14. Do it over again

THE 1992 BALDRIGE AWARD CRITERIA (1000 points total)[4]

1. *Leadership* (90 points)
   - 1.1 Senior executive
   - 1.2 Management for quality
   - 1.3 Public responsibility
2. *Information and analysis* (80 points)
   - 2.1 Scope and management of quality and performance data
   - 2.2 Competitive comparisons and benchmarks
3. *Strategic quality planning* (60 points)
   - 3.1 Strategic quality and planning process
   - 3.2 Quality and performance plans
4. *Human resource development and management* (150 points)
   - 4.1 Human resource management
   - 4.2 Employee involvement
   - 4.3 Employee education and training
   - 4.4 Employee performance and recognition
   - 4.5 Employee well-being and morale
5. *Management of process quality* (140 points)
   - 5.1 Design and introduction of products and services
   - 5.2 Process management—production and delivery
   - 5.3 Process management—business and support
   - 5.4 Supplier quality
   - 5.5 Quality assessment
6. *Quality and operational results* (180 points)
   - 6.1 Product and service quality
   - 6.2 Company operations
   - 6.3 Business process and support services
   - 6.4 Supplier quality
7. *Customer focus and satisfaction* (300 points)
   - 7.1 Customer relationships
   - 7.2 Commitment to customers
   - 7.3 Customer satisfaction determination
   - 7.4 Customer satisfaction results
   - 7.5 Customer satisfaction comparisons
   - 7.6 Future requirements and expectations

Sources: [1]Walton (1986), [2]Juran (1992), [3]Crosby (1979), [4]George (1992).

The empirical research

Most existing empirical studies conclude that TQM does produce value. However, most of the studies were conducted by consulting firms or quality associations with vested interests in their outcomes, and most did not conform with generally-accepted standards of methodological rigor. For example, in 1983 the Union of Japanese Scientists and Engineers published a study of Japanese companies that won the Deming Prize between 1961 and 1980. The study concluded that these firms had maintained above-average long-range performance, as measured by earnings, productivity, growth rates, liquidity, and worker safety. However, the study did not include firms that had not won the Deming Prize (one would not expect the experiences of Deming Award winners to represent all firms' experiences with TQM), it did not report on the progress of nonTQM firms over the same period, and it did not control for industry factors that might have produced the observed performance differences.

In 1989, The Conference Board, a New York business research group, released a study of the quality practices of large U.S. corporations. They received 149 responses to 800 surveys, and reported that 111 (74.5%) had quality initiatives in place. Over 30 percent said that TQM had improved their performance, with less than 1

Table 2. The twelve TQM factors

1. Committed leadership: a near-evangelical, unwavering, long-term commitment by top managers to the philosophy, usually under a name something like Total Quality Management, Continuous Improvement (CI), or Quality Improvement (QI).
2. Adoption and communication of TQM: using tools like the mission statement, and themes or slogans.
3. Closer customer relationships: determining customers' (both inside and outside the firm) requirements, then meeting those requirements no matter what it takes.
4. Closer supplier relationships: working closely and cooperatively with suppliers (often sole-sourcing key components), ensuring they provide inputs that conform to customers' end-use requirements.
5. Benchmarking: researching and observing best competitive practices.
6. Increased training: usually includes TQM principles, team skills, and problem-solving.
7. Open organization: lean staff, empowered work teams, open horizontal communications, and a relaxation of traditional hierarchy.
8. Employee empowerment: increased employee involvement in design and planning, and greater autonomy in decision-making.
9. Zero-defects mentality: a system in place to spot defects as they occur, rather than through inspection and rework.
10. Flexible manufacturing: (applicable only to manufacturers) can include just-in-time inventory, cellular manufacturing, design for manufacturability (DFM), statistical process control (SPC), and design of experiments (DOE).
11. Process improvement: reduced waste and cycle times in all areas through cross-departmental process analysis.
12. Measurement: goal-orientation and zeal for data, with constant performance measurement, often using statistical methods.

percent reporting performance declines as a result of TQM. This study did not control for industry factors, did not include medium-sized or small firms, and did not track the performance of comparable non-TQM firms over the same period. In 1989, the Gallup Organization surveyed 600 senior executives on behalf of The American Society for Quality Control. The study reported that 54 percent of respondents were at least 'pleased' with their quality efforts, and half of these claimed significant performance impacts. The study focused on large firms and did not control for industry factors.

In 1991, the U.S. Government General Accounting Office (GAO), responding to a request from the U.S. Congress, produced a study of the 20 highest-scoring applicants for the 1988 and 1989 Baldrige Awards (U.S. GAO, 1991). The GAO reported that these firms had achieved better employee relations, improved product quality, lower costs, and improved customer satisfaction. According to the study, however, the methodology did not constitute 'a statistically-rigorous analysis of the companies' performance under quality management' (1991: 3); indeed, the study did not control for industry factors, did not include firms that did not apply for the Baldrige, and did not report on the progress of non-TQM firms over the same period.

Several large TQM consulting firms have produced in-house quality studies for their clients, but most have released only their results, and not their methodologies. In 1992, the Authur D. Little Corporation produced an in-house report based on a survey of 500 large U.S. firms (Arthur D. Little, 1992). Ninety-three percent of respondents claimed to have some form of TQM, with 35 percent reporting that their TQM efforts have had 'significant performance impacts,' and 62 percent expecting significant impacts over the next 3 years. Although the methodology was not released publicly, it appears that the study did not include small firms, and did not investigate the performance of non-TQM firms over the same period.

The most widely-cited TQM research project to date was the International Quality Study (American Quality Foundation, 1991), a joint project conducted by Ernst & Young (the accounting and consulting firm), and the American Quality Foundation (the research arm of ASQC, the American Society for Quality

Control). This project, which studied the TQM efforts of over 500 automotive, computer, banking, and health care organizations in the U.S., Canada, Germany, and Japan, had several shortcomings: it had no theoretical grounding, the research sponsors had vested interests in disseminating TQM (their stated aim was 'to develop an empirical basis for quality improvement worldwide'), it apparently excluded small and medium-sized organizations, and it is not clear whether the study tracked the performance of a control sample of non-TQM firms. Nonetheless, by conducting in-depth field interviews and controlling for national and industry differences, this research was far more rigorous than its predecessors. The sponsors concluded that some TQM practices—particularly process improvement and supplier certification—did universally improve performance, but the performance impacts of the remaining TQM features varied depending on the firm's stage of TQM advancement. These results will be compared later with the findings reported here.

Aside from these studies, which were mainly designed to show that TQM can work (with a bit of consulting help), there exists a mutual fund—called the General Securities fund—that trades only in stocks of firms known to adhere to the TQM philosophy. This fund has matched the performance of the Standard & Poor's 500 despite a very conservative asset mix (the fund manager keeps about 70% of fund assets in cash), and Morningstar awarded a 4-star rating to its 5-year performance. The stocks themselves have slightly outperformed the S&P 500 over the same period. Moreover, *Business Week* (1993) recently examined the stock performance of 10 Baldrige winners, reporting that if a person had invested equal amounts in each Baldrige winner when their awards were announced, the stocks would have appreciated a cumulative 89.2 percent since 1988, compared to 33.1 percent for the Standard and Poor's 500. Although interesting, this evidence is inconclusive because it includes a small sample of very large firms, and it excludes smaller and privately-held firms (including the bankrupt Wallace Company). Moreover, since performance is one criterion for Baldrige Award selection (see Figure 1), the *Business Week* sample was biased toward high-performing TQM firms.

In sum, although several of the existing studies claimed to prove that TQM does produce economic value, the question is not fully resolved due to the methodological problems cited above, along with the contingencies raised in the Ernst & Young report, which is the most rigorous study to date.

TQM and imperfect imitability

Is TQM imitable? At first glance, it would appear so, and there is an impressive apparatus in place to disseminate TQM to all U.S. organizations, including secondary schools and universities, health care institutions, financial services firms, law firms, CPA firms, nonprofits, and government. This apparatus includes the TQM gurus (with several best-sellers, 'Quality College' for executives, and regional training schools), the business periodicals, consulting firms, best-selling books and videos, executive education programs, college courses, the Baldrige Award publicity, and most importantly, the word-of-mouth testimony of executives already committed to the philosophy. Many TQM firms ensure component quality by requiring suppliers (including their CPA firms and law firms) to adopt TQM programs, and some (such as Ford, GM, and Chrysler) have developed sophisticated supplier training and certification programs.

However, despite TQM's apparent widespread dissemination—and the claims by adherents that any firm can imitate TQM—there are powerful reasons to believe TQM is imperfectly imitable. The diffusion of innovation literature provides a useful perspective on this issue. Whereas the resource literature focuses mainly on resource imitation from the perspective of firms seeking to protect competitive advantage, the diffusion of innovation approach takes the perspective of the potential adopter. This line of research shows that firms will not always attempt to imitate resources that produce advantages for competitors, and that diffusion of innovation depends on the following factors (Rogers, 1983; Abrahamson and Rosenkopf, 1993): (1) *perceived relative advantage*—the extent to which adopters believe the innovation is better than current practice; (2) *compatibility*—the degree to which an innovation is perceived by the adopter as consistent with their needs, values, and experiences; (3) *simplicity*—the degree to which the innovation is perceived as understandable and

implementable; (4) *trialability*—the degree to which an innovation can be experimented with on a limited basis; and (5) *observability*—the degree to which an innovation and its benefits can be observed by the potential adopter.

Diffusion of innovation models stress the importance of similarity, or *homophily*, which Rogers (1983) defined as the degree to which innovator and potential adopter share attributes such as objectives, strategies, norms, beliefs, experiences, and cultures. Empirical studies in a variety of disciplines have confirmed that innovations disseminate most rapidly among homophilous units, since they are most likely to share perceptions of relative advantage, compatibility, simplicity, trialability, and observability. It follows from the homophily principle that heterophily (i.e., vital incongruities between innovator and potential adopter) acts as a key barrier to resource imitation.

Based on the five criteria for the adoption of innovations, one would not expect, *a priori*, that a high proportion of rationally-behaved U.S. firms would attempt to imitate TQM. Even TQM advocates agree that TQM attributes conflict with the existing philosophies and practices of most U.S. firms (e.g., Crosby, 1984). The problem intensifies among firms with fewer opportunities to observe homophilous firms successfully engaged in R&D, such as small firms and service businesses. Schaffer and Thomson (1992) have argued that six factors make TQM programs especially difficult for U.S. firms to imitate: (1) process (rather than results) orientation, (2) TQM is too large-scale and diffused, (3) bad results are excused for the sake of program success, (4) delusional measurements of success, (5) TQM is staff- and consultant-driven, and (6) TQM is biased to orthodoxy, not cause and effect. The authors argued that, despite the hype and hyperbole, TQM is ill-suited to most U.S. firms, and that most should retain their traditional line-driven, results orientation.

Moreover, the Japanese origins of many TQM practices produce an inherent heterophily between innovators and potential adopters that deter many U.S. firms. Young (1992) argues that management practices developed in Japan are fundamentally incompatible with U.S. managerial assumptions, observing that 'Japan has a unique cultural and geographic history that affects its institutions, assumptions about employee behavior, business relationships, cost management, and performance evaluation systems. These systems differ sharply from those in the United States' (1992: 678).

TQM appears to require sweeping reforms in core organizational features, particularly leadership styles and culture. Empirical studies conducted from the organizational ecology perspective show that innovations affecting core organizational features such as strategy, structure, and culture pose the most significant survival risks, and may produce resistance to adoption even if their expected values are positive (Hannan and Freeman, 1984; Singh, Tucker, and House, 1986). As Carroll (1993) points out, many organizations will resist attempting core reforms on the grounds of risk aversion, or on the expectation that existing strategies will presently bear fruit, or because they do not want to face the precariousness and turbulence of change, even if it is likely to improve performance.

A resource-based analysis supports this conclusion, suggesting that many potential adopters would not find TQM readily imitable due to time compression diseconomies, connectedness of resources, causal ambiguity, and social complexity. Managers may applaud the notion of employee empowerment on the one hand, but find quality action teams, suggestion systems, and training programs completely infeasible within existing financial and human resources (e.g., long-term union members who regard existing authority structures and work definitions not as stumbling blocks but as hard-earned gains). In the study cited above, Young (1992) argued that firms are unlikely to adopt quality practices successfully in the short term if existing employees lack work discipline, lack team orientation, lack cultural and demographic homogeneity, prefer work rules, do not accept training well, and are not accustomed to linkages between compensation and firm performance.

These characteristics not only take time to change, but they highlight the difficulties raised both by complementary resources and causal ambiguity. Potential TQM adopters may not appreciate that TQM success depends not only on adopting the TQM attributes, but also on the preexistence of complementary factors apparently unrelated to TQM, yet more difficult to imitate than TQM itself. For example, TQM appears to require a culture receptive to change, a motivation

to improve, people capable of understanding and implementing TQM's peculiar set of practices, corporate perseverance, leadership qualities such as the capacity to commit, and perhaps some exogenous chance factor that may motivate change and learning (e.g., threat from a foreign competitor). Without these tacit, intangible, causally-ambiguous, difficult-to-imitate complementary resources, TQM programs have no foundation for success (Winter, 1987; Spender, 1993; Szulanski, 1993).

It also appears that TQM requires a complete restructuring of social relationships both within the firm, and among the firm and its stakeholders. According to Barney (1991) 'A variety of firm resources can be socially complex. Examples include the interpersonal relationships among managers in a firm, a firm's culture, and a firm's reputation among suppliers and customers.' (1991: 110) Under TQM, firms must reconstitute all these relationships, in addition to relationships among employees and between managers and employees. And they must reconstitute them more or less at the same time. As Barney points out, 'Such social engineering may be, for the time being at least, beyond the capabilities of most firms. To the extent that such resources are not subject to direct management, these resources are imperfectly imitable. (p. 110)

Despite widespread TQM adoption among the *Fortune* 1000, and despite the bandwagon effects, publicity, and increasing external pressure, most firms have *not* adopted TQM. The one, highly publicized group of U.S. firms that has adopted TQM in overwhelming numbers—large manufacturers competing in global markets—did so partly because of the powerful bandwagon (bolstered by generally favorable performance studies), but primarily because they, of all potential U.S. adopters, were most homophilous with the large Japanese TQM innovators: they perceived TQM as providing advantage (as it had for the Japanese manufacturers that threatened their markets), they believed it was compatible with existing needs and experiences (the TQM gurus and early adopters asserted this, and Japanese firms like Toyota and Honda had shown TQM could work outside Japan), they believed they had the necessary complementary resources (e.g., a culture amenable to employee empowerment), they believed they understood Japanese practices (they used the same gurus, and some entered joint ventures), and they perceived opportunities to experiment with TQM on a trial basis (such as in GM's Cadillac Division). One would expect their success or failure with TQM to hinge almost entirely on the accuracy of these perceptions.

HYPOTHESES

If TQM does produce economic value, and this has not been established, we would expect the powerful isolating mechanisms just discussed to produce competitive advantage for TQM firms. As such, we would expect to find that TQM firms outperform non-TQM firms so long as firms perceived their resources and capabilities with some reasonable degree of accuracy, and behaved more or less rationally in deciding whether to adopt TQM. Of course, some firms will act on wildly inaccurate perceptions (Starbuck, 1985)—in particular, some will wrongly believe they have the complementary resources needed to make TQM work (such as the capacity to commit). Others will behave irrationally, joining the bandwagon without regard to TQM's demands or to their own resources or suitability for TQM. Some firms that should adopt TQM will erroneously decide to reject it. Even if TQM does produce economic value, these inevitable mistakes may tend to suppress any empirically-derived TQM-performance relationship.

However, the diffusion of innovation literature suggests that, despite the inaccurate perceptions and irrationalities that enter into all decisions (especially those involving bandwagon phenomena), most firms will assess themselves and TQM more or less rationally using the five criteria, and those least-suited to TQM will not generally attempt it. As a result, if TQM does produce economic value, TQM firms should outperform non-TQM firms overall. Therefore, the following hypothesis acts as an initial test of the economic value of TQM:

Hypothesis 1: TQM firms outperform non-TQM firms

A central notion in TQM training and literature concerns the need to adopt longer time horizons, and the expectation that TQM programs will not produce short-term bottom-line results (Deming,

1986). Most TQM advocates agree that TQM cannot produce consistent performance advantages until after the third year of implementation (e.g., Schmidt and Finnigan, 1992), at which point most organizations have had sufficient time to adapt, assimilate, and stabilize under the new approach. This notion suggests the following hypothesis:

Hypothesis 2: Long-term TQM firms outperform short-term TQM firms

The discussion of diffusion of innovations gives rise to the expectation that TQM would produce the best results for homophilous adopters, i.e., those with experiences, conditions, and cultures resembling those of existing TQM practitioners. Since TQM originally emerged from manufacturing environments, and because TQM remains more widely disseminated among manufacturers, manufacturing adopters should outperform service adopters. To some extent, such a finding could result from the time differences just discussed, since manufacturers have a longer history with TQM. The third hypothesis predicts that, independent of time effects, manufacturers outperform service firms among TQM adopters.

Hypothesis 3: Manufacturing TQM firms outperform service TQM firms

Finally, TQM performance should bear a positive association with the firm's incorporation of the 12 basic features of TQM. This capacity depends both on the firm's complementary resources at the time of adoption, and on its ability to adapt and assimilate TQM principles over time. This leads to the remaining hypotheses:

Hypothesis 4: TQM performance is positively associated with committed leadership

Hypothesis 5: TQM performance is positively associated with adoption and communication of TQM

Hypothesis 6: TQM performance is positively associated with closer customer relationships

Hypothesis 7: TQM performance is positively associated with closer supplier relationships

Hypothesis 8: TQM performance is positively associated with benchmarking

Hypothesis 9: TQM performance is positively associated with increased training

Hypothesis 10: TQM performance is positively associated with open organization

Hypothesis 11: TQM performance is positively associated with employee empowerment

Hypothesis 12: TQM performance is positively associated with a zero-defects mentality

Hypothesis 13: TQM performance is positively associated with flexible manufacturing

Hypothesis 14: TQM performance is positively associated with process improvement

Hypothesis 15: TQM performance is positively associated with measurement

DATA AND MEASURES

Sample

The empirical research proceeded in three phases. In the first phase, the researchers reviewed the TQM literature, underwent TQM training, developed measurement scales for the TQM dimensions, and pretested these scales, including review and feedback from TQM consultants, trainers, and executives. In the second phase, the researchers mailed the pretested survey to the CEOs of all firms with 50 employees or more within selected zip codes in the northeastern U.S. The CEOs were asked to complete the survey whether or not their firms had adopted TQM. In the third phase, the researchers conducted on-site personal interviews with CEOs and quality executives in 30 firms, also in selected zip codes in the northeastern U.S., but not in zip codes included in the mail survey. Of these 30 firms, 23 had TQM programs, and these 23 were also asked to complete the structured survey.

The mail survey was designed and administered under guidelines established in Dillman's (1978) Total Design Method. Of the 143 surveys mailed in the second phase, 40 were returned, 36 of

which were complete, for a usable response rate of 25.2 percent. Twenty-one of these firms (58.3%) claimed to have made meaningful commitments to TQM. This percentage is lower than those reported in earlier studies, but consistent with the researchers' expectations in a representative sample including both manufacturing and service firms. The researchers believe the percentage would have been much lower if the smallest firms had not been excluded from the sample.

In the third phase of the research, 19 of 23 surveys were returned, 18 of which were complete (all from TQM firms, by design), for a usable response rate of 78.3 percent, and an overall usable response rate of 32.5 percent (54 responses from 166 surveys). This response rate compares favorably with other studies using comparable methodologies (e.g., Gomez-Mejia, 1992; Zahra and Covin, 1993).

Annual median sales among sample firms was $136 million, and the median number of employees was 750. Although these statistics exceeded known population parameters for all firms located in those zip codes, this result had been expected due to the artifical size minimum employed in the sampling procedure. These medians closely approximated those reported by Powell (1992) and Zahra and Covin (1993) using similar sampling procedures, and were significantly smaller than those found in some established data bases (e.g., the PIMS data base).

In the cover letter, the researchers requested that the survey be completed either by the CEO or, in the case of TQM firms, by either the CEO or a senior executive with overall responsibility for quality program implementation. Subsequent phone calls to a subsample of 10 phase two respondents confirmed that the surveys were completed either by CEOs or senior quality executives. All of the personal, on-site interviews in the third phase included either CEOs, senior quality executives, or both.

In the third phase, six firms were asked to complete two surveys per firm to establish interrater reliability, and four firms responded. Among these respondents, the mean intrafirm correlation for the 92 survey items was 0.74, compared to 0.22 for interfirm responses. Moreover, 76 percent of all intrafirm responses (210 of 276) fell within a single point of one another on the 5- and 6-point scales employed, compared with the 55 percent (152 of 276) that would be expected by chance. Although the firm sample was small, these statistics strongly supported a presumption of interrater reliability in the surveys.

Measures

Although TQM assessment instruments existed prior to this research (e.g., Saraph, Benson, and Schroeder, 1989; George, 1992), none was found suitable for this research, which required scales that integrated various approaches to TQM, in a form acceptable for scholarly survey research and data analysis (for a critical evaluation of existing scales, see Human and Ohmer, 1993). In the pretest phase, the researchers developed a TQM measurement scale based on an exhaustive review of the TQM literature, and revised this scale through repeated discussions and site visits with consultants and quality executives. The final scale contained 47 items covering 12 variables, and is given in Appendix 1c.

Cronbach alpha coefficients were computed to test the reliabilities of the TQM scales (Cronbach, 1951). Typically, these coefficients should fall within a range of 0.70 to 0.90 for narrow constructs such as those defined here, and 0.55 to 0.70 for moderately broad constructs (Van de Ven and Ferry, 1979). In the empirical study, the coefficients for the twelve variables ranged between 0.78 and 0.90, and varied only trivially between the second and third phases of the research.

Resource-based strategy research has shown that firm-level factors such as organization climate (Hansen and Wernerfelt, 1989) and structure (Powell, 1992) can explain performance variance over and above variance attributable to industry factors. To provide the most rigorous test of the performance consequences of TQM, this research assessed the TQM-performance relationship over and above industry and firm size effects. To measure industry effects, the researchers developed the scale of 14 industry items shown in Appendix 1a. Based on Porter's (1980) industry analysis framework, these items were divided into two variables, entry barriers and rivalry, and these variables were used as an index of industry differences. Since each of these constructs is somewhat broader than the TQM

constructs (e.g., rivalry includes advertising intensity, R&D, and industry growth rate), the Cronbach coefficients of 0.64 and 0.60 were considered acceptable under the Van de Ven and Ferry (1979) criteria.

Overall financial performance was measured subjectively, using the five items shown in Appendix 1d, addressing profitability, sales growth, and overall financial performance. TQM performance was assessed separately, using the items shown in Appendix 1e. Subjective performance measures are widely accepted in organizational research (Lawrence and Lorsch, 1967; Dess, 1987; Powell, 1992), and in this research were preferred to financial statement data because the heterogeneous sample produced significant industry differences in capital structures and accounting conventions, and firm differences in inventory valuation, depreciation, and officers' salaries. Also, this research included many privately-held firms that would not have provided confidential financial information as a matter of policy.

As a test of the convergent validity of the total performance measure, objective financial measures were obtained for 15 publicly-held survey participants. In this subsample, return on sales, a commonly-used measure of financial performance in strategy research (e.g., Cool and Dierickx, 1993; Zahra and Covin, 1993), correlated significantly with the subjectively-derived total performance measure ($r = 0.64$; $p \leq 0.01$), suggesting that, although the objective and subjective measures are not identical, the objective measures constituted a key element of the respondents' subjective assessments.

RESULTS

Table 3 shows the descriptive statistics and correlations among the variables involved in testing Hypothesis 1. The three TQM measures are defined in Table 3, and the scales are provided in Appendix 1. Table 3 indicates support for the validity of key measures used in this research. For example, Table 3 shows that firm performance correlated significantly with both entry barriers ($r = 0.29$; $p \leq 0.05$) and rivalry ($r = -0.32$; $p \leq 0.05$), and in the directions predicted in the Porter framework. Moreover, these two variables explained independent proportions of performance variance, correlating insignificantly with one another ($r = -0.09$). Combined, the two industry variables explained 17 percent of total performance variance, a result consistent with findings reported by Schmalansee (1985) and Rumelt (1991). Schmalansee found that 19.6 percent of profitability variance was attributable to industry effects, concluding that (1985: 350) '80 percent of the variance in business-unit profitability is unrelated to industry or share effects. While industry differences matter, they are clearly not all that matters.' Rumelt reported that 16.1 percent of profitability variance was attributable to industry effects, although about half of this variance was unstable from one period to the next. Rumelt concluded that (1991: 167) 'the most important sources of economic rents are business-specific.' The findings here support these conclusions.

Hypothesis 1 predicted that financial performance would relate positively and significantly with TQM. Table 3 shows that the three zero-order TQM-performance correlations were all positive, and ranged from marginally significant ($r = 0.23$; $p \leq 0.10$) to highly significant ($r = 0.35$; $p \leq 0.01$). However, the proper test of this hypothesis requires that industry and firm size factors be partialled from the analysis. Table 4 shows the results of this analysis, assessing the partial correlations between TQM and performance when industry and firm size have been partialled (see Cohen and Cohen, 1993).

Table 4 shows that all TQM-performance partial correlations were positive and significant, ranging from $pr = 0.30$ ($p \leq 0.05$) to $pr = 0.37$ ($p \leq 0.01$). Moreover, each partial correlation exceeded the corresponding zero-order correlation. This means that one or more of the three partialled variables had suppressed the zero-order correlation through its joint correlations with TQM and performance. An analysis of the Table 3 intercorrelations shows that the increased TQM-performance partial correlations were caused by entry barriers and firm size (ln emps), and supports the following conclusions: (1) the zero-order TQM-performance correlations would have been higher if TQM were not negatively correlated with entry barriers, which in turn was positively correlated with performance. Although the TQM-entry barrier correlation was not statistically significant, and therefore does not require interpretation, the simple fact of its

Table 3. Descriptive statistics and correlations: Total sample

(N = 54)	Mean	S.D.	1	2	3	4	5	6	7
1. Entry barriers	3.11	0.86	1.00						
2. Rivalry	3.25	0.52	−0.09	1.00					
3. ln Emps	6.63	2.22	0.03	0.01	1.00				
4. TQM1	0.72	0.45	−0.11	−0.10	0.20	1.00			
5. TQM2	2.39	1.75	−0.10	−0.24	0.21	0.85	1.00		
6. TQM3	2.22	1.52	−0.04	−0.18	0.10	0.92	0.91	1.00	
7. Total performance	3.00	1.15	0.29	−0.32	−0.13	0.23	0.28	0.35	1.00

TQM measures:
TQM1—the dichotomous variable shown in Appendix 1b, item 1 (1 = TQM; 0 = no TQM).
TQM2—the 6-point scale shown in Appendix 1b, item 2.
TQM3—mean response to all TQM items in Appendix 1c except those for flexible mfg. (which do not apply to service firms).

negative direction was sufficient to create the suppression effect; and (2) the zero-order TQM-performance correlations would have been higher if TQM were not positively (though insignificantly) correlated with firm size, which in turn correlated negatively with performance.

The findings in Table 4 support Hypothesis 1, along with the underlying assumption that TQM does provide economic value to the firm. If, as argued earlier, TQM is also difficult to imitate successfully, then the results do not contradict the assertion that TQM can act as a source of competitive advantage, perhaps even sustainable advantage. The remaining hypotheses consider the conditions under which TQM may produce such advantage.

Table 5 presents descriptive statistics and performance correlations for the variables involved in testing Hypotheses 12 through 15. Because these hypotheses concern only TQM adopters, only TQM firms (n = 39) were involved in the remaining hypothesis testing. For each independent variable, correlations were computed for two performance measures, TQM Performance (see Appendix 1e) and Total Performance (see Appendix 1d). The former measures satisfaction with the TQM program, and the latter measures overall firm performance. One interesting but nonhypothesized result in Table 5 is that, even though large firms were more likely to adopt TQM than small firms (see Table 3), the correlation between TQM performance and firm size was significant and negative, suggesting that size may impede successful TQM implementation.

Table 4. Testing H1

(N = 54)	Zero-order r	Partial r
TQM variables		
TQM1	0.23*	0.30**
TQM2	0.28**	0.31**
TQM3	0.35***	0.37***

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
1. All t-tests are two-tailed.
2. Partial r is the correlation between Total Performance and the TQM variable when the context set (entry barriers, rivalry, and ln emps.) is held constant.

Hypothesis 2 predicted that long-time TQM adopters would report better performance than short-time TQM adopters. The large zero-order correlation between years since adoption and TQM performance (r = 0.53, $p \leq 0.001$) supported this hypothesis, but the nonsignificant correlation with Total Performance (r = 0.10; ns) did not. This means that long-time TQM adopters were more satisfied with their TQM programs than short-time adopters, even though no apparent time–performance correlation existed. Tables 6 and 7 help to clarify this situation, comparing the attributes of firms with more than 4 years TQM experience to those with less than 4 years experience. These results show that the long- and short-time adopters differed significantly on six TQM variables, with two of them—the extent of training and process improvement—very highly significant. A plaus-

Table 5. Statistics for testing H2–H15

(N = 39)	Mean	S.D.	Corr w/TQM Perf. r	Corr w/TQM Perf. pr	Corr w/Total Perf. r	Corr w/Total Perf. pr
Contextual factors						
H2: Years since TQM adoption	3.08	2.01	0.53†	0.53†	0.10	0.10
H3: Industry	0.61	0.49	0.52†	0.52†	0.04	0.04
ln emps	6.90	2.09	−0.34**	−0.34**	−0.29*	−0.29*
TQM factors						
H4: Executive commitment	3.84	0.86	0.41***	0.36**	0.45***	0.36**
H5: Adopting the philosophy	3.78	1.04	0.29*	0.17	0.32*	0.26*
H6: Closer to customers	3.58	0.88	0.27*	0.25	0.30*	0.20
H7: Closer to suppliers	2.71	1.12	0.61†	0.34**	0.28*	0.30*
H8: Benchmarking	2.55	0.85	0.24	0.02	0.22	0.22
H9: Training	3.42	1.00	0.43***	0.21	0.20	0.16
H10: Open organization	3.21	0.96	0.61†	0.61†	0.51†	0.43***
H11: Emp. empowerment	2.81	0.99	0.64†	0.59†	0.45***	0.37**
H12: Zero defects mentality	2.90	1.29	0.61†	0.45***	0.34**	0.28*
H13: Flexible mfg. (n = 24)	2.76	0.89	0.53†	−0.01	0.01	0.04
H14: Process improvement	2.65	0.93	0.57†	0.21	0.22	0.25
H15: Measurement	2.81	1.13	0.56†	0.18	0.19	0.17

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
1. All t-tests are two-tailed.
2. pr is the correlation between performance and the variable given when the contextual factors are held constant. For the contextual factors, r and pr are equivalent.
3. Industry is a dichotomous variable (0 = service; 1 = mfg).

ible interpretation is that long-term TQM firms reported more satisfaction with TQM because they had successfully mastered the core TQM techniques, but they gained no significant performance advantages because they did not accompany the techniques with improvements in the intangibles that have significant performance impacts for all firms, particularly executive commitment and open organizational culture.

Hypothesis 3 predicted that manufacturing TQM firms would outperform service TQM firms. The large positive zero-order correlation between TQM performance and industry (r = 0.52; $p \leq 0.001$) supported this hypothesis, but again the nonsignificant partial correlation (r = 0.04) did not. The TQM performance–industry correlation remained significant even after years since adoption had been partialled (r = 0.45; $p \leq 0.001$), suggesting that manufacturers were significantly more satisfied with their TQM programs than service firms, independent of any differences related to years since adoption. Tables 8 and 9 shed additional light on these findings, showing that manufacturers differed significantly from service firms in four areas—closeness to suppliers, zero defects mentality, process improvement, and measurement—without differing in others that have important performance impacts, such as open organization, employee empowerment, and executive commitment. Again, it appears that manufacturers reported more satisfaction with their TQM programs because they successfully mastered the TQM tools and techniques, but their performance gains did not exceed those of service firms because the manufacturers did not surpass them in the intangible areas most responsible for TQM performance.

Hypotheses 4 through 15 consider the relationships between performance and the 12 TQM variables. These results are shown in the 'TQM factors' section of Table 5, which shows both the zero-order correlations and the partial correlations when effects of the three contextual variables have been removed. Of the 12 TQM variables, only three—executive commitment, open organization, and employee empowerment—produced significant partial correlations for both performance measures. Two additional variables—zero-defects mentality and

Table 6. TQM performance and years since TQM adoption

	Short-term (n = 20)		Long-term (n = 19)		
	Mean	S.D.	Mean	SD	Δ
Contextual factors					
Years since TQM adoption	1.60	1.10	4.84	1.01	†
Industry	0.60	0.50	0.68	0.48	ns
ln emps	6.25	2.00	7.37	1.92	ns
TQM factors					
Executive commitment	3.70	0.86	4.04	0.84	ns
Adopting the philosophy	3.75	1.02	3.97	1.03	ns
Closer to customers	3.35	0.93	3.84	0.77	*
Closer to suppliers	2.53	1.09	2.97	1.07	ns
Benchmarking	2.38	0.77	2.83	0.90	**
Training	2.93	0.98	4.00	0.79	†
Open organization	3.09	0.97	3.40	0.91	ns
Emp. empowerment	2.53	0.99	3.20	0.78	**
Zero defects mentality	2.72	1.35	3.23	1.18	ns
Flexible mfg. (n = 24)	2.14	0.60	3.28	0.76	**
Process improvement	2.25	0.86	3.14	0.75	†
Measurement	2.50	1.09	3.25	1.02	**
Performance					
TQM performance	3.49	0.62	4.07	0.65	***

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
1. All t-tests are two-tailed.
2. Short-term is defined as fewer than 4 years since adoption of TQM. Long-term is four years or more since adoption.

closeness to suppliers—correlated with TQM performance at $p \leq 0.05$, but with total performance only at $p \leq 0.10$. Therefore, of the Hypotheses 4 through 15, only Hypothesis 4 (executive commitment), Hypothesis 10 (open organization), and Hypothesis 11 (employee empowerment) were supported conclusively. As noted earlier, these results suggest that the key to TQM performance lies not in TQM tools and techniques like benchmarking and process improvement, but in intangible, behavioral factors like leadership, organizational skill, and culture.

To explore the possibility of TQM taxonomy, the researchers cluster-analyzed the 39 TQM firms over the twelve TQM variables using a Euclidean, hierarchical, single-linkage clustering algorithm developed by Hartigan (1975). This procedure produced the three groups shown in Table 10. Group 1 consisted principally of small- to medium-sized firms (median employees = 500), mostly manufacturers (17 of 22 firms) with considerable TQM experience (median years since adoption = 4.0) and success (mean total performance = 3.54). Group 2 consisted of 13 firms, only two of which were manufacturers. These firms were quite large on average (median employees = 5,000), but had little experience with TQM (median years since adoption = 1.0 years), and relatively poor performance (mean total performance = 2.66). Group 3 consisted of four large manufacturing firms (median employees = 3,650) with considerable TQM experience (median years since adoption = 3.5), but poor performance (mean total performance = 2.30).

Groups 1 and 3 each contain manufacturers experienced in TQM, yet Group 1 is the highest performing group, and Group 3 is the lowest. The mean differences in Table 10 suggest an explanation. Although the Group 3 firms were at least as advanced as Group 1 firms on several variables (process improvement, flexible manufacturing, closeness to suppliers, and benchmarking), they fell behind even the TQM-inexperienced Group 2 firms in others (executive commitment, adopting the philosophy, closeness

Table 7. TQM performance and years since TQM adoption

	Correlations with TQM performance			
	Short-term (n = 20)		Long-term (n = 19)	
	r	*pr*	*r*	*pr*
Contextual factors				
Industry	0.52**	0.52**	0.52**	0.52**
ln emps	−0.56***	−0.56***	−0.41*	−0.41*
TQM factors				
Executive commitment	0.15	0.05	0.58***	0.28
Adopting the philosophy	0.08	−0.16	0.40*	0.18
Closer to customers	−0.02	−0.03	0.40*	0.31
Closer to suppliers	0.44**	0.09	0.76†	0.69***
Benchmarking	0.03	−0.04	0.19	0.15
Training	0.35	0.37	0.14	0.11
Open organization	0.53**	0.36	0.66***	0.49**
Emp. empowerment	0.49**	0.34	0.71†	0.59**
Zero defects mentality	0.45**	0.20	0.72†	0.53**
Flexible mfg.	−0.04	−0.03 (n = 11)	0.15	0.39 (n = 13)
Process improvement	0.19	−0.01	0.76†	0.65***
Measurement	0.43**	0.26	0.52**	0.18

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
1. All *t*-tests are two-tailed.
2. *r* is the zero-order correlation between TQM Performance and the variable given.
3. *pr* is the correlation between TQM Performance and the variable given when contextual factors are partialled. *r* = *pr* for contextual factors.
4. Short-term is defined as fewer than 4 years since adoption of TQM. Long-term is 4 years or more since adoption.

to customers, open organization, and employee empowerment). In other words, the Group 3 firms mastered the imitable TQM tools—especially those directly related to production—without adopting its difficult-to-imitate intangibles. These programs more closely resembled traditional Quality Control (QC) than contemporary TQM programs, and apparently had little significant impact outside the factory.

DISCUSSION

The findings support the conclusion that TQM can produce economic value to the firm, but that it has not done so for all TQM adopters. TQM success appears to depend critically on executive commitment, open organization, and employee empowerment, and less upon such TQM staples as benchmarking, training, flexible manufacturing, process improvement, and improved measurement. Although firms may find these tools indispensible to a fully-integrated TQM initiative, they apparently do not produce performance advantages in the absence of the intangibles. This result is consistent with the resource-based notion of complementary resources, and suggests that, rather than merely imitating TQM procedures, firms should focus their efforts on creating a culture within which these procedures can thrive. This profile differs substantially from those found in existing TQM studies, which focused almost entirely on the TQM tools and techniques.

Moreover, TQM does not appear to be as pervasive as some earlier studies suggested: a little over half of firms responding to the phase-2 survey had adopted TQM, and this number was overstated due to the minimum firm size (50 employees) imposed in the sampling design. Although this result differed from the 93 percent and 74.5 percent adoption rates reported among the largest U.S. firms, it was in keeping with the researchers' expectations of potential adopters

Table 8. TQM performance and industry group

	Mfg. (n = 24)		Service (n = 15)		
	Mean	S.D.	Mean	S.D.	Δ
Contextual factors					
Years since TQM adoption	3.54	1.72	2.33	2.26	ns
Industry	1.00	0.00	0.00	0.00	†
ln emps	6.64	2.03	7.37	1.92	ns
TQM factors					
Executive commitment	3.94	0.90	3.67	0.78	ns
Adopting the philosophy	4.00	0.91	3.43	1.18	*
Closer to customers	3.53	0.94	3.65	0.80	ns
Closer to suppliers	3.28	0.86	1.80	0.87	†
Benchmarking	2.68	0.84	2.33	0.85	ns
Training	3.53	0.87	3.23	1.19	ns
Open organization	3.38	0.91	2.93	1.02	ns
Emp. empowerment	2.98	0.97	2.55	0.99	ns
Zero defects mentality	3.35	1.00	2.18	1.41	***
Flexible mfg. (n = 24)	2.76	0.89	na	na	na
Process improvement	3.03	0.80	2.04	0.79	†
Measurement	3.35	0.86	1.95	0.98	†
Performance					
TQM Performance	4.05	0.62	3.32	0.56	†

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
All t-tests are two-tailed.

who evaluated TQM more or less rationally in light of their own needs and resources.

The results suggest that, although the intangibles were universally important to TQM success, other factors were context-dependent. In particular, closer supplier relationships appeared to promote TQM performance among manufacturers but not among service firms, and process improvement appeared to promote TQM performance among service firms but not among manufacturers. These results support the contingency approach adopted in the American Quality Foundation (1991) study, but they tell a slightly different story. The earlier study reported that supplier certification and process improvement were uniformly associated with performance across all respondent groups. The results reported here suggest that the performance–supplier relationship, though significant, vanishes when industry and years since adoption are partialled (see Table 5), although it remains significant for the subsample of manufacturers (see Table 9). Similarly, the performance–process improvement correlation, though significant, vanishes when industry and years since adoption are partialled, although it remains significant for service firms. In other words, when industry and time are taken into account, closeness to suppliers and process improvement do not generally explain TQM performance variance, although they may explain performance in some industry contexts.

The on-site interviews conducted in the third phase of this research produced anecdotal evidence that supplements this profile of TQM as a strategic resource. During this phase of the study, the researchers encountered several highly successful non-TQM firms. One firm that typified this group had produced remarkable growth and profitability in a rivalrous, low technology manufacturing industry, although it explicitly rejected TQM. The interviews showed that this firm had for years done many of the things promoted by TQM advocates—including empowering employees, eliminating bureaucracy, and simplifying processes—but had never regarded these activities as an integrated formal program to be adopted, and had not applied a special vocabulary or ideology to them. These

Table 9. TQM performance and industry group

	Correlations with TQM performance			
	Mfg. (n = 24)		Service (n = 15)	
	r	*pr*	*r*	*pr*
Contextual factors				
Years since TQM adoption	0.51***	0.51***	0.43*	0.43
ln emps	−0.26	−0.26	−0.37	−0.37
TQM factors				
Executive commitment	0.55***	0.32	0.06	−0.15
Adopting the philosophy	0.22	0.14	0.14	0.02
Closer to customers	0.48**	0.18	0.12	−0.15
Closer to suppliers	0.53***	0.59***	0.23	−0.05
Benchmarking	0.10	0.11	0.25	0.02
Training	0.42**	0.09	0.45*	0.34
Open organization	0.57***	0.47**	0.63†	0.56***
Emp. empowerment	0.69†	0.57***	0.54***	0.28
Zero defects mentality	0.53***	0.31	0.47*	0.37
Flexible mfg.	0.33	0.29	na	na
Process improvement	0.30	0.15	0.60***	0.54*
Measurement	0.43**	0.27	0.22	0.00

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$

1. All *t*-tests are two-tailed.
2. *r* is the zero-order correlation between TQM performance and the variable given.
3. *pr* is the correlation between TQM performance and the variable given when contextual factors are partialled. $r = pr$ for contextual factors.

activities were, in the words of its CEO, just 'common sense' and 'good business.'

The empirical results suggested that TQM can produce competitive advantage, but is TQM *necessary* to success? Apparently not. Both the anecdotal and statistical evidence suggest that, although TQM can produce competitive advantage, adopting the vocabularies, ideologies, and tools promoted by the TQM gurus and advocates matters less than developing the underlying intangible resources that make TQM implementation successful. And these resources appear to produce success with or without formal TQM adoption: TQM firms that lack them do not succeed, and non-TQM firms that have them do. Perhaps TQM's highest purpose, and its real contribution to American business, is in providing a framework that helps firms understand and acquire these resources as part of an integrated change program. One executive in a successful non-TQM firm put it best: 'If a company needs a fancy program to listen to their customers, then I think they'd better get one.

CONCLUSIONS

In the empirical study, the researchers employed a variety of validating procedures and controls, including extensive pretesting, confirming the identities of a respondent sample, testing for interrater relaibility, testing the convergent validity of the total performance measure, conducting on-site personal interviews, comparing sample statistics with population parameters and with statistics reported in comparable studies, testing all measurement scales for internal reliability, focusing on a single geographic area (controlling for regional performance differences), and controlling for factors that may produce spurious zero-order correlations (such as industry and firm size). Nonetheless, the survey methodology has several limitations that should be addressed in interpreting the findings.

One limitation is the study's cross-sectional research design. Although the data showed a significant TQM–performance correlation, they did not strictly prove that TQM caused perform-

Table 10. Clustering firms on TQM variables

	Cluster 1	Cluster 2	Cluster 3	Multiple comparisons		
	(n = 21) Mean	(n = 13) Mean	(n = 5) Mean	1–2	1–3	2–3
Contextual factors						
Median years since TQM	4.00	1.00	3.50	***	ns	ns
Industry	0.81	0.23	1.00	†	ns	ns
Median emps	500.0	5000.0	3650.0	**	***	ns
TQM factors						
Executive commitment	4.33	3.18	3.08	†	***	ns
Adopting the philosophy	4.43	2.96	2.75	†	†	ns
Closer to customers	3.98	3.12	2.63	***	***	ns
Closer to suppliers	3.27	1.74	3.25	†	ns	***
Benchmarking	2.78	1.95	3.17	***	ns	***
Training	3.95	2.65	3.06	†	**	ns
Open organization	3.74	2.56	2.06	†	†	ns
Emp. empowerment	3.43	2.00	1.81	†	†	ns
Zero defects mentality	3.65	1.49	3.00	†	**	†
Flexible mfg.	2.54	0.71	3.00	†	ns	†
Process improvement	3.10	1.79	3.40	†	ns	†
Measurement	3.54	1.77	2.81	†	ns	***
Performance						
Total performance	3.54	2.66	2.30	**	**	ns
TQM performance	4.11	3.29	3.56	†	*	ns

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$, †$p \leq 0.001$
All t-tests are two-tailed.

ance to increase, but only that an association existed. High performance may give rise to TQM programs, or TQM and performance may both be caused by some third factor not measured in this study (although, based on previous strategy research, the most powerful known explanatory factors were included in the study). The researchers believe that causation from TQM to performance is the most plausible of the various interpretations, but a longitudinal design—with pre- and post-TQM performance measures—would be required to support a causal inference.

Another limitation is the relatively small sample size employed in the study. The samples of all firms (n = 54) and all TQM firms (n = 39) were quite sufficient for the statistical methods employed in this study, and the sample statistics strongly supported the integrity of the sample, as did other sample demographics, which conformed both with anecdotal evidence and with findings in other studies (e.g., TQM firms were, on average, larger than non-TQM firms, and service firms trailed manufacturing firms in TQM implementation). However, the subsamples of manufacturing TQM firms (n = 24), service TQM firms (n = 15) and non-TQM firms (n = 15) were not large, and the findings from the associated hypothesis tests should be generalized with caution. The researchers acknowledge the potential external validity problems in the subsamples, and urge other strategy researchers to test their findings using larger samples and alternative methodologies.

One concern of the researchers was that, although the survey cover letter asked all firms to respond, whether or not they had adopted TQM, the subject matter of the study (TQM) may have produced greater nonresponse among non-TQM firms than among TQM firms. As noted earlier, 58 percent of the phase two mail survey respondents were TQM firms, and 42 percent were non-TQM. Although this indicates lower TQM dissemination than previous studies, the researchers believe, based mainly on anec-

dotal and on-site interview evidence, that the actual proportion of TQM firms in the population is much lower than 58 percent, and perhaps closer to 30 percent. The 58 percent proportion in the sample was in part due to the size minimum of 50 employees imposed on the sample, and perhaps partly due to higher response among TQM firms. In any case, there is no reason to believe this factor would invalidate any of the empirical results reported here (other than the 58%–42% split).

A final limitation was survivor bias, although the researchers did attempt to address this in the research design. From an organizational ecology perspective, one could argue that the study understates the TQM–performance relationship because non-TQM firms are failing at a faster rate than TQM firms. If this is true, then TQM will continue to disseminate rapidly not only because more firms are adopting TQM, but because the failure of non-TQM firms will leave an ever-rising proportion of TQM firms in the surviving population. This research did not study nonsurvivors, and the researchers did not encounter studies comparing survival rates among TQM and non-TQM firms. As noted earlier, the researchers have concluded that survival is associated with certain critical intangible resources, whether or not they fall within a TQM initiative.

The researchers believe this study contains findings useful both to practicing managers and to other strategy researchers. The message for managers is that, although TQM programs can produce performance advantages, they do not address the needs of all organizations, and they are fraught with pitfalls for firms that lack the requisite complementary resources. Moreover, despite relentless pressure from TQM advocates, we have concluded that it is quite possible for firms to prosper outside the confines of the TQM ideology and vocabulary, so long as they nurture the intangible resources critical to survival and success.

This study makes several contributions to strategic management research. First, in contrast to the existing TQM literature, which is almost entirely practitioner-oriented, this study provides the first integrated theoretical and empirical profile of TQM as a strategic resource. The researchers know of no other management concept or practice that has ever received so much practitioner attention, with so little academic study, as TQM, and this study begins to redress that imbalance. Second, this study provides support for the expanding stream of resource-based empirical research that demonstrates the importance of firm-level intangible resources. Although these resources pose difficult methodological and measurement problems, this line of research is now showing signs of maturity and accumulation. Third, this study integrates resource-based insights with those from alternative theoretical perspectives, specifically diffusion of innovation theory and organizational ecology. Although the notion of a unified, resource-based strategic management paradigm has appeal, this study shows that multiple theoretical approaches can still add depth to the interpretation of empirical data.

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APPENDIX 1: MEASUREMENT SCALES

1a: INDUSTRY

Participants were asked to circle the best response to each statement on a 1–5 scale (5 = agree strongly, 1 = disagree strongly). The variables measured are indicated for all scales, but were not so indicated in the surveys.

Entry barriers

1. Our industry is very difficult for new firms to enter successfully
2. In our business, existing firms have insurmountable advantages over new entrants
3. Large firms have definite cost advantages in our industry
4. Our industry is dominated by a few large competitors

Rivalry

1. In our industry, customers are loyal—they rarely switch to new firms or competitors
2. Competition in our industry is mainly on price, not product or service differentiation
3. Compared to other industries, rivalry in our industry is extremely intense
4. Firms in our industry advertise heavily compared to other industries
5. Demand in our industry has been growing rapidly in the past 3 years
6. Innovation and R&D are more prevalent in our industry than in most industries
7. Over the past 3 years, our industry has been more profitable than most
8. We have a serious excess capacity problem in our industry
9. Our industry is still in early growth and infancy

10. Our industry would be characterized as a high-technology industry

1b: TQM GENERAL

Respondents were asked the following two general TQM questions:

1. Has your organization ever made a significant commitment to Total Quality Management or a similar Total Quality program?

A. YES
B. NO

2. Please tell us how advanced the implementation of the program is compared to Quality programs of other organizations you are familiar with.

A. FAR MORE ADVANCED in implementation than most other organizations I am familiar with
B. SOMEWHAT MORE ADVANCED in implementation than most other organizations I am familiar with
C. ABOUT EQUALLY ADVANCED in implementation than most other organizations I am familiar with
D. SOMEWHAT LESS ADVANCED in implementation than most other organizations I am familiar with
E. FAR LESS ADVANCED in implementation than most other organizations I am familiar with
F. NO SIGNIFICANT INVOLVEMENT with a Quality program

1c: TQM FACTORS

Respondents were asked to indicate their implementation of the Quality features given below, on a 0 to 5 scale (5 = highly advanced in implementation; 1 = have not begun implementation but intend to; 0 = do not intend to implement).

Executive commitment

1. A top executive decision to commit fully to a Quality program
2. Top executives actively championing our Quality program
3. Executives actively communicating a Quality commitment to employees

Adopting the philosophy

1. Quality principles included in our mission statement
2. An overall theme based on our Quality program
3. Entering a Baldrige Award competition

Closer to customers

1. Increasing the organization's direct personal contacts with customers
2. Actively seeking customer inputs to determine their requirements
3. Using customer requirements as the basis for Quality
4. Involving customers in product or service design

Closer to suppliers

1. Working more closely with suppliers
2. Requiring suppliers to meet stricter Quality specifications
3. Requiring suppliers to adopt a Quality program

Benchmarking

1. An active competitive benchmarking program
2. Researching best practices of other organizations
3. Visiting other organizations to investigate best practices first hand

Training

1. Management training in Quality principles
2. Employee training in Quality principles
3. Employee training in problem-solving skills
4. Employee training in teamwork

Open organization

1. A more open, trusting organizational culture
2. Less bureaucracy
3. Frequent use of cross-departmental teams
4. Use of empowered work teams

Employee empowerment

1. Increased employee involvement in design and planning
2. A more active employee suggestion system
3. Increased employee autonomy in decision-making
4. Increased employee interaction with customers and suppliers

Zero-defects mentality

1. An announced goal of zero-defects
2. A program for continuous reduction in defects
3. A plan to reduce rework drastically

Flexible manufacturing

1. Design for Assembly (DFA) or Design for Manufacturability (DMA)
2. A flexible manufacturing system
3. A just-in-time inventory system
4. Cellular manufacturing
5. Process capability studies
6. Statistical Process Control
7. Taguchi methods, or Design of Experiments (DOE)

Process improvement

1. A program to reduce order-processing cycle time
2. A program to reduce new product or service development cycle times
3. A program to reduce overall product or service delivery cycle times
4. A program to reduce paperwork
5. A program to find wasted time and costs in all internal processes

Measurement

1. Measurement of Quality performance in all areas
2. Charts and graphs to measure and monitor Quality
3. Statistical methods to measure and monitor Quality
4. Employee training in statistical methods for measuring Quality

1d: TOTAL PERFORMANCE

Using the agree–disagree scale shown earlier, respondents were asked to rate their firms' overall performance over the past 3 years:

1. Over the past 3 years, our financial performance has been outstanding
2. Over the past 3 years, our financial performance has exceeded our competitors'
3. Over the past 3 years, our revenue (sales) growth has been outstanding
4. Over the past 3 years, we have been more profitable than our competitors
5. Over the past 3 years, our revenue growth rate has exceeded our competitors'

1e: TQM PROGRAM PERFORMANCE

Using the agree–disagree scale shown earlier, respondents were asked to indicate how their TQM programs had impacted performance by answering each question.

1. Our Quality program has dramatically increased our organization's productivity
2. Our Quality program has improved our competitive position
3. Our Quality program has dramatically increased our profitability
4. Our Quality program has dramatically increased our revenues
5. Our Quality program has dramatically improved our overall performance
6. Our Quality program has been a positive development for our organization
7. Our Quality program has had a negative impact on our profitability
8. We would have been better off without a Quality program