THE PRACTICE OF QUALITY MANAGEMENT

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INTRODUCTION TO THE VOLUME

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1.0 Why Research In Total Quality Management?

On March 26 and 27, 1993 a research conference was held at the Simon School of the University of Rochester on the topic of empirical research in quality management. The purpose of the conference was to stimulate leading scholars to begin research on quality management, and to provide a forum for discussion of the results. Attending the conference were approximately eighty scholars and quality managers at major U.S. firms. Eastman Kodak, Xerox, Allied Signal and Shell provided financial support for the research projects and conference logistics.

The design of the conference was driven by the rise and importance of quality as a management tool. Many firms have begun to explore quality management ideas, and driven by corporate adoption, there is a growing need to teach M.B.A students the salient ideas of the movement. At the same time, there are doubts and skepticism being voiced as to the value of quality management by observers who note that many quality programs fail. Both managers and academics are faced with a series of questions such as: what tools and techniques work, and what is the impact of quality programs on corporate performance? To date little research has addressed these and related issues. An address by Professor Robert Kaplan to the 1991 meeting of the American Assembly of Collegiate Schools of Business (Kaplan 1991) reported that little research in quality management had been done. A brief review of the research literature since then leads me to the conclusion that judgment still holds in 1994.
There are a number of plausible reasons why so little quality research has been produced to date. First, quality management is a rather new field, and academics know little about it. The fixed costs of learning about a new and evolving discipline will be a barrier to research. Second, what is somewhat different and challenging about research in quality is its intrafunctional focus. Most academic faculty are functionally trained and most journals are functionally defined. Unlike traditional functional oriented research, to explore important quality topics, there is a need to understand many functions and disciplines including operations, finance, marketing, accounting and organizational theory. Third, in several of these disciplines (particularly operations), there is not a strong tradition of empirical research. Quality is a young area, and data about quality are scarce. Empirical research is necessary to begin any research program. So, a major challenge of the research agenda is formulating empirical research designs.

The idea of the conference was to encourage academics to overcome these obstacles and begin research in this important area. An important part of the conference was the dissemination of its results in this book. It is hoped that the following chapters suggest research ideas and research methodologies appropriate to quality management. In the jargon of quality management, it is a desired outcome that other academics begin the process.

2.0 Why Empirical Research In Total Quality Management?

The intent of this volume is to present empirical research in quality management. The question may be asked, "Why is empirical research in quality management important?" To answer this question, it is useful to consider the objectives of management research.

The objective of research in quality management, like that for any management field, is two-fold: to develop theory and to assist practice. These objectives are not mutually exclusive, but reflect the different objectives of academic researchers and managers. The papers in this volume address both of these objectives, with differing emphases.

By developing theory, I mean a creating set of structured principles that explain or predict management practice. Although there are many definitions of theory, I limit my use to a set of structured principals that are derived using the scientific method. The goal of developing theory is to discover the scientific underpinnings of quality, so that observed phenomena can be understood and future events can be predicted. Academics strive for generality in research and this increases the time required for data collection and analysis, as compared to more applied research conducted by practitioners.

By research that assists practice, I mean knowledge that managers use when choosing among actions. Types of knowledge that assist managers include description of strategy and tactics, assessments of success of strategies and tactics, and theories that lead to normative prescriptions for action.

Empirical research helps both to develop theory and assist practice. Data can be useful for both purposes, and theory can be used to "engineer" solutions to management problems. However, empirical research may not always be equally useful to both purposes. For example, some empirical data may lead to theory that is useful in explaining trends in markets, but may be useless for forecasting or other practical applications. Also, applied principals may be based upon what
(apparently) works, without deeper insight into theory. For example, ancient engineers and doctors based their actions on what "apparently" worked, not theory.

To date, the state of quality research has been primary descriptive of successful (and unsuccessful) practice and is largely prescriptive. Its purpose has been largely to assist practice. This is completely understandable since quality derived from practitioners and their needs are pragmatic. Many quality thinkers prescribe tools and techniques for implementing quality programs based upon experience and observation. As an example, Deming's 14 Points (Deming 1990) are largely prescriptive, but are not based upon scientifically tested theory.

The chapters in this volume reflect both perspectives: answering the "why" of those interested in developing theory and the "how" of practitioners. The volume also presents different types of empirical studies. Several of the studies are primarily descriptive: reporting the details of the use of teams in quality programs, a plan for deploying quality management at a university, a taxonomy for management of services, and a case study of implementing a statistical quality control (SQC) project. This data may be useful to create theory and to assist practice.

Several studies present and test theories of quality management. Some are: a study of the financial performance of firms adopting quality programs, a theory of organizations and quality, an assessment of the value of quality in software, benchmarking the management of product development, organizational learning and TQM, and a cross sectional study of quality performance in the printed circuit board industry.

3.0 What is Meant By Total Quality Management?

Total Quality Management (TQM) is a term to used to describe many types of programs to improve quality and productivity. Both Garvin (1988) and Kolesar (1993) document the history of quality programs and argue that TQM developed from three earlier movements: inspection, statistical quality control and quality assurance.

Inspection focused on conformance of production to specifications so that products could be assembled with standardized parts. Statistical quality control (SQC) developed statistical methods to monitor quality and set standards for large lot manufacturing.

Quality assurance developed next, focusing on four elements: quantifying the cost of quality, total quality control, reliability engineering and zero defects. The cost of quality concept developed by Juran (1951) provided an economic rationale for quality improvement efforts, describing quality costs as avoidable (defect related costs) and unavoidable (prevention related costs). Feigenbaum (1956a) coined the term, total quality control. The idea was to expand quality activities beyond the manufacturing floor to the entire firm because "quality is everybody's job", (Feigenbaum 1956b). Reliability engineering used probability theory to predict and extend the time period over which a product functions according to specifications. The concept of zero defects, developed at Martin Company in 1961-62, emphasized that quality is improved by adopting a standard of no errors, rather than accepting a defect rate defined by SQC. All of these quality ideas were fashioned in the United States. However, the next phase of quality management, called TQM was primarily developed in Japan and first exploited by Japanese companies.

Total quality management is widely perceived as evolving from the earlier movements, but there is no standard definition of TQM and those that exist are very
broad and encompassing. Kolesar (1993) identifies the key characteristics of TQM program as

“1) a company-wide dedication to...totally satisfying customer needs and expectations..., 2) Quality concerns are fully integrated and (a) central aspect of...business planning..., 3) using factual data to support decision making..., 4) ...involving all employees..., 5) ...prevention of quality problems, designing them out of products and the processes that create them and on planning for quality..., [and] 6) ...a policy of continuous improvement...”.

Many quality managers and thinkers lump other timely management movements into the TQM movement. For example, some classify just-in-time manufacturing, zero-inventory and time-based-competition as within the domain of TQM.

The chapters in this volume take a broad view of what constitutes TQM and present a wide spectrum of applications of TQM.

4.0 Description of the Chapters

The chapters fall into four categories that I categorize as Performance, Understanding TQM, Organizations, and Using TQM.

Performance:

A key issue of TQM is does it work? The chapter: An Exploratory Empirical Investigation of the Effects of Total Quality Management on Corporate Performance, " by George Easton and Sherry Jarrell is a pioneering attempt to document the impact of TQM on the overall financial performance of a sample of 39 U.S. firms. Actual performance is compared to a benchmark of how the firms would have performed had they not adopted TQM. The finding indicates that performance as measured by profit margin, return on assets and stock return are marginally better for firms that have adopted TQM. Although the results are not conclusive, this research creatively demonstrates how performance of TQM can be measured and evaluated. It shows the potential for research in financial aspects of quality management.

Understanding TQM:

Several of the chapters study aspects of TQM including the implementing quality management, cost of quality, managing product development cycle times and success, drivers of quality improvement, types of information used in quality improvement efforts and application of quality to services.

Arthur Swersey, Shigeru Ishii and Hiroshi Takamori study “Quality Activities and Quality Performance of Japanese and U.S. Firms in the Printed Circuit Industry.” They show significant differences in quality activities and quality performance between these two countries. Although U.S. companies make more extensive use of statistical quality control charts, the Japanese have much lower rates of rework and customer returns.

In “Cost, Quality and Customer Satisfaction of Software Products: A Field Study,” the relationship between life cycle cost, quality and customer satisfaction in
software products is studied. The authors, Professors Krishnan, Kekre, Kreibel, Mukhopadhyay, Kellner and Srinivasan, study the relationship between these factors using a dataset of 27 software products of a leading software vendor. The results show that significant reductions in life-cycle cost are possible with an improvement in quality. Significantly, front-end investments in design and planning, especially in larger products substantially improves quality and reduces life-cycle costs.

Faster and more effective product development is an important objective of many firms' quality programs. In "Measuring Produce Development to Improve Quality of the Process," Abbie Griffin studies baselines for cycle time and success rate performance baselines for new product development. The chapter develops product development cycle time and success performance baselines across product types for 198 completed projects. It also demonstrates how different product development characteristics impact overall time to market and what factors seem to correlate with commercial success.

It is clear that knowledge and information are becoming increasingly important for competitive success. Amit Shankar Mukherjee and Luk N. Van Wassenhove, in "The Impact of Knowledge on Quality," study 37 quality improvement project at N.V. Bekhter. They show that the nature of knowledge required in different types of quality projects depends on their scope. They statistically demonstrate that as projects become less structured the importance of formal knowledge increases. This insight has managerial implications. They show that when quality improvement goals are well defined and the factors that have impact on the goals are well understood, plants should turn to the people closest to the product. However, experiential knowledge may not be sufficient when projects are unstructured or when project goals call for order-of-magnitude improvements. These results have important consequences for the management of improvement projects.

Services are increasingly dominating advanced economies. There is a need to understand what quality means within the service sector of the economy. Uday Apte, Uday Karmarkar and Richard Pitbladdo in "Quality Management in Services: Analysis and Measurement" present a framework and a taxonomy for describing and measuring service quality. The framework is tested on a large set of case studies.

Organizations:

The organizational implications of quality programs are understood to be important issues. Two chapters report field data and theories of how organizational aspects of TQM improve performance. Karen Hopper Wruuck and Michael C. Jensen in "Science, Specific Knowledge and Total Quality Management" analyze TQM from an economic and organizational perspective. They suggest that TQM is a new organizational technology that is science based, non-hierarchical and non-market oriented. They argue that TQM generally requires major changes in the organizational rules of the game, namely systems for allocating decision rights, performance measurement systems and reward and punishment systems. The study draws on examples from Sterling Chemicals, Inc. to lay out the analysis.

Many TQM programs shift the emphasis of the organization from detection of defects to improvement of the production process. Most quality improvement programs emphasize employee involvement and team work. Sriram Dasu, Christopher Erickson and Jovan Grahovac, in "Introduction of Quality-Driven Team-Based Systems: Issues at the Boundary of Operations Management and Industrial Relations," explore the impact of teams on process improvements. This
work based upon field studies of several aerospace firms and an electronic manufacturer discusses the impact of teams on managers' workers and unions.

*Using TQM:*

Two chapters report on applications of TQM. Paul R. Kleindorfer reports on the on-going progress of "Implementing TQM at the University of Pennsylvania." He discusses pragmatic issues of implementation of a program at a non profit organization and reports early results. Peter J. Kolesar presents a major case study of a statistical quality control effort in "The Mess at Plastron: A Case History of an SPC Startup." This fascinating story outlines the step by step progress of a major quality control effort and the organizational and technical challenges faced by the participants. It is an instructive exercise for those desiring to learn the real challenges of using statistical quality control to analyze and improve performance.

5.0 *New Research Directions*

The chapters in this volume suggest many new directions for research in quality. Within each of the above categories, additional empirical research would be valuable. All of the chapter, but especially those in the section, *Using TQM*, show that there are many different applications of quality ideas. Data are needed to understand each application better. The chapters on *Understanding TQM* suggest that it is possible to develop and test theories of quality. The chapters on *Performance* demonstrate that studies of the operational and financial effect of quality can yield positive results. Many thinkers on quality think that organizational impacts of quality are the most important drivers of the quality process. There is a great need for empirical research on organizational issues, such as how quality programs affect human resource management (recruitment, training, evaluation, compensation, contracts), and organizational structure (teams, hierarchies and partition of decision rights). Finally, there is the need for theory that ties together empirical findings and research. A paper that gives theoretical basis for some of the results here is Lederer and Rhee (1995).
References


1 Ancient practitioners of bridgebuilding and medicine relied upon experience to guide prescription, but did not rigorously test their theories. Some of these prescriptions were valid, but others were not. For centuries doctors prescribed leeches and bloodletting and were convinced of their efficacy. It was only later that old practices were discarded based upon scientific testing. Thus there is great value in scientific testing of empirically discovered prescriptions.