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Success Attributes For Quality Improvement Strategy: An Organizing Framework

A Dissertation

Presented for the

Doctor of Philosophy Degree

THE UNIVERSITY OF TENNESSEE

Knoxville

Richard L. Neubert

August, 1997

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DEDICATION

This dissertation is dedicated to my mother, Muriel D. Neubert. I could not have reached my goals without her love and support. She gave me the drive to succeed and taught me to take pride in my work. She fought many battles to help me reach my goals. Most importantly, she helped me in situations where only a mom could.

ACKNOWLEDGMENTS

This dissertation would not have been possible without the very generous support of my advisor, Dr. H. Dudley Dewhirst. He took a chance by accepting me into the strategic management program eight years ago. His advice and patience have helped me to keep the comprehensive exam process in perspective. Dudley has also been a friend who is never too busy to provide support.

I owe a great deal to Dr. Mary G. Leitnaker. She inspired me to pursue an MS in Industrial Statistics. Without her guidance and excellent teaching skills, I would never have survived statistics theory. With her friendship and sense of humor, I have been able to keep a positive attitude about graduate school.

I also owe a considerable amount to Dr. Richard D. Sanders. His insightful perspective on quality improvement, his extraordinary work ethic, and his leadership have made working with him very rewarding. Richard has always been a friend whose appreciation of and perceptive comments about my work have always inspired me to do better.

I would like to thank the director of the Management Development Center, John E. Riblett, for his support. John has been generous in providing me financial support over these six years. He was a friend in 1980, helping with my participation in UT's MBA contest team. John has continued to be a friend who is never too busy to listen to my ideas and provide his support. He has made working with the Management

Development Center one of the best experiences of graduate school.

I would also like to thank Dr. Michael C. Rush for inspiring me to study management for my Ph.D. degree. I had my first management course and read my first journal article under his guidance. During an MBA contest, he encouraged me and gave me the confidence to try other challenging tasks–including a Ph.D.

A very special thank you goes to Dr. Charles F. Moore. Charlie's support and guidance helped me during each step of my journey from undergraduate studies in Chemical Engineering to my pursuit of a Ph.D. He introduced me to computers and inspired my interest in quality improvement. Through his work with the Management Development Center he also provided me an assistantship and an office. I will always be grateful.

Finally, I would like to thank Dr. Michael L. Keene for his guidance through this dissertation. Before taking his technical writing class, I had the basic problem of not being able to start writing my dissertation. When I did start writing, the end result was unsatisfactory. Mike helped me solve both problems. His coaching also helped me resolve several issues in collecting and writing up case-study data. Most of all, his suggestions on quickly writing drafts, writing creative material early in the day, and attacking the first draft have made the dissertation process a pleasant experience.

ABSTRACT

Recognizing the importance of quality improvement strategy, the relevant strategy literature offers several anecdotal and prescriptive narratives for quality strategy success. Many of the narratives describe the integration among key elements of management strategy: corporate culture, reward systems, information systems, quality efforts, team building, quality outcomes, and customer value. However, the current literature provides neither clear information nor an organizing framework to translate these elements into success attributes. The purpose of this study is to address these limitations in the literature through conceptual development and methodological refinement.

This study strives to answer the research question: What are the components for a continuous quality improvement strategy, and how do they combine together to successfully affect company performance?

The researcher selects one industry versus different industries to minimize the effect that industry has on quality strategy. He selects the electronics industry because of his previous research efforts and the knowledge that quality is a major strategy within that industry. He samples firms from a relevant population of electronics firms that are the world sales leaders for their principal products and are known for their successful efforts in quality improvement strategy. *He selects four business units from three organizations.* This selection also allows investigation under different manufacturing conditions such as U.S. manufacturing versus

Southeast Asia manufacturing and low-volume high-tech manufacturing versus high-volume lower-tech manufacturing.

This study explores the research question through interviews, archival records, direct observation, surveys, and management-team presentations. The researcher collects the primary data by doing the following:

- interviewing liaison managers about general business-unit information,
- interviewing forty three business-unit managers about specific quality-related information,
- studying archival records to confirm interview information, and
- observing meetings and business-unit operations to confirm interview and archival data.

Using an inductive, constant comparative method, the researcher systematically codes the data into a taxonomy of fifty attributes for successful quality strategy. The researcher then confirms the reliability of the attributes by doing the following:

- consulting with the liaison managers to refine the attributes into a survey,
- surveying the business-unit managers to determine how strongly they believe that the attributes exist at their business units, and
- presenting to the business-unit senior management teams to determine the importance of the survey results to their quality strategies.

The researcher explores the relevance of the research by looking for common themes in the research results. An extensive literature review ties the themes into an organizing framework. The researcher addresses limitations in the framework and provides guidance for future research on the moderating effects of innovation and quality strategy.

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Chapter 1

Introduction

The interest in product quality by companies has greatly expanded over the last several years. One can see this through the number of requests for applications for the Malcolm Baldrige Quality Award. Requests have increased from 12,000 in 1988 to nearly 180,000 in 1990 (Gahani, 1993).

Many authors describe product quality as a strategy associated with high performing, globally competitive firms. Companies are now having to compete in a world market; "world wide competition (especially from the Japanese) is a threat...and quality is a major competitive focal point" (Morgan, 1985, p. 62). Several authors share this opinion (Crosby, 1979; Garvin, 1988; Drucker, 1981; Takeuchi & Quelch, 1983). A number of authors note the importance of quality strategies related to the rise in Japanese companies (Hayes & Abernathy, 1980).

Quality as a strategy helps companies not only to compete globally, but also to compete in "stalemate industries" where every other strategy has been tried. When every other strategy has failed, quality will work (Calgori

& Ardisson, 1988).

This introduction will show the emerging components of quality strategy and then indicate the importance of the components. An assessment of the linkages among the components of quality will lead to the goals of this study. Finally, this introduction will discuss the tangible benefits of the study from both theoretical and practical points of view.

1.1 The Components of Quality

A number of studies discuss the components of quality strategy (Bounds et al., 1995; Bounds et al., 1994; Garvin, 1988; Bowen et al., 1991; Porter, 1980; Porter, 1985; Deal & Kennedy, 1982). The most widely used quality strategy factors among managers today are the criteria used by the Malcolm Baldrige award committee:

1. Leadership,
2. Human resource development and management,
3. Strategic quality planning,
4. Management of process quality,
5. Customer focus and satisfaction,
6. Information and analysis, and
7. Quality and operational results (Award Criteria, Malcolm Baldrige National Quality Award, 1994).

The Malcolm Baldrige criteria are important because many companies use these criteria to focus their energies on quality improvement, to gauge the effectiveness of their quality efforts, and to diagnose ways to improve their quality programs (Bounds et al., 1995).

1.2 Quality Strategy: Confusion and Lack of Unifying Framework

The Baldrige criteria are also important because they can be "success attributes"; that is, improvements in the areas covered by these criteria can improve company performance (Bounds et al., 1995; Bounds et al., 1994). However, a closer look at these criteria and other proposed success attributes shows a confusing picture. The criteria are loosely stated and can be difficult for companies to interpret. Moreover, following these criteria does not guarantee long-term performance. One Baldrige winner, the Wallace Company, won the award in 1990 and filed for Chapter 11 in 1992 (Hill, 1993).

A number of studies relate quality strategy to corporate performance (Peters & Waterman Jr., 1982). Unfortunately, several companies have not been successful with their quality strategy (Gahani, 1993). For example, many of the "excellent" firms described in Peters and Watermans's "In Search of Excellence" (1982) are no longer top performing companies. Obviously research is needed to help clear up this confusion.

A number of authors describe confusion about quality strategy (Garvin,

1988; Lawler, 1994; Powell, 1995). Besides expressing the need for new ways of viewing quality strategy, they express the need for a unifying framework to help minimize this confusion (Garvin, 1988; Lawler, 1994; Powell, 1995).

1.3 Research Question and Research Goals

Based on the confusion about quality strategy discussed in Section 1.2, the following research question will guide the study:

" What are the attributes for a successful continuous quality improvement strategy, and how do they combine together into a unifying framework?"

To answer the above research question, this research will have the following goals:

- generate and verify new theory about success attributes in quality strategy,
- generate and verify successful variations of existing quality strategy theory, and
- develop a unifying framework for successful quality strategy.

This study will develop "success attributes" related to quality improvement that are positively linked to company performance. It will start with the Malcolm Baldrige criteria and investigate the following *key elements* of quality strategy:

- Leadership, including team and commitment building;

- Human resource management, including recognition and reward systems;
- Strategic quality planning, including quality as a business strategy (quality strategy);
- Process management, including statistical process control;
- Customer satisfaction, including customer focus; and
- Information technology, including the Internet and E-mail.

This study will follow Dean and Bowen's (1994, p. 397) advice and exclude the *quality and operation results* category "because it is simply an assessment of effectiveness."

The current literature provides neither clear information nor a unifying framework to translate these elements into successful company performance. Therefore, the purpose of this study is to address these limitations in the literature through conceptual development and methodological refinement of the current research streams.

The study will be in two phases. The first phase will be a theory-building phase using an inductive, multiple-case study approach. It will develop a comprehensive framework for unifying the knowledge about quality improvement strategy. The second phase will verify the framework developed in phase one.

1.4 Benefits

The benefits of the study will extend to managers as well as researchers. A major benefit is that the study starts with an important set of real-world criteria and uses data that are grounded in real-world experiences of managers. This study should help clarify for managers the quality success attributes that affect quality strategy. Developing a framework of quality success attributes should help managers better understand how the components of quality fit together into a total strategy. These attributes should also complement "bench marking," the search for best practices of successful firms.

This study will offer several benefits to academics. It will help move the field of quality strategy research closer to a unifying framework and should provide successful variations of existing theory for others to test. The research will also uncover underdeveloped research areas for others to fully explore. It may provide exciting new theory for others to research. The effort might also provide an incentive for others to try the "less traveled" trail of theory building versus the well-beaten path of empirical theory testing.

1.5 Roadmap for this Dissertation

Besides following a less-common *theory-building* path versus a more typical empirical *theory-testing* path, this dissertation takes two other atypical routes. First, the literature review process is unusual. This dissertation

submits two literature reviews: one on inductive case study research, the other on quality strategy. Accepting guidance from the case study literature, the quality strategy literature review *follows* data collection. This sequence contrasts that of empirical theory testing research, where strategy literature review *precedes* data collection. Second, the data collection process is more extensive than case study literature recommends (Eisenhardt, 1989a). It uses liaison managers, external reviewers, a survey, and top management presentations to strengthen interview data.

Considering these departures from common research procedures, the following roadmap should simplify the reader's navigation through this dissertation:

- Chapter 1 introduces this research effort by briefly discussing the importance of quality strategy, components of quality strategy, and the need for a unifying framework. It also formally states the research question and theoretical/practical benefits.
- Chapter 2 surveys the literature on inductive case study research and recommends research methods.
- Chapter 3 outlines the inductive research methods used in this dissertation and how they address measurement, reliability, and validity issues.
- Chapter 4 discusses the within-case analyses.
- Chapter 5 analyzes the cross-case data, develops a unifying framework, and recommends theory-testing hypotheses.

- Chapter 6 reviews the quality strategy and innovation literature.
- Chapter 7 summarizes this study, including a unifying framework, and recommendations for future research. It also assesses strengths and weaknesses.

Chapter 2

Case-Study Research: A Recommended Course

The next two chapters discuss case-study research methodology. This chapter surveys the literature and recommends a case-study research methodology. It recommends a modified inductive approach using a multiple case study design. This approach addresses measurement issues and provides steps to minimize measurement concerns.

Chapter 3 discusses the modifications to these recommendations that were used in this research. It also discusses compliance to the recommended steps to minimize measurement concerns.

2.1 Theory Building from Case Studies

The discussion here elaborates on the inductive approach called "grounded theory research" and on the case study design. Examples of both are given. Next the discussion gives arguments for the realistic modifications of

grounded theory research that this research should use. Using a multiple case design provides greater generalizability of results. Using modifications of grounded theory allows the researcher to look for successful variations of previously-explored theory while discovering new theory.

2.1.1 Theory-Building Objectives

Theory building oriented toward exploration and discovery is best accomplished with inductive analysis. Dimensions of analysis "emerge from open-ended observation as the evaluator comes to understand the program patterns that exist" (Patton, 1990, p. 44). This approach is very different from a hypothesis-testing approach, where the researcher decides *in advance of the research* what relationships are important and collects data to test the hypothesized relationship. This approach also differs from an experiment, which just looks at a few phenomena and controls for the extraneous phenomena not being studied. For example, the effects of all variables other than those being studied are minimized or controlled in a laboratory experiment.

In "pure" inductive analysis, the researcher enters into the study without any *a priori* hypotheses in mind. Instead, theory that is relevant, testable, and valid develops directly from the evidence found in the actual data. This inductive "from the ground up" approach is called "grounded theory" research (Bogdan & Biklen, 1986).

Grounded theory is firmly predicated in data that are systematically gathered and analyzed. As the actual research progresses, continuous

interplay exists between analysis and data collection (Strauss & Corbin, 1994). This analytical approach is often referred to as the "constant comparative" method (Glaser & Strauss, 1967).

Bogdan and Biklin (1986) recommend this approach because it compels the researcher first to consider basic component patterns before looking at the larger overarching processes and systems. By focusing on the constituent patterns in the data, the researcher is less overwhelmed by the immensity of the data and is more effective in understanding very complex phenomena within it.

Glasner and Strauss (1967) give several examples of early behavioral studies forming the foundations of grounded theory. (They are listed in Table 2.1.) Grounded theory evolved

- from verifying existing theory,
- to incrementally adding to existing theory,
- to generating entirely new theory.

Denzen and Lincoln (1994, p. 277) suggest "realistic and balanced" modifications which make the researcher more sensitive to previously researched theory.

Using their suggestions and the fact that early grounded theory researchers incrementally added to existing theory, this research considers previous theory to look for theory development opportunities. It specifically looks for opportunities to incrementally add to existing theory.

Case study analysis investigates data in the real-life setting of the

Table 2.1: Comparative Studies Using "Grounded Theorizing"

Author	Subject of Case	Use of "Grounded Theorizing"
(Swanson, 1960)	Building theory from the analysis of supernatural experiences	Comparisons among several groups to verify well-developed theory
(Blauner, 1964)	Study of alienation in industry and its consequences	Comparisons among several groups to verify existing theory
(Redfield, 1941)	Comparisons between folk and urban cultures	Verification of existing theory and generation of new hypotheses *only* within bounds of existing theory
(Eisenstadt, 1956)	Analysis of social systems	Verification of existing theory in the light of new data
(LaPiere, 1938)	Study of personality development	Comparisons among several groups to build an new frame of reference
(Janowitz, 1964)	Study of the military's influence on the political development of nations	Comparisons among several groups to build theory based on the logic of verifying old theory
(Goffman, 1963)	Study of social stigma within companies	Comparisons among several groups to build theory with illustrations to verify the theory
(Shibutani & Kwan, 1965)	Analysis of race and ethnic relationships	Comparisons among several groups and regularities within groups to build theory
(Etzioni, 1961)	Study of compliance structures within companies	Comparisons among several groups to build theory with categories from existing theory
(Geertz, 1963)	Study of social and cultural patterns of economic development of towns	Comparisons between two major groups to build theory
(Evans-Pritchard, 1937)	Formulation of substantive theory about magic and witchcraft	Comparisons among several factors within a single case to generate theory
(Park, 1950)	Study of race relations in social situations	Generation of theory based on personal observation, personal experience and archival data
(Strauss et al., 1964)	Study of emotional diseases in social settings	Generation of theory based on integration of the various levels of analysis

Glasner, B. and Strauss, A. (1967). Ethnography and qualitative design in educational research. Aldine, Chicago.

phenomena being studied. The real-life context and the real-life content of the data are studied at the same time. This aspect of case studies, called "naturalistic inquiry" (Patton, 1990), assumes that the researcher makes no attempt to manipulate the research setting. Guba (1994) describes the naturalistic inquiry aspect of case studies as a "discovery oriented" approach which minimizes the researcher's involvement and places no prior constraints on the research outcomes.

The focus of the case study analysis is to answer the "how" and "why" questions in research (Yin, 1994, p. 5). Besides identifying the success factors in quality improvement strategy, much of this investigation looks at *how* the process of quality strategy works in order to understand *why* the factors behind it contribute to its success.

Major reasons for using case studies are their focus on contemporary events rather than on historical events, and their use of data inputs from multiple sources (Yin, 1994, p. 8). Much information on quality strategy is obtained by asking working managers about their current quality efforts. Also, much of the information gathered is from a variety of sources: artifacts, interviews, observations, and documents.

Case studies are useful when the researcher retains slight control over the events being studied. In contrast to analysis of historical data where there is no control over the data, case studies provide the researcher a little more control because of direct observation of participants in the study. Because interaction occurs between the researcher and the participant, the

researcher can informally influence the data. The case study approach provides a good alternative for looking at ongoing social interactions because the researcher is not able to "directly, precisely, and systematically" (Yin, 1994, p. 8) manipulate the data as in a laboratory experiment.

In summary, the case approach allows the researcher to capture all the complexities and detail that are critical to understanding the data and developing theory from it. The inductive theory building is oriented toward exploration and discovery to answer the "how" and "why" questions about contemporary phenomena. In this study, success attributes for quality strategy should emerge from the observed case-study patterns. Constructs should emerge from observed categories of the success attributes. In developing a unifying framework, the researcher should show statistical relationships among the constructs. The researcher should be able to explore and discover an understanding behind the unifying framework by using complexities and detail from case studies.

2.1.2 Multiple Case Design for Theory Building

Single case studies are effective at studying a single phenomenon. For example, Selznick (1949) in his pioneering study of TVA, used only one organization to study the phenomenon of power-sharing cooptation. His goal was to describe adequately the single conceptual idea of cooptation of groups of workers by managers in a power-sharing situation.

Multiple-case designs are more effective than single-case designs in allowing the researcher to generalize the results of the study. For

multiple-case designs, the inference is stronger from the results of the sample of companies to populations of companies. Furthermore, multiple case study designs allow the researcher to access within-case variation and compare it to cross-case variation of phenomena. This approach is similar to the nested designs in conventional statistics, which compares within-case variation to cross-case variation. Multiple case study designs also allow for replication of results. This replication of results is similar to using multiple experiments in more conventional research designs.

2.1.3 Examples of Previous Theory Building from Multiple Case Study Research

A review of the literature shows extensive research using inductive multiple-case studies. Table 2.2 summarizes the more recent examples in chronological order. All of the examples use from two (Kazanjian, 1988) to eight cases (Harris & Sutton, 1986; Gersick, 1988; Eisenhardt, 1989b). Also, all of the examples build theory and add to existing theory.

Patton (1980, p. 43) insists that research designs should be "most appropriate to the researcher's concerns." Considering that the *research concerns* for this study are theory building and adding to existing theory, this study should use a modified inductive design.

This study should also use a multiple-case design, which is recommended for theory building because "similarities observed across a diverse sample offer firmer grounding" than do "constant elements observed in a homogeneous sample" (Harris & Sutton, 1986). Moreover, a

Table 2.2: Examples of Inductive Multiple-Case Study Research Studies

Study	Type of Cases	Research Problem	Data Sources	Researcher	Results
(Burgelman, 1983)	6 internal corporate ventures	Management of new ventures	Archives Interviews Some observation	Single researcher	Process model linking firm levels
(Harris & Sutton, 1986)	8 diverse firms	Role of parting ceremonies in dying firms	Interviews Archives	Research Team	Conceptual framework of parting ceremonies
(Bourgeois & Eisenhardt, 1988)	4 microcomputer firms	Strategic decision-making in high velocity environments	Interviews Questionnaires Archives Some Observation	Research team and tandem interviews	Midrange theory to link power and firm performance
(Gersick, 1988)	8 diverse projects	Project team development	Observation Some interviews	Single researcher	Punctuated equilibrium model
(Kazanjian, 1988)	2 tech-based ventures	Growth patterns of new ventures	Interviews Archives	Single researcher	Stage-of-growth patterns model
(Eisenhardt, 1989b)	8 microcomputer firms	Strategic decision-making in high velocity environments	Interviews Questionnaires Archives Some observation	Research team and tandem interviews	Midrange theory on process of fast strategic decision-making
(Ancona, 1990)	5 consulting teams	Team-context interaction	Interviews Observation Archives Questionnaires	Single researcher	Key interactions in team environments

K. M. Eisenhardt (1989a). Building theories from case study research. Academy of Management Review, Oct:16–21.

multiple-case design allows comparison of within-case variation to cross-case variation and also ensures replication of results.

2.1.4 Theory-Building Framework

Several authors (Bogdan & Biklen, 1986; Denzin & Lincoln, 1994; Glaser & Strauss, 1967; Patton, 1980; Yin, 1994) have described various aspects of theory-building research, but none until Eisenhardt (1989a) provided a framework for conducting theory-building research from case studies. Because of the completeness of the framework and the goals of this study, Eisenhardt's framework should be followed. Steps in this design are listed in Table 2.3 and are discussed in this section. The realistic modifications to her design are also discussed in the section.

Getting Started

In the initial steps of the study, the researcher should be concerned with focus and firm grounding to avoid premature conclusions about specific relationships found in the data.

Focus in building theory from case studies is best accomplished by formulating a specific research question. The research question guides the research in the following ways:

- helps identify the broad topics to investigate,
- helps identify the types of organizations to research, and
- helps identify the kinds of data to study.

Table 2.3: Framework for Building Theory from Multiple Case Studies

Step	Activity	Reason
Getting Started	Definition of research question	Focuses efforts
	Possible a priori constructs	Provides better grounding of construct measures
	Neither theory nor hypotheses	Retains theoretical flexibility
Selecting Cases	Specified population	Constrains extraneous variation and sharpens external validity
	Theoretical, not random, sampling	Focuses efforts on theoretically useful cases–i.e., those that replicate or extend theory by filling conceptual categories
Crafting Instruments and Protocols	Multiple data collection methods	Strengthens grounding of theory by triangulation of evidence
	Qualitative and quantitative data combined	Synergistic view of evidence
	Multiple investigators	Fosters divergent perspectives and strengthens grounding
Entering the Field	Overlap data collection and analysis, including field notes	Speeds analyzes and reveals helpful adjustments to data collection
	Flexible and opportunistic data collection methods	Allows investigators to take advantage of emergent themes and unique case features
Analyzing Data	Within-case analysis	Gains familiarity with data and preliminary theory generation
	Cross-case pattern search using divergent techniques	Forces investigators to look beyond initial impressions and see evidence thru multiple lenses
Shaping Hypotheses	Iterative tabulation of evidence for each construct	Sharpens construct definition, validity, and measurability
	Replication, not sampling, logic across cases	Confirms, extends, and sharpens theory
	Search evidence for "why" behind relationships	Builds internal validity
Unfolding Literature	Comparison with conflicting literature	Builds internal validity, raises theoretical level, and sharpens construct definitions
	Comparison with similar literature	Sharpens generalizability, improves construct definitions, and raises theoretical level
Reaching Closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small

Note. From "Building theories from case study research," by K. M. Eisenhardt, 1989, Academy of Management Review, 14, p. 3. Copywrite 1989 by the Academy of Management. Adapted with permission.

In essence, the research question sets up the initial paths for the researcher to investigate, gives focus to the research path, and prevents the researcher from becoming overwhelmed by the vast amount of data encountered along the way (Mintzberg, 1979).

Firm grounding ideally occurs if the researcher initially starts with "no theory under construction and no hypothesis to test." Realistically, it is impossible to start with a "clean theoretical slate" (Eisenhardt, 1989a, p. 536). The researcher should have the flexibility to be able to exploit serendipitous findings and have the sensitivity to add to existing theory (Denzin & Lincoln, 1994). The data can lead to important new findings if the researcher is not constrained by previous stated hypotheses but maintains a flexibility and sensitivity for discovery.

Selecting Cases

To build theory from case studies, Eisenhardt (1989a) strongly suggests selecting cases for theoretical rather than for statistical reasons. In typical quantitative studies, researchers might select companies to minimize sources of variation. For example, they might randomly sample companies from a population of different industries to minimize industry as a source of variation. By randomly selecting companies from different industries, the error due to industry is distributed among the companies according to chance. Thus the experimental error due to industry becomes random error.

Eisenhardt (1989a, p. 537) suggests that in theory-building case studies

sampling for statistical reasons is "neither necessary, nor even preferable." Sampling for theoretical reasons is more prevalent. Theoretical reasons include:

- "replicate previous cases,"
- " extend emergent theory,"
- " fill theoretical categories," and
- " provide examples of polar cases."

Examples of selecting cases for theoretical reasons include:

- Selecting cases from the microcomputer industry to extend theory on "high velocity environments" (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989b), and
- Developing strategic theory while processing industry information by selecting cases from targeted industries:
  - paint and forestry industries (Fredrickson, 1986),
  - publishing and hospital industries (Miles & C., 1978), and
  - food processing and banking industries (Jemison, 1981).

By focusing on targeted industries, the researcher can satisfy the theoretical research needs and still minimize industry as a source of variation. (The researcher *controls* on industry.)

Case selection also helps create external validity of the study. External validity for this study is the generalizability from case studies to theory. Specifically, the external validity is the inference *from* case study findings in

this study *to* quality strategy propositions which could extend beyond the cases limited to this study. (See Section 2.2 for more about external validity.)

Examples in Table 2.2 suggest that this study should employ no less than three cases. The number of cases studied is determined by the practical limits associated with case studies (Yin, 1984). For example, sample size is limited by the company's willingness to participate and the sheer immensity of the data. Also, examples of strategy development (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989b; Hofer & Schendel, 1978; Porter, 1980; Fredrickson, 1986; Miles & C., 1978; Jemison, 1981) suggest that this research should focus on companies within one industry.

Crafting Instruments and Protocols

The data collection instruments and protocols focus on the researcher's need to maintain an objective outlook. This need for objectivity is especially important in case studies because case studies use verbal information as major sources of data. In this study in particular, a large amount of verbal information comes from multiple sources.

Yin (1994) addresses this need for objectivity by stating that multiple data sources typically have independent conceptions. For example, data from documents and archival records are usually conceived at different times and are about different events than data from interviews. The independence of the data sources' origins can help assure objectivity in the

data collection process. Objectivity is also promoted from multiple data sources when *data triangulation* occurs. Data triangulation is several data sources supporting evidence converging to the same conclusion. Any conclusion that develops from data triangulation is more accurate and convincing than a conclusion without convergence (Yin, 1994). Eisenhardt (1989a) suggests several ways to achieve data triangulation. She states that evidence from qualitative data such as case-study data can greatly support evidence from quantitative data such as survey data. She agrees with Mintzberg (1979, p. 587), who describes data triangulation as follows: " We uncover all kinds of relationships in our hard data (survey data that can be statistically analyzed) but it is only through the use of this soft data (case-study data within its real-life context) that we are able to explain them."

Eisenhardt (1989a) also suggests using multiple investigators to analyze the data. The use of multiple investigators with their different perspectives can add richness to the interpretation of data. Convergent perceptions of the data by the investigators (*investigator triangulation*) build confidence in the findings and also increase the chances of surprising findings.

Entering the Field

Two major problems exist in case-studies data collection:

- The amount of data is immense; and
- The data collection may take some unexpected turns.

The key to being effective in collecting data in the field is to recognize the potential problems and to address systematically those problems early in the study.

A potential problem with having an immense amount of data is that the processes of data collection and data analysis are interconnected (Glaser & Strauss, 1967) and are very difficult to separate. This interconnection occurs because field notes are a running commentary of observations, impressions, and comments for others. Eisenhardt (1989a) suggests using liaison managers with each case to help sort through the vast amount of data.

Another potential problem in building theory from case studies is that the data collection process may take some unexpected turns. Eisenhardt(1989a, p. 539) suggests the researcher must be flexible to be able to navigate through those unexpected paths and make frequent adjustments in the data collection instruments. She explains that "flexibility is controlled opportunism in which researchers take advantage of the uniqueness of a specific case and the emergence of new themes to improve resultant theory." For example, Burgleman (1983) frequently changed the individuals to be interviewed as it became clear which individuals were important.

Analyzing Within-Case Data

Eisenhardt (1989a) describes data analysis as the essential part of theory building from case studies. She also says that data analysis is the most difficult part of the theory-building process. Part of this difficulty is because most published studies offer generous advice about data collection but offer meager discussions on data analysis.

A key to analyzing case-study data is analyzing data within each case. Within-case analysis is important because it helps the researcher organize the "staggering volume of data"(Eisenhardt, 1989a, p. 540) in case-study research. Fortunately the grounded theory approach by Glaser and Strauss (1967) provides guidance for within-case data analysis that helps the researcher capture many of the nuances in the data. Their approach requires frequent overlap of data analysis and data collection, where data is frequently compared and contrasted throughout the data collection process.

Other authors offer suggestions for within-case analysis. Quinn (1980), in his study of strategic decision making, uses pure descriptions to give the reader insights into his case-study data. In general, the above researchers "become intimately familiar with each case as a stand-alone entity" and allow the "unique patterns of each case to emerge" before they "push to generalize patterns across cases"(Eisenhardt, 1989a, p. 540).

Following the advice of the above researchers, within-case data analysis consists of the following:

- constantly comparing and contrasting data within each case,

- creating thorough descriptions of the data within each case,
- letting each case act as a stand-alone entity, and
- letting the unique patterns emerge within each case before looking for cross-case patterns.

Searching for Cross-Case Patterns

Eisenhardt (1989a) describes the next logical step in data analysis as one prone to partiality. She depicts cross-case analysis as a step susceptible to information-processing biases. She states that people are inherently ineffective processors of information. They eagerly accept vivid data (data that easily confirms previous assumptions) or data from elite sources (such as from highly ranking company officers). They often discount (or drop) data that disprove previous assumptions. In essence, these biases can cause false or premature conclusions.

She suggests that one solution for minimizing information-processing biases is to look across the data in divergent ways. One tactic she suggests is to pick a dimension or category, and then compare within-case similarities to cross-case differences. For example, in a study of strategic decision making (Eisenhardt, 1989b), she sorts through cases using the following dimensions:

- founder-run versus professional management,
- high versus low performance,
- first versus second generation product, and

- large versus small size.

Some of the categories, such as size or product generation, do not lead to distinct patterns. Other categories, such as performance, lead to within-case similarities and cross-case differences.

Eisenhardt (1989a) also suggests selecting pairs of cases, and then listing the similarities and differences between each pair. She suggests that looking for similarities in seemingly different pairs (or looking for differences in seemingly similar pairs) can lead to a fuller understanding of patterns in the data. For example, in her study of strategic decision making (Eisenhardt, 1989b), she initially presumes that CEO power dominates differences across cases. She later discovers, using paired-case comparisons, that decision-making speed accounts for a major portion of the cross-case differences.

A third suggestion by Eisenhardt (1989a, p. 541) is to look at one data source at a time to take advantage of the unique insights from different types of data. For example she suggests looking at observational data separately from archival data. When a pattern found in one data source is corroborated by evidence found in another data source, the finding is "stronger and better grounded."

Following Eisenhardt's suggestions, cross-case data analysis consists of the following bias-minimizing steps:

- picking categories and comparing within-case similarities to cross-case differences for each category,

- selecting pairs of cases and listing the similarities and differences between each pair, and
- studying one data source at a time.

The purpose of the above bias-minimizing steps is to improve the likelihood of reliable theory coming from the data analysis. The cross-case analysis allows the researcher to confirm or disprove the inferences made from other cases and thus improve the confidence in those inferences (Yin, 1994). (See Section 2.2.)

Shaping Hypotheses

The within-case and cross-case data analysis steps help the researcher form tentative constructs and form initial relationships between variables. The hypotheses-shaping step helps the researcher measure the constructs and verify the emerging relationships that are being formed. However, this step is more judgemental in theory building from case studies than it is in traditional theory testing because the researcher cannot use statistical tests, such as F-tests, on narrative data (Eisenhardt, 1989a). Instead of using F-tests to compare within-case findings to cross-case findings, this study uses the methods of within-case and cross-case data analyses to constantly compare the emerging theory to the data.

To build evidence which measures the constructs, Eisenhardt (1989a, p. 541) suggests using multiple sources. This building process occurs by a constant comparison of data with constructs so "accumulating evidence

from several sources converges on a single, well-defined construct." The multiple sources of evidence define the construct and distinguish it from other constructs.

To verify that the emergent relationships between constructs fit with the evidence in each case, Eisenhardt (1989a) suggests looking at each case as a separate experiment. She suggests treating a series of cases as a series of experiments, each confirming or disproving a relationship. Evidence about a relationship supported by several cases provides confidence in the strength of the relationship. Evidence that disproves a relationship provides an opportunity to redefine the relationship or extend the theory. Case study data are extremely powerful in that they often provide an understanding of the underlying reasons *why* a relationship occurs.

Unfolding Literature

Eisenhardt (1989a, p. 544) suggests that comparisons of case-study results with extant literature are an essential part of theory-building research. These comparisons should ask, "What is this similar to, what does this contradict, and why?" Similarities of results with extant literature strengthen the credibility of the emerging relationships with readers. Contradictions of the results with extant literature can jeopardize the results as well as present important opportunities. Unresolved contradictions give the impression that the results are either incorrect or that they apply only to the cases studied. Thus, they are not generalizable

to other situations. Resolving conflicts forces the researcher into a "creative, frame-breaking mode of thinking" which gives the researcher deeper insights into the emerging theory. The result is often a theory with "stronger internal validity, wider generalizability, and higher conceptual level." (See Section 2.2.)

Reaching Closure

A major issue in a theory-building study is deciding when the process of data collection and analysis should end. Glaser and Strauss describe a point called "theoretical saturation" where the researcher repeatedly sees the same patterns and the next data points marginally contribute to the theory. The researcher becomes empirically more confident that the amount of data obtained is sufficient to support the factors being studied. This empirical confidence is reached when the amount of data allows the researcher to maximize the differences among the factors being studied (Glaser & Strauss, 1967).

2.2 Quality of Research Design

Table 2.4 lists and defines the four validity and reliability tests that are commonly used to judge the quality of empirical social research. This section discusses how the previous theory-building steps address threats to validity and reliability. In essence, by minimizing these threats, the theory-building steps address the issue of measurement and the linkages

Table 2.4: Definitions for Design Quality Criteria

Criterion	Definition
Construct Validity	Establishing correct operational measures for the concepts being studied
Internal Validity	Establishing a causal relationship, whereby certain conditions lead to other conditions–as distinguished from spurious relationships
External Validity	Establishing the domain to which a study's findings can be generalized
Reliability	Demonstrating that the operations of a study–such as the data collection procedures–can be repeated, with the same results

Note. From Case Study Research (p. 33) by R. Y. Yin, 1994, Thousand Oaks, CA: Sage Publications, Inc. Copyright 1994 by Sage Publications, Inc. Adapted with permission.

between the observational and the conceptual levels of abstraction.

The data collection step offers the researcher several opportunities to minimize threats to *construct validity.* By making efforts to minimize threats to construct validity, the researcher minimizes problems of measurement. *Within cases*, the researcher builds construct validity by forming constructs from multiple sources of evidence in the data. For example, a construct built from evidence found in interviews, direct observation, documents, and archival records is much more convincing than one supported solely by interview data. *Across cases*, the researcher builds construct validity by showing replication of evidence in several cases to support emerging constructs. A construct on leadership built by measuring manager characteristics is much stronger if similar manager characteristics are found across several cases.

In the hypotheses- shaping step, the researcher can also strengthen the validity of the constructs by using multiple reviewers to verify emerging constructs. External investigators should follow the chain of evidence from initial research questions through data collection and data analysis to conclusions, making sure the linkages are tight. They should review the first draft of case write-ups making sure the linkages between the observational and the conceptual levels of abstraction are also tight (Eisenhardt, 1989a; Yin, 1994).

The data collection and analysis steps offer researchers several opportunities to minimize threats to *reliability.* By making efforts to minimize threats to reliability, researchers are building confidence in the dependability of the measurement system. One of the ways that researchers build reliability is to minimize errors and biases in the study's data collection and analysis steps. The researchers should assume, as Eisenhardt (1989a) suggests, that humans are inherently ineffective processors of information. They should anticipate information-processing inadequacies by conducting meticulous data collection and analysis. They should document every step so subsequent researchers can repeat the same case. The research should be conducted "as if someone were always looking over your shoulder" (Yin, 1994, p. 37). If possible, data should be collected by multiple investigators. Perspectives on case-study data from several investigators can counteract biases from individual investigators. For example, data collection from multiple perspectives is less susceptible to the

excess influence by vivid data (data that easily confirms previous assumptions) or data from elite sources (such as from highly ranking company officers)(Eisenhardt, 1989a).

Researchers should also take bias-minimizing steps in data analysis, such as comparing within-case similarities to cross-case differences for categories of data. They should minimize bias by comparing similarities to differences for pairs of cases. They should also study one data source at a time. Confirmation of constructs across cases and data sources strengthens their reliability. Researchers should further strengthen reliability by using external investigators to check the data for errors and biases. The investigators should look carefully at the time sequence of events by checking for logical patterns. External investigators should also check the data analysis step for errors and biases.

Placing the unfolding literature review step after data collection further increases reliability of the research. As mentioned earlier, conflicts between patterns found in data and patterns found in extant literature provide theory-building opportunities. Likewise, pattern evidence repeated in supporting literature increases reliability of the results found in the data. Supporting literature also increases the understanding of why results are or are not repeatable.

The data collection and analysis steps offer the researcher several opportunities to minimize threats to *internal validity.* Babbie (1986) suggests several criteria that allow researchers to infer causality from two

variables found in the data:

- "causes" precede "effects" in time (that is, causes have *temporal precedence* over effects),
- the two variables are strongly associated with each other, and
- the observed association cannot be explained by a third variable.

Researchers should anticipate these criteria by conducting meticulous data collection and analysis to include the following steps:

- looking at patterns for starting and ending points in time to establish temporal precedence of events,
- establishing strong variable associations with evidence from multiple data sources,
- corroborating strong variable associations with evidence from multiple cases, and
- providing sufficient evidence that competing explanations of variable associations have been explored and ruled out.

Placing the literature review step after data collection can increase the internal validity of the research by bringing out rival explanations of findings. Results of previous research found in the literature can also increase the understanding of possible cause–effect relationships.

Creating *external validity* is possibly the biggest challenge to researchers building theory from case studies. A question plaguing case-study researchers is:

How are the results of a small number of cases generalizable?

Part of the answer to the above question can be found by comparing how investigators collect data and process results in survey research versus case-study research. In survey research, investigators typically create external validity with *statistical* generalization. If they correctly collect sample data from a larger population and accurately show statistically significant relationships among the sample data, they can usually generalize the findings to a larger universe. In case-study research, investigators create external validity with *analytical* generalization rather than statistical generalization. In analytical generalization, investigators try to generalize a set of results to a broader theory, not from samples to universes. For analytical generalization to occur, there must be strong within-case evidence and it is must be supported by replicated cross-case evidence. This is similar to the "replication logic" that allows experimenters to generalize results from experiments to theory (Yin, 1994). For example, Jane Jacobs illustrated analytical generalization in her book, *The Death and Life of Great American Cities* (1961). She created strong within-case evidence on the role of sidewalks, the role of neighborhood parks, the role of small blocks, and the process of slumming. She presented strong cross-case evidence by replicating the evidence on the role of sidewalks, the role of neighborhood parks, the role of small blocks, and the process of slumming. She generalized her work to build theory on urban planning.

The case selection step is important in improving external validity.

Cases should be selected in ways that support theory development. The chosen cases should allow within-case similarities and cross-case differences to come out to allow theory building about quality strategy.

Eisenhardt (1989a, p. 544) suggests that the literature review step after data collection is important in building external validity because "it ties together underlying similarities in phenomena normally not associated with each." This association creates "wider generalizability and a higher conceptual level" of abstraction.

Table 2.5 provides a summary of how the theory-building steps strengthen the validity and reliability of the theory that is being generated. As the theory-building research is being conducted, the researcher should ask this question at every step in the process:

> "How can I continually improve the validity and the reliability of this research?"

This research should be conducted, with an effort to add to the list shown in Table 2.5. An overarching theme of this research design should be to thoroughly address the problem of measurement and linkages between the conceptual and observational levels of abstraction.

Table 2.5: The Theory-Building Design Steps which Strengthen Validity and Reliability

Criterion	Research Design Step	How Criterion is Strengthened
Construct Validity	Data Collection	Multiple data sources within cases
		Replication of data evidence across cases
	Shaping Hypotheses	Check of chain of evidence and case by multiple reviewers
Reliability	Data Collection	Meticulous attention to data-collection detail
		Multiple investigators minimizing biases
	Analyzing Data	Bias-minimizing analyses of categories and pairs of cases
		Analysis of one data source at a time
		Multiple investigators minimizing biases and errors
	Unfolding Literature	Support of repeated patterns by literature
		Understanding of "why" results are (or are not) repeatable
Internal Validity	Data Collection	Starting and ending points in time of events
	Data Analysis	Establishment of strong associations and rival explanations in findings
	Unfolding Literature	Understanding of cause-effect relationships
External Validity	Case Selection	Selection process showing within-case similarities and cross-case differences
	Unfolding Literature	Higher conceptual understanding of inference

Chapter 3

Research Methodology: Modifications to Minimize Measurement Concerns

The previous chapter recommends a case-study research methodology described by Eisenhardt (1989a). Her methodology addresses measurement concerns and provides steps to minimize threats to validity and reliability. This chapter discusses the methodology followed in this research project. Most of the discussions in this chapter address how this research complies with Eisenhardt's (1989a) recommendations to address measurement concerns and minimize threats to validity and reliability. Discussions here also include balanced modifications to her framework.

3.1 Measurement

Well designed behavioral research always strives to minimize measurement concerns. Measurement concerns occur because behavior research operates

at two levels, the conceptual level and the observational level. Researchers develop theory at the conceptual level, but collect data at the observational level. They develop theory among conceptual-level abstractions called "constructs." Researchers cannot see or even measure constructs directly. They must make inferences among constructs by showing relations among observed data. They partially minimize measurement concerns by successfully showing linkages between conceptual and observational levels of abstraction (Kerlinger, 1986).

For example, consider researchers who believe that scholastic achievement in children is related to three constructs:

- children's perception of themselves (self-concept),
- children's aptitude for learning (aptitude), and
- children's need for achievement (achievement motivation).

The researchers cannot directly study self-concept, aptitude, or achievement motivation, but they can make inferences from tests directly related to these constructs. They can indirectly make the following conclusions from evidence:

- inferences about self-concept by studying " figure drawing" test results,
- inferences about achievement motivation by studying achievement test results, and
- inferences about aptitude by studying aptitude test results.

The researchers develop theory about achievement by proposing

hypotheses among the constructs of achievement, self-concept, achievement motivation and aptitude. They infer relationships among the constructs of achievement, self-concept, achievement motivation, and aptitude by showing relationships among observable figure drawing, achievement, and aptitude test results.

The researchers minimize measurement concerns by showing the linkages between the constructs and the observable data measuring the constructs. They can support the linkages in the following ways:

- reviewing the vast amount of previous research on achievement, self-concept, aptitude, and achievement motivation which shows previous linkages between these constructs and observable data;
- demonstrating that their research design minimizes threats to the validity and reliability of their findings; and
- showing statistical evidence of relationships among the observed construct measures and the constructs.

This project shows linkages between constructs and observable measures in similar ways. The literature review in Chapter 6 shows previous linkages between constructs and observable data. Compliance with Eisenhardt's recommendations (discussed in the next section) helps minimize threats to the validity and reliability. Statistical evidence in the form of Cronbach's α's (see Section 3.2.3) also provide evidence of relationships among constructs and measures.

3.2 Following Eisenhardt's Recommendations with Balanced Modifications

This section walks the reader through the research methodology used in this research. It emphasizes compliance to Eisenhardt's (1989a) recommendations to minimize threats to reliability and validity. It also notes balanced modifications to her framework.

Getting Started

The researcher started with the following question:

> "What are the attributes for a successful continuous quality improvement strategy, and how do they combine together into a unifying framework?"

This research question provided the following initial guidance for starting this research effort. This research should:

- study companies with successful ongoing continuous quality improvement strategic efforts,
- build theory about the attributes of successful quality strategy, and
- collect data which will allow the researcher to develop a unifying framework for quality strategy.

Selecting Cases

This research studied four business units within the electronics industry.

Previous research efforts presented several strong reasons to study cases from the electronics industry:

- The researcher had previously researched the electronics industry and understood many of the quality strategy issues within that industry.
- The researcher knew business contacts and university contacts who had consulted with the electronics industry and had agreed to be external examiners to this research.
- The researcher knew contacts within the electronics industry who agreed to have their company studied. They also agreed to be liaison managers in this research project.

A major theoretical reason for selecting the electronics industry was that the results possibly could be generalizable to theory about other dynamic environments.

The electronics industry is plagued with problems that afflict other dynamic industry environments (Digrius, 1995):

- intense international competition,
- crises and discontinuities within the industry, and
- pressures to downsize/reengineer processes.

The electronics industry is noted for solving these problems with quality strategy solutions (Digrius, 1995). The results could provide theory which

is generalizable to dynamic environments with similar strategic issues.

The four business units selected could allow some interesting cross-case comparisons:

- quality strategy in an Asian environment versus quality strategy in an American environment,
- information technology issues by firms deeply involved in the Internet and E-mail versus information technology issues by firms not extensively using the Internet and E-mail, and
- high technology versus lower technology quality strategy.

A pair of cases were Asian and US business units of the same company. Two of the cases were high technology firms; two were lower technology firms. Two of the cases were heavily involved in Internet/E-mail technology; two of the cases were minimally involved in Internet/E-mail technology.

This study picked "business units" as analysis units because the quality strategy literature "deals extensively with business unit strategy" and is "generally silent on corporate strategy" (Dean & Bowen, 1994, p. 403).

The researcher followed Eisenhardt's (1989a) suggestion to establish *external validity* by picking cases where some interesting comparisons could be generalized. The researcher selected cases where within-case and cross-case evidence could support generalizations to theory on quality strategy. (See Section 2.2.) Table 3.1 gives brief profiles of the selected business units.

Table 3.1: Business Unit Profiles

Business Unit	Industry	Annual Sales in Units (Approximate)	# of Employees (Approximate)
Elec/Asia	Electronics (Electronic Components)	4 million	600
Elec/USA	Electronics (End Products)	1.5 million	800
HiTech/Medical	Electronics (Medical Diagnostics)	100	200
HiTech/Internet	Electronics (Internet Imaging)	10 thousand	50

Crafting Instruments and Protocols

The four business units selected had documented quality strategy success:

- All four of the business units were the world-wide market leaders for their main product(s).
- All four of the business units had won customer value awards from their main customers.
- All four of the business units had won local quality awards.
- Some of the business units had won top US and worldwide quality awards.

Following the advice of Eisenhardt (1989a) and Yin (1994) to achieve *objectivity*, this study used the following data sources:

- initial interviews,
- semi-structured interviews,
- direct observation,
- documents, and
- archival records.

Initial interviews with the liaison person(s) of the participating companies lasted approximately one hour each. These open-ended interviews guided the semi-structured interviews to follow. The initial interviews helped the researcher to identify key corporate personnel to interview later and also helped the researcher formulate the semi-structured interviews with these personnel.

The next round of interviews was semi-structured (Kazanjian, 1988) to help avoid biases toward one theoretical construct. Predetermined lines of inquiry about quality improvement success attributes were supplemented with discussions that naturally arose from the interviews. Following Yin's (1994) suggestion, the researcher was flexible in the inquiry process to fully explore the uniqueness of each case situation. The researcher followed Eisenhardt's (1989a) advice to ask similar questions of all business units to replicate data evidence across cases.

The researcher tried to follow Eisenhardt's advice to be meticulous in collecting data. He asked "temporal" and "causal" questions in an effort to capture "points in time" data.

He asked the following questions when appropriate:

- "Has there been a change over time?"
- "Did 'A' come before 'B' ?"
- "Did 'A' cause 'B' ?"

The researcher wanted to capture possible time sequences in the data to later investigate possible "causal" relationships in the analysis phase.

Semi-structured interviews lasted approximately 90 minutes. The interviews were tape recorded and transcribed verbatim. Interviews were supplemented with direct observation data, records, and archival data. Direct observation data were collected to include work conditions, informal behavior, general impressions, and any other pertinent observations. Records and archival data included published data (such as annual reports) and other data that the company considered important. See Table 3.2 for a list of physical evidence.

Following the advice of Eisenhardt (1989a) and Yin (1994), the researcher used multiple reviewers to investigate the data:

- consultants and faculty who were familiar with the cases to review the data, emerging categories, and constructs within each case;
- liaison managers to review the data, emerging categories and constructs on their company;
- colleagues and peers to examine field notes and transcripts; and
- the dissertation director to oversee the entire data examination process.

Table 3.2: Summary of Data Sources by Participating Business Units

Data Source	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
Entry Interview	X	X	X	X
Case-study Interviews	X	X	X	X
Consultants	X	X	X	X
External Reviewers	X	X	X	X
Presentations	X	X	X	X
External Documents:				
Annual Report	X	X		
Mission Statement	X	X	X	X
Magazine Articles	X	X	X	X
Company Publications	X	X	X	
Trade Journals	X	X	X	X
Internal Documents:				
Quality Audit	X	X		
Quality Survey			X	
Organizational Chart	X	X	X	X
Training Materials	X	X	X	X
Perf. Appraisals	X	X	X	X
Historical Records	X	X	X	X
Direct Observation:				
Physical Proximity	X	X	X	X
Office/Work Space	X	X	X	X
Accessibility of Units	X	X	X	X
Planning Meetings	X		X	
Luncheon Meetings	X	X	X	

Table 3.3: Managers Interviewed

Function	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
General Management	1	2	1	2
Technology Director			1	
Information Services			1	
Research Manager			1	
Human Resources	1	1	1	1
Manufacturing	1		1	
Product Management	1	2	1	1
Product Development	1	1	4	1
Engineering	1		1	
Marketing			2	1
Purchasing	1		1	
Logistics	1		1	
Quality Assurance	1	2	1	
Environmental Affairs		1		
Controller		1		
Materials Management		1		
BU Manager Totals	9	11	17	6
Consultants			2	1
Liaison Managers	2	4	2	1
External Reviewers	1	1	1	1

The researcher also achieved multiple perspectives on data interpretation by using liaison managers. See Table 3.3 for a list of interviewed managers, consultants, liaison manager, and external reviewers.

3.2.1 Attribute Development Using Data Triangulation

The researcher used *data triangulation* to extract success attributes from semi-structured interviews. Multiple data sources supported each attribute:

- At least two interviewed managers mentioned each attribute.
- Physical evidence in the form of internal documents, external documents, or direct observation supported each of the attributes.
- Liaison managers (at least one from each business unit) carefully perused the attributes. The liaison managers assured the researcher that the list of attributes was worded properly and that the list adequately captured their quality success strategy.
- The researcher checked of the correctness of the attributes by presenting the preliminary research findings to the top management teams of the four business units. The researcher also followed up with the liaison managers to assure that the attributes were correct and complete.
- External reviewers familiar with the business units checked the correctness and completeness of the attributes.
- The committee chairman reviewed the correctness and completeness of the process of forming attributes.
- The researcher verified the attributes with a follow-up survey. See the next section for a discussion of the follow-up survey.

3.2.2 Follow-Up Survey

The researcher used a follow-up survey to verify the attributes that came from the interview data. The researcher followed the advice of liaison managers to limit the number of attributes to fifty. The managers assured

the researcher that the fifty attributes adequately captured their quality strategy success (see the previous section).

In the survey, the researcher asked each manager, "Given that the 50 statements are success attributes, how strongly do you feel that each attribute exists in your organization?" He asked each manager to rank each attribute on a five point Likert-like scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Strongly Disagree.

See Appendix A for the survey.

3.2.3 Construct Development

Because creating a unifying framework was a goal of this research, the researcher continually examined the interview data for emerging constructs. Each of the fifty attributes was evaluated as a measure for emerging constructs. Starting with the Malcolm Baldrige criteria (see Section 1.1) and exploring constructs in previous literature (see Chapter 6), the researcher worked closely with the liaison managers and external reviewers (see Section 3.2.3) to fit the fifty attributes into the following constructs:

- leadership,
- human resource management,
- strategic quality planning,
- process management,
- customer focus, and
- information technology.

The forty-three-manager sample size in this study was too small to allow the researcher to analyze the relationships among the observed construct measures using factor analysis. However, the researcher was able to discover interesting findings by analyzing the rankings of the attribute survey scores. Chapter 5 analyzes the rankings of individual attributes and rankings of average attribute scores within a construct across the four business units.

Cronbach's Alpha

The researcher was also able to analyze the reliability of the attributes in each construct category using a reliability coefficient called *Cronbach's Alpha (α)*. Cronbach's α measures "internal consistency" or the similarity of attribute survey scores within a category across different managers. One interpretation of Cronbach's α is the squared multiple correlation between the observed measures of a construct and all possible measures of that construct. Typically, these coefficients should fall within a range of 0.70 to 0.90 for narrowly defined constructs and 0.55 to 0.70 for broadly defined constructs (Powell, 1995). A survey of journal articles using Cronbach's α including Cronbach's original article (Cronbach, 1951) suggested that measures with a squared multiple correlations of .25 or below should be dropped from reliability coefficient calculations.

Cronbach's α is computed using the following formula:

$$\alpha = \frac{k\overline{cov}/\overline{var}}{1 + (k-1)\overline{cov}/\overline{var}} \tag{3.1}$$

where k is the number of attributes in a category, $\overline{cov}$ is the average

covariance of attribute survey scores within a category, and $\overline{var}$ is the average variance of attribute survey scores within a category.

Looking at Equation 3.1, one sees that Cronbach's α depends on both the number of items (k) and the inter-category correlation. One can have a large reliability coefficient, even when the inter-category correlation is small, if the number of items is large enough (Powell, 1995).

The summaries of constructs with Cronbach's α' scores are shown in Section 4.1. Detail of Cronbach's α calculations are shown in Appendix C.

Entering the Field

The researcher followed Eisenhardt's (1989a) advice in addressing the two major data collection problems: immense amounts of data and unexpected data-collection circumstances. The researcher minimized the immensity of the data by using liaison managers to help him sort through the vast amount of interview data.

The researcher also followed Eisenhardt's (1989a) advice to make balanced modifications to previous theory-building research methods in response to unexpected circumstances. The unexpected circumstances shortened the time available for data collection:

- Managers of one of the business units were being transferred.
- Another business unit was possibly being sold.

These circumstances meant that the time devoted to interview data collection and analysis had to be shortened. Other unexpected

circumstances presented an opportunity to verify the interview data with a survey and a business-unit presentation:

- All managers who were interviewed agreed to be surveyed.
- All of the liaison managers agreed to help the researcher fine-tune a survey, analyze the survey data and form constructs from attribute data.
- Several of the external reviewers agreed to oversee interview, survey, and construct analyses.
- All four business units agreed to a management-team presentation to verify the research results.

The shortened time framework and increased manager/external reviewer support meant the following "balanced modifications" to Eisenhardt's model:

- Use liaison managers and external reviewers to quickly analyze the interview data to determine success attributes for quality strategy.
- Use liaison managers and external reviewers to fine-tune a survey to test the reliability of the success attributes.
- Use liaison managers and external reviewers to verify categories and emerging constructs from interview and survey data.
- Present the survey results to the business-unit management teams to verify the research results.

- Use statistics to test the reliability of constructs from attribute categories.

These benefits came from modifying Eisenhardt's methodology:

- The modifications added some quantitative evidence to qualitative evidence.
- The survey and presentations helped verify the interview data and help strengthen the emergent theory.
- The survey data allowed the researcher to statistically test the construct reliability (using Cronbach's α).
- The survey data allowed the researcher present a greater "preponderance of evidence" for other researchers to test.

These weaknesses came from modifying Eisenhardt's methodology:

- The modifications might not be as firmly grounded in case-study theory as Eisenhardt's methodology.
- The modifications pushed the researcher to hurry through some of Eisenhardt's steps, to quickly produce a survey.
- The sample size was too small for construct comparisons using factor analyses.

This research minimized the above weaknesses by emphasizing case-study analysis and using the survey data and presentation results to support within-case and cross-case patterns coming from the case-study analysis.

Analyzing Within-Case Data

Following Eisenhardt's (1989a) advice, within-case data analysis consisted of the following:

- constantly comparing and contrasting data within each case,
- letting each case act as a stand-alone entity, and
- letting the unique patterns emerge within each case before looking for cross-case patterns.

The researcher was careful to maximize the *reliability* of the within case data by analyzing each case without considering other business units, even though some data were collected specifically for cross-case comparisons. The researcher used liaison managers and external reviewers to verify within-case data. He asked the following question:

> "These are the patterns that are coming from the interviews, am I measuring what is actually occurring?"

He also used survey data and management-team presentation results to support these data.

Searching for Cross-Case Patterns

To improve the likelihood of *reliable theory* coming from the cross-case data analysis, the researcher followed Eisenhardt's suggested bias-minimizing steps:

- picked categories and compared within-case similarities to cross-case differences for each category,
- selected pairs of cases and studied the similarities and differences between each pair, and
- studied one data source at a time.

This step compared an Asian business unit with a US business unit from the same company. It compared business units with high involvement in Internet and E-mail technology to business units with low involvement. This step also looked at pairs of high-technology cases and compared them to pairs of lower-technology cases.

As with within-case data analysis, the researcher used liaison managers and external reviewers to verify cross-case data. The researcher also used survey data and management-team presentation results to support these data.

3.2.4 Management-Team Presentations

The researcher presented the preliminary results of the case studies to the four business units. He also included a presentation of the survey results to the three US business units. He sent survey results to Elec/Asia.

The business units viewed the presentations as way to gain some insight into their quality programs. The researcher viewed the presentations as a way to thank the business units for their participation in this research by giving feedback on the results. It also was another way to verify the

interview and survey data.

Shaping Propositions

Rather than test hypotheses, this research presents propositions for others to test. With this in mind the researcher modified Eisenhardt's (1989a) "Shaping Hypotheses" to shape propositions. The researcher followed Eisenhardt's (1989a) advice in this step to establish *construct validity* by treating each case as a separate experiment. He treated a series of cases as a series of experiments, each confirming or disconfirming an emergent relationship. He also verified the emergent relationships between constructs with:

- the evidence from the interviews,
- the evidence from the survey, and
- the evidence for the presentations.

The case study data provided underlying reasons "why" relationships between constructs occurred.

Unfolding Literature

As a quality strategy framework evolved from the data, the literature review minimized measurement concerns in the following ways:

- The vast amount of previous research on quality strategy strengthened the *reliability* of the repeated patterns that came from the data. The

quality literature added an understanding of *why* many of the quality strategy patterns appeared in every case study. The innovation literature also provided an understanding of *why* the patterns were different for high technology firms.

- The quality literature strengthened the *internal validity* by providing an understanding of possible cause-effect linkages among the emerging constructs. For example, the literature supported the causal role of "leaders as systems designers." The literature also supported the role of customer focus being the end result of quality efforts.
- The literature strengthened *external validity* by providing guidance for generalizability of the results to theory. Specifically, it provided an understanding of why the quality results confirmed existing theory. It also helped the researcher generalize the results with high technology firms. The innovation literature provided possible reasons why high technology firms were different. These possible reasons were sources for theory-testing propositions. (See Section 7.5.)

Reaching Closure

Closure came at the natural end of the interviews, survey, and presentations:

- after 43 managers were interviewed,
- after 43 managers were surveyed, and
- after 4 business-unit presentations were made.

Coincidentally, this closure came at a point of *theoretical saturation* where the researcher was seeing repeated patterns. It also came at a time where new data were only marginally contributing to the research.

3.3 Quality of Research Design: Overview

The chapter retraces the researcher's efforts to follow Eisenhardt's (1989a) suggestions in Chapter 2, specifically in Section 2.2, to increase the reliability and validity of the results. Her steps are outlined in Table 2.5. The researcher's efforts are summarized in Table 3.4.

Table 3.4: The Steps in this Research to Strengthen Validity and Reliability

Criterion	Research Design Step	How Criterion is Strengthened
Construct Validity	Data Collection	Used multiple within-case data sources: initial interviews, semi-structured interviews, direct observation, documents, archival records, surveys, and management-team presentations
		Used replication of cross-case evidence: similar interview questions, surveys, management-team presentations across cases
	Shaping Hypotheses	Checked chain of evidence with liaison managers, faculty, and consultants
Reliability	Data Collection	Paid careful attention to data-collection details, especially to include "temporal" and "causal" data
		Used multiple investigators: liaison managers, faculty, and consultants
	Analyzing Data	Analyzed categories and pairs of cases: Asia/USA quality strategy, high/low technology, high/low use of Internet/E-mail
		Analyzed each business unit as a stand-alone entity
		Used multiple investigators: liaison managers, faculty, and consultants to minimize biases and errors
	Unfolding Literature	Supported repeated patterns using quality and innovation literature
		Developed an understanding of "why" quality and innovation results are (or are not) repeatable
Internal Validity	Data Collection	Asked "temporal" and "causal" interview questions
	Data Analysis	Established strong quality strategy associations and rival innovation explanations in findings
	Unfolding Literature	Developed an understanding of some cause-effect relationships: leaders as "systems designers," and customer focus as the result of quality efforts
External Validity	Case Selection	Selected business units within the electronics industry. Selected for Asia/USA quality strategy, high/low Technology, and high/low use of Internet/E-mail
	Unfolding Literature	Developed higher conceptual understandings of quality strategy and inferences About innovation

Chapter 4

Within-Case Analysis

This chapter analyzes within-case data. The researcher followed Eisenhardt's suggestions (1989a) to look at each case as a stand-alone entity by constantly comparing and contrasting data within each case.

The researcher also experienced her frustrations with the massive amount of data that come from the case study analyses. Fifty success attributes came from over one hundred hours of interviews. Six constructs came from the fifty success attributes and the survey results. To minimize the reader's difficulty in proceeding through the case study data, this chapter provides the following categorization:

- interview quotes are grouped within success attributes,
- success attributes are grouped within constructs, and
- constructs are grouped within the business-unit backgrounds.

Discussions of attributes and constructs started in Chapter 3 are continued as this research looks within each case. These discussions are

further developed in Chapter 5 as this research looks at patterns across the cases.

This chapter starts with tables of the attributes grouped into constructs with Cronbach's α's. It also lists the attributes that did not fit into constructs. This chapter next gives business-unit backgrounds with the interview data in the preceding categorization. Lastly this chapter analyzes within-case data including the attributes which scored the highest in the follow-up survey. The within-case analyses support the propositions in Chapter 7.

Because of the immensity of the interview data, this chapter keeps the business unit background descriptions brief. These brief descriptions are consistent with the researcher's promise to preserve the confidentiality of the identity of the four business units.

4.1 Attributes and Constructs

Tables 4.1 through 4.6 list forty-eight attributes that make up the six constructs of leadership, human resource management, strategic quality planning, process management, customer focus, information technology. Cronbach's α's are given with each construct. (See Appendix C for detail Cronbach's α calculations.)

Only the following two attributes did not fall into constructs:

- Attribute # 16: "We have increased competencies, increased awareness, increased energy, and increased desire–simply put,

Table 4.1: Construct: Leadership*

#	Attributes
1.	Our leaders influence others to understand and commit to their long-term corporate visions.
2.	Our leaders help shape a quality culture.
3.	Our leaders provide open access to information about the firm's performance.
4.	Our leaders provide support for team efforts.
5.	Our leaders provide support for individual entrepreneurial efforts.
6.	Many innovations result from our firm's ability to take advantage of our cultural diversity.
7.	Even though our products are customer-driven, we do a good job at motivating our customers to want our technological innovations.
8.	We place more emphasis on the "means" of planning than on the "ends" of planning.
9.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
10.	We succeed because we make all of our actions accountable to internal and external stakeholders, including our families, our communities, each other, and our religious beliefs.
11.	A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.
12.	Our diverse mix of leadership styles helps us quickly adapt to changing environments.
13.	Our leaders possess flexible leadership styles that adapt to changing environments.
14.	Our leaders create incentives for change by changing others' perceptions of problems to create a willingness to change.
15.	Our firm has a healthy "sense of urgency" due to our condition of crisis management.
16.	We have increased competencies, increased awareness, increased energy, and increased desire–simply put, increased productivity–due to our condition of crisis management.
17.	Empowerment has helped minimize the disruptive effect of management changes.
18.	Our leaders empower employees to make decisions at lower levels.
19.	Our leaders empower employees with the financial resources to do their jobs with a minimal need for management approval.
20.	Empowerment has reduced time pressures on managers, allowing employees to have easier access to them.

*Reliability Coefficients: Cronbach's α = .8465 Standardized Cronbach's α=.8488

Table 4.2: Construct: Human Resource Management[†]

#	Attributes
21.	We have objective job standards that focus on process improvement, teamwork, and customer satisfaction.
22.	Our quality efforts are helped by training–especially ongoing training and on-the-job training.
23.	We excel at job analyses, selection of the best candidates, and performance appraisal.
24.	Our human resource department relates well to the interests and concerns of our employees.
25.	Our human resource department is a strong advocate for the rights of employees to upper management.
26.	We emphasize "follow-up" in all of our human resource activities.
27.	We excel at how people get and give information–for example, how employees are informed and how employees give suggestions to their managers.
28.	We fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home.
29.	Our reward system rewards employees for contributing to customer value.
30.	Our recognition system recognizes employees for contributing to customer value.

[†]Reliability Coefficients: Cronbach's α = .8237 Standardized Cronbach's α=.8275

Table 4.3: Construct: Strategic Quality Planning[‡]

#	Attributes
31.	Quality improvement is an important part of our overall business strategy.
32.	Our business unit learns and continually improves quality.
33.	We have a strong culture that focuses on continually improving quality.
34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."

[‡]Reliability Coefficients: Cronbach's α = .8783 Standardized Cronbach's α=.8811

Table 4.4: Construct: Process Management[**]

#	Attributes
35.	We use "simple" (easy to use and understand) ways to monitor, control, and improve processes.
36.	We organize our processes around outcomes–versus tasks or departments.
37.	We find the root causes of systems problems.
38.	We continually "benchmark" with the best quality practices in our industry.
39.	We excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.
40.	We minimize human sources of process variation by training standardization.

[**]Reliability Coefficients: Cronbach's α = .7681 Standardized Cronbach's α=.7684

Table 4.5: Construct: Customer Focus[††]

#	Attributes
41.	We stay close to our customers and suppliers.
42.	We have customer-driven versus a technology-driven products.
43.	Our main focus in creating customer value is also creating value for the end-consumer.
44.	We create customer value better than our competitors.
45.	We have an ability to understand and measure customer value.
46.	Our leaders plan and continually improve processes to promote customer value.

[††]Reliability Coefficients: Cronbach's α = .8344 Standardized Cronbach's α=.8407

Table 4.6: Construct: Information Technology[‡‡]

#	Attributes
47.	Internet and E-mail has improved communications with customers and suppliers.
48.	The use of the Internet and E-mail has reduced company functional barriers.
49.	Internet and E-mail contributes to product and process design improvements.
50.	Internet and E-mail has reduced the need for many management layers.

[‡‡]Reliability Coefficients: Cronbach's α = .7936 Standardized Cronbach's α=.7980

increased productivity–due to our condition of crisis management."

- Attribute # 28: "We fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home."

Both attributes had squared multiple correlations of below .25 and were dropped from reliability coefficient calculations (See Section 3.2.3.) Further discussions of why these two attributes did not fall into constructs are given in Section 5.1.

Detailed discussions of research methods are given in previous sections:

- Sections 3.2.1 through 3.2.3 give the details of formulating and validating these attributes and constructs.
- Section 2.1.4 discusses multiple data sources for these attributes and constructs.
- Sections 3.2.2 and 3.2.4 discuss the follow-up survey and management-team presentations that strengthened the validity of other data sources.

4.2 Elec/Asia

Discussions with a vice-president of Elec, an international electronics company, persuaded the researcher to study two business units of that firm, Elec/Asia and Elec/USA. This section and the next give brief backgrounds and analyses of these two business units.

Located in Southeast Asia, Elec/Asia is a major manufacturer of electronic components for other electronics companies and other divisions of Elec. It is Elec's leading example of world-class quality strategy and is good candidate for this research for several reasons:

- It has won a number of quality awards, including Elec's first company-wide quality award and its country's top quality award.
- It has a fifteen-year history of quality-oriented leadership with a thoroughly ingrained quality culture.
- Its managers are open, candid, and receptive to the outside scrutiny required for this Ph.D. research.

Elec/Asia manufactures approximately 4 million components a year with over 600 workers and twelve managers. The workers are from Southeast Asia; the managers are from Southeast Asia, India, Japan, continental Europe, and England. It conducts regular quality audits; these audits document successful quality strategy, especially in areas of process management and customer value. Also, its managers are particularly interested in an opportunity to benefit from research that would help them better understand and improve their quality efforts.

4.2.1 Elec/Asia: Leadership

Even though this business unit was located in Southeast Asia, its managers were very similar to managers in the US. The majority of the managers were Asian but the researcher did not notice differences in management

styles from managers in the US. A reason for the similarities was because of the high number of previous American and European managers . One of the success attributes came from the diversity of cultural backgrounds and leadership styles. They were able to take advantage of those cultural and leadership differences. The cultural and leadership differences fostered innovations and change.

Attribute # 6. Many innovations result from our firm's ability to take advantage of our cultural diversity.

> I am believer in diversity. I think its our leadership strength. Many of our new ideas come from our diversity. [Elec/Asia-2]

Attribute # 12. Our diverse mix of leadership styles helps us quickly adapt to changing environments.

> We have managers from different cultures, different religions, different backgrounds, and very different points of view. These differences are strengths (not weaknesses). These differences enhance our ability to rapidly change and adapt to different markets and products. [Elec/Asia-1]

> Another strength is that we have been able to withstand many changes. This is another strength in our diversity. [Elec/Asia-4]

The original general manager who started the quality program felt strongly about the importance of empowerment. Even though several general managers had succeeded him, they continued to empower their

employees. An effect of empowerment helped minimize the disruptive effects of these management changes.

Attribute # 17. Empowerment has helped minimize the disruptive effect of management changes.

> *** started our quality program. He empowered others to continue the principles and systems he started. ... we have had many management changes but, because of empowerment, the disruption to work flows has been kept to a minimum. [Elec/Asia–8]

Although only three leadership success attributes came from the interviews, leadership played a major role in the success of this business. This is quite evident in the cross-case analyses in Chapter 5. Leadership scored high in a follow-up survey. The leaders of this business unit saw themselves as systems designers who were able to encourage change that fostered continuous quality improvement. They encouraged change by taking advantage of their cultural diversity and diverse leadership styles. They also were able to use empowerment to change systems with a minimal disruption to their work flows.

4.2.2 Elec/Asia: Human Resource Management

Most of the human resource efforts focused on the activities that also benefited their quality programs. All job descriptions emphasized process improvement, teamwork, and customer satisfaction.

Attribute # 21. We have objective job standards that focus on process improvement, teamwork, and customer satisfaction.

> ...job definitions and standards reflect our quality focus. They include team efforts for continuous process improvement for total customer satisfaction. [Elec/Asia–7]

> All of the managers are part of teams. The lines between the functional groups are not there .... Marketing works with engineering...manufacturing works with quality assurance. All of our job descriptions mention continuous process improvement and, of course, quality ... with the customer value in mind. We have internal and external customers. [Elec/Asia–1]

> All of the work descriptions focus on quality. They are very objective ...the quality objectives include teamwork ..., and customer satisfaction and are built into performance appraisals. [Elec/Asia–7]

All of the human resource activities focused on long-term quality goals with maximum employee involvement. For example, this business unit kept the number of training programs to a minimum, but emphasized "follow-up." Human resource activities were carefully tracked and evaluated for their long-term effectiveness.

Attribute # 26. We emphasize "follow-up" in all of our human resource activities.

> We don't have a lot of programs but what we have are carefully evaluated and followed up. You know that it's really important and it has been tried in other places. [Elec/Asia–3]

A major success attribute was how employees gave suggestions. Successful employee suggestion contests were quite evident.

Attribute # 27. We excel at how people get and give information–for example, how employees are informed and how employees give suggestions to their managers.

> We have contests for the best suggestions. Many of our process improvements (in terms of time and money) have come from employee suggestions. [Elec/Asia–4]

This business unit excelled at the ways that employees were recognized and rewarded. The researcher noticed successful award programs which focused on quality improvement. The programs were consistent, well executed, and well received by all employees.

Attribute # 29. Our reward system rewards employees for contributing to customer value.

> The financial rewards for team contests are small in terms of money but they mean a lot to the teams. [Elec/Asia–6]

> We tie our rewards to quality assurance. We raise the goals every year. That's OK. The teams are fierce competitors. [Elec/Asia–9]

Attribute # 30. Our recognition system recognizes employees for

contributing to customer value.

> We take their picture. They see their pictures on bulletin boards and on our quality calendar ... we have a (customer) awards dinner. All of the ways we recognize quality and customer satisfaction are simple, not elaborate, but they work.
> [Elec/Asia-6]

Overall, the human resource activities contributed strongly to the success of this business unit. Human resource activities were part of the overall system to improve quality. All job standards were objective and supported the systematic goals of process improvement, teamwork, and customer satisfaction. Also, reward and recognition systems were in line with the systemic goal of improving customer value. A major feedback loop in this quality improvement system was the flow of information to and from the employees. How employees gave suggestions and got information was an attribute for success.

This business unit emphasized "systemic" goals versus "personal" goals. (See Chapter 6.) The one human resource success attribute present in other business units but absent at Elec/Asia was attribute # 28: "We fit jobs into the overall lifestyles of our employees." The researcher saw evidence that jobs were fit into the overall life styles of the factory workers but saw no evidence that jobs were tailored to the lifestyles of the managers. It seemed that so much emphasis was placed on systems that the lives of the managers were overlooked. One European manager commented that

managers of this business unit were expected to be very devoted to their jobs. It was not clear to the researcher whether this apparent insensitivity was due to local or corporate policies. Because the researcher was also studying another business unit of Elec, he could possibly answer this question. (See Subsection 4.3.2.)

4.2.3 Elec/Asia: Strategic Quality Planning

All of the noticeable strategic activities focused on creating a strong quality culture. Most memos, most bulletin board messages, and practically every business activity was tied to quality improvement. The researcher noticed a consistency of efforts to improve quality across many levels. The researcher also notice a consistency across time. Memos and brochures on quality strategy over a ten-year period consistently reinforced quality strategy.

Attribute # 33. We have a strong culture that focuses on continually improving quality.

> All of our processes focus on quality. Quality is a given for us. [Elec/Asia–4]

> I don't like the word "culture," but we have a strong quality culture where we put quality into everything we do. [Elec/Asia–4]

> It is us. It works. It has been part of us for over 10 years. All of management believes in it. We all believe in it. We continually improve on it. [Elec/Asia–3]

Quality strategy dominated every business activity the researcher observed during his forty-hour visit at Elec/Asia. The researcher saw interdependent purposeful processes which all focused on quality improvement.

Although only one success attribute on strategic quality planning is illustrated here from Elec/Asia (Attribute # 33), it was evident that a quality improvement strategy played a major role in the success of this business. Discussions about strategy usually resulted in discussions about leadership because leaders were "systems and strategy designers." A later follow-up survey and management-team presentation confirmed the importance of strategy.

4.2.4 Elec/Asia: Process Management

The researcher did not see elaborate statistical analyses. In fact, he did not see one process control chart. The process improvement activities emphasized simplicity. Most of the factory workers used simple "dart" charts which helped them diagnose process problems and also suggested directions to adjust the process for a quick solution.

Attribute # 35. We use "simple" (easy to use and understand) ways to monitor, control, and improve processes.

> The end result of our design of experiments (DOE) work is simplicity. Everything you will see in our DOE group shows process improvement from quickly and simply spotting and

> adjusting processes, not complicated statistics. [Elec/Asia–2]
>
> We use "dart" charts .... The charts quickly point out a process problems and, most importantly, the direction to adjust the processes. The charts are simple and easily understood. [Elec/Asia–5]

A follow-up management-team presentation confirmed that the observed "simple" process management tools were the end result of years of painstaking process management. The company had moved away from an "efficiency-centered" approach that was heavily dependent on statistics to an approach which emphasized simplicity, with easy-to-use diagnostics and improvement tools. One manager noted that most processes had been stable for years and that the simple tools had evolved after many successful long-term process management efforts.

4.2.5 Elec/Asia: Overall

This business unit was a preeminent example of effective organizational systems driven by quality improvement strategy that focused on creating customer satisfaction. All activities were systems, with leaders being the systems designers. To design systems, leaders empowered employees from many diverse cultures to work well in teams. These empowered teams worked well to innovate and adapt quickly to changing environments. This team empowerment helped minimize the disruptive effect of management changes. Human resource activities supported these teams by setting

objective job standards which focused on process improvement, teamwork, and customer satisfaction. Human resource activities also excelled in how employees were informed and how they gave suggestions to their managers. Much of this success was due to team-oriented reward and recognition systems which focused on customer value. Quality activities all contributed toward increasing product reliability through minimizing product variation and eliminating errors.

The quality strategy helped create a culture that focused on continually improving quality. Elec/Asia documented successes in meeting quality goals in its annual quality audits (see Table 3.2). Successes included world-class benchmarks in reducing process variation and maximizing process efficiency. The benchmarks resulted in a long history of customer awards. These successes resulted from this business unit's ability to access and satisfy customer needs by staying close to customers and suppliers. Extensive efforts had fine-tuned design of experiments and statistical process control activities into simple ways to monitor, control, and improve processes.

4.2.6 Elec/Asia: Highest Rated Attributes

Table 4.7 lists the highest scoring attributes from a follow-up survey of this business unit (see Section 3.2.2 for survey details). One notices that the scores were very high for all ten attributes. The researcher's initial reaction to the high scores was to investigate whether the managers felt compelled to give high ranking survey results. Careful study of the interview data and in-depth conversations with a liaison manager quickly dispelled this

Table 4.7: Ten Highest Scoring Attributes: Elec/Asia

Score	Construct	#	Attribute
4.67	HRM	21.	We have objective job standards that focus on process improvement, teamwork, and customer satisfaction.
4.67	Strategy	33.	We have a strong culture that focuses on continually improving quality.
4.56	Leadership	02.	Our leaders help shape a quality culture.
4.56	Leadership	11.	A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.
4.56	Strategy	31.	Quality improvement is an important part of our overall business strategy.
4.56	Strategy	32.	Our business unit learns and continually improves quality.
4.56	Process	35.	We use "simple" (easy to use and understand) ways to monitor, control, and improve processes.
4.56	Customer	41.	We stay close to our customers and suppliers.
4.44	Leadership	09.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
4.44	Leadership	17.	Empowerment has helped minimize the disruptive effect of management changes.

reaction. The managers' comments in the interviews were very candid. Several managers gave critical comments along with positive comments. All indications from the interview data were that the managers were being open and honest. The researcher concluded that surveys, which the managers submitted confidentially, also indicated open and honest opinions. The researcher noticed during his interview session at Elec/Asia an exceptional level of enthusiasm for their quality program. A liaison manager confirmed that the high scores were consistent with this enthusiasm. Some reasons for this enthusiasm are listed in Section 4.2. The liaison manager indicated that Elec/Asia was one of Elec's top-performing world-wide business units. He indicated that their successes sustained their high level of enthusiasm.

The six highest scoring attributes confirmed a strong quality culture starting with an overall business strategy that focused on continuous quality improvement. This strong culture was nurtured by human resource activities which focused objective job standards on process improvement, teamwork, and customer satisfaction. Leaders also significantly impacted this quality culture by motivating and empowering teams to effect change to improve quality.

This change process involved learning and continually improving quality. Their employees' freedom to express their opinions and challenge the "status quo" contributed to this change process. Staying close to customers and suppliers helped them assess customer expectations and change their focus quality activities to meet those expectations. Distilling

design of experiments and statistical process control techniques down to *simple* process improvement techniques helped them change their processes to minimize variation and eliminate errors.

4.3 Elec/USA

Located in the southeastern USA, Elec/USA is a leading manufacturer of electronic end products. It enjoys a world-wide majority market position for its main product line. It is a highly-rated example of Elec's US quality implementation strategy and is a good candidate for this research for several reasons:

- It has implemented quality strategy for over twenty years, and has won many state-wide and company-wide quality awards.
- It has an indelibly fixed quality culture and has cooperated closely with many leading companies in quality strategy, such as Ford Motor Company and Eastman Chemical Company (a Malcolm Baldrige Award winner).
- It has a long history of success from participating in University of Tennessee studies and, hence, welcomes this Ph.D. research.

Elec/USA manufactures over 1.5 million end products a year, with over 800 workers and 11 managers. The workers are from the southeastern USA, and most of the managers are also from the Southeast. It conducts regular quality audits; these audits document successful quality strategy, especially in areas of process management, such as continuous flow manufacturing.

Many of its managers have won Elec's top individual quality award. Also, because of intense competitive pressures, its managers are particularly interested in an opportunity to benefit from research that would help them better use quality strategy to compete.

4.3.1 Elec/USA: Leadership

Leaders in this business provided support for their long-term corporate vision by helping others understand those visions. They also provided the focus on teamwork, an important component of leadership needed to attain those visions.

Attribute # 1. Our leaders influence others to understand and commit to their long-term corporate visions.

> Employees require understanding of why you should do what you want them to do from managers. [Elec/USA–20]

> I think they ALL have common major goals and are working toward them. The leaders really do a good job of helping them understand these major goals and what it takes to reach them. [Elec/USA–20]

Attribute # 4. Our leaders provide support for team efforts.

> We all support teams. It's got to be the team work, working together toward common goals. [Elec/USA–20]

The leaders motivated the best in themselves and their employees to

make major changes. They created a willingness to change by helping others understand why changes were necessary.

Attribute # 11. A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.

> Start in the beginning, involve the person–in the study or determination of why it needs to change–and they understand it. They'll do it willingly. [Elec/USA–20]

Attribute # 14. Our leaders create incentives for change by changing others' perceptions of problems to create a willingness to change.

> *** and *** brought about lots of changes. *** was the type of manager that would throw a biscuit out. ...he also made us hungry enough to go after the biscuit. *** was a lot like me. If it wasn't moving the way he wanted .... He would put jelly on the biscuit .... By the time he had planted the idea, you had accepted it. [Elec/USA–10]

They provided incentives to change, even in "crisis management" mode. They invigorated their workers.

Attribute # 15. Our firm has a healthy "sense of urgency" due to our condition of crisis management.

> Today you are required to make more decisions, required to change priorities, required to do *more* with *less*. Resources are

strained, frustrations are greater. But yet we're still succeeding better than we did in the " good old days." Our crisis mode has created a healthy "sense of urgency." [Elec/USA–10]

Attribute # 16. We have increased competencies, increased awareness, increased energy, and increased desire–simply put, increased productivity–due to our condition of crisis management.

I think you can take advantage of a crisis mode. Maybe different functions that didn't pull together before now see people pull together. Change is easier. We have increased productivity. When things are good, change is more difficult. [Elec/USA–18]

Empowerment was a major component of increased competencies during crisis management. Empowerment improved time pressures on managers which, in turn, improved their accessibility by others. Empowerment also helped minimize the disruptive effect of management changes. The empowerment included giving the resources (including financial resources) to their employees to manage their jobs with minimal management approval.

Attribute # 17. Empowerment has helped minimize the disruptive effect of management changes.

As soon as you start micro-managing you are saying–you can't trust them. We don't micro-manage. Giving them the trust to do their jobs had helped us change managers with no disruptions to our processes. [Elec/USA–20]

Attribute # 19. Our leaders empower employees with the financial resources to do their jobs with a minimal need for management approval.

> Empowerment is a solution. Tight financial control is saying you really don't believe in empowerment. [Elec/USA–20]

Attribute # 20. Empowerment has reduced time pressures on managers, allowing employees to have easier access to them.

> We try to keep the doors open. We have tried to maintain an open door policy on a continual basis. I think a true test of empowerment is whether you have time to have an open door policy. During the last 6 months I have had to delegate more to *** to free up the time. [Elec/USA–18]

The leaders in this business unit were system designers who articulated and implemented their long-term corporate visions. A major part of in this implementation effort was helping the employees to understand and commit to their visions. Many of the quality improvement visions involved change, especially change under constrained "crisis management" conditions. Leaders provided an understanding of the benefits of change, which motivated others to seek change and innovations. Leaders also promoted and empowered team efforts in this change process. By empowering others, managers were able reduce the disruptive effect of management (personnel) changes. They were also able to endure constrained "crisis management" conditions because empowerment reduced some of their time pressures.

4.3.2 Elec/USA: Human Resource Management

This business unit was successful at updating job skills through their training programs, especially on-the-job training.

Attribute # 22. Our quality efforts are helped by training–especially ongoing training and on-the-job training.

> Today you constantly have to be updating your skills. We update our skills with training. ... some of the best is ongoing on-the-job training. [Elec/USA–20]

A follow-up survey and management-team presentation confirmed that, like Elec/Asia, this business unit did not highly rate attribute # 28: "We fit jobs into the overall lifestyles of our employees." Even though empowerment had helped Elec/Asia and Elec/USA withstand many of the disruptions that accompanied management changes, these changes had taken their toll. Recent reorganizations and impending restructuring had left workers and managers with the impression that some corporate policies were dominated by the corporate financial bottom line, not necessarily by concern for workers. (See Subsection 4.2.2.)

4.3.3 Elec/USA: Strategic Quality Planning

Their quality strategy was deeply ingrained in their overall business strategy. Quality made sense to most employees because it was consistent with their personal and corporate values.

Attribute # 31. Quality improvement is an important part of our

overall business strategy.

> We defined our corporate quality ... made it our business program. [Elec/USA-20]

Attribute #34. Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."

> The people come to work to achieve those goals ... personal goals; their personal goals are complemented by the common corporate goals. [Elec/USA-20]

> My family values are (that) I want to come in and create good products. ... that is in line with our corporate values. [Elec/USA-20]

All the physical indicators of this business unit's overall business strategy (memos, inter-office correspondence, newsletters, posters, etc.) also stressed quality improvement. Many indicators also stressed quality as a part of their corporate and personal values. The researcher saw a consistency of shared personal and corporate values that focused on quality improvement. Many of the workers shared a work ethic to create good products for others. Quality improvement strategy was consistent with creating "good products."

4.3.4 Elec/USA: Process Management

This business unit had many successes in process improvement, including design of experiments programs to find root causes to process problems.

They had successful parallel process activities which organized process activities around outcomes, rather than departments. They also successfully compared their process improvement activities with the best quality practices in their industry.

Attribute # 36. We organize our processes around outcomes–versus tasks or departments.

> Instead of different departments–change the organization structure around quality results. [Elec/USA–20]

Attribute # 37. We find the root causes of systems problems.

> Getting to the real causes of systems problems is basic. For us engineers, it is as basic as mass and energy balances. ... what comes in must equal what goes out. [Elec/USA–12]

Attribute # 38. We continually "benchmark" with the best quality practices in our industry.

> So we are doing a lot more benchmarking. Of course our outside customers that we are talking to now are giving us a lot of feedback. [Elec/USA–12]

Attribute # 39. We excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.

> We changed, put in the flow processes, made production people responsible from the beginning to end of process for whole

product. Next step, we had most of the engineers to report to the same person. They have a common goal to produce quality, delivery and cost. [Elec/USA–20]

This business unit organized their interdependent processes around quality outcomes that focused on customer satisfaction. Their process improvement activities involved design of experiments activities that focused on finding root causes of systems problems. They were continually comparing their process programs with the best quality manufacturing in their industry. One successful benchmarking activity enabled them to implement a successful (parallel process) "continuous flow manufacturing" program.

4.3.5 Elec/USA: Customer Focus

The end result of all the quality activities was providing customer satisfaction. This meant a paradigm shift from being "technology-driven" to being "customer-driven."

Attribute # 42. We have customer-driven versus technology-driven products.

> Earlier we were technology-driven. We were major innovators. We are are still a major innovator; but I believe that we all see the intelligence of satisfying the customer with our technologies. Now, satisfying the customer drives everything. [Elec/USA–16]

Attribute # 46. Our leaders plan and continually improve

processes to promote customer value.

> We continually improve all of our quality programs for the goal of total customer satisfaction. [Elec/USA–20]

Being customer-driven versus technology-driven was a primary strategy shift for this major innovator of electronics products. Their success at focusing on customer satisfaction was mentioned to the researcher in every interview. Every leadership activity, every strategy, every process improvement activity focused on promoting customer value.

4.3.6 Elec/USA: Information Technology

This business unit praised the benefits of reducing company barriers, improving products, and improving processes through improved within-company communications.

Attribute # 48. The use of the Internet and E-mail has reduced company functional barriers.

> We are trying to use E-mail to eliminate some of the barriers that we have had up here from years gone by. [Elec/USA–12]

Attribute # 49. Internet and E-mail contribute to product and process design improvements.

> Internet and E-mail have improved communications between the design engineers in *** and the process engineers here. There is not as much of the "them versus us" in process design. There's better cooperation. [Elec/USA–12]

Attribute # 50. Internet and E-mail has reduced the need for many management layers.

> ...plus Internet and E-mail contributes a flatter structure. We've started to communicate a little bit more with our first-line management team here and in *** to make sure they know where we are going. [Elec/USA–12]

Improved communications were all within the company (Elec). These improvements were important because some major suppliers and customers were also within the company.

4.3.7 Elec/USA: Overall

This business unit's quality improvement efforts were part of its overall business strategy with a focus on creating customer satisfaction. All quality activities were part of strategic systems, with leaders the systems designers. Leaders motivated employees to commit willingly to their long-terms visions by helping them understand the visions and the problems associated with change. Leaders (and all employees) developed healthy "crisis management" competencies, awareness, and energy in solving the change-related problems. Leaders developed many competencies in employee teams by spending time with and committing financial resources to their team efforts. This empowerment also minimized the disruptive effect of management changes. Ongoing training and on-the-job training helped team competencies. Personal characteristics, such as a desire to

honestly create good products, motivated change efforts by all employees.

This business unit's ability to organize its processes around outcomes, find the root causes to systems problems, implement continuous flow manufacturing, and "benchmark" its process activities with the best quality practices in its industry contributed to its many process improvement successes. Customer-driven process improvement activities focused on satisfying customers' demands for variation reduction, error eliminations, and product reliability. Information technology facilitated these process improvements as well as product design efforts.

4.3.8 Elec/USA: Highest Rated Attributes

Table 4.8 lists the highest scoring attributes from a follow-up survey of this business unit (see Section 3.2.2 for survey details).

One notices that the scores were very high for all ten attributes. All data sources including an internal quality audit (see Table 3.2) confirmed a high level of confidence in and commitment to their quality effort.

Over fifteen years of continually learning and continually improving quality had created a strong quality culture. The three highest scoring attributes confirmed this strong culture. Quality strategy was part of their overall strategy. Part of the strength of this quality strategy was its consistency with their corporate values to honestly produce good products for their customers. Leaders impacted this culture by actively supporting team efforts and creating an environment where employees freely expressed their ideas and challenged the "status quo." Human resource activities also

Table 4.8: Ten Highest Scoring Attributes: Elec/USA

Score	Construct	#	Attribute
4.55	Strategy	31.	Quality improvement is an important part of our overall business strategy.
4.45	Strategy	32.	Our business unit learns and continually improves quality.
4.45	Strategy	33.	We have a strong culture that focuses on continually improving quality.
4.27	Leadership	09.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
4.27	HRM	21.	We have objective job standards that focus on process improvement, teamwork, and customer satisfaction.
4.27	Strategy	34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."
4.27	Process	39.	We excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.
4.18	Leadership	04.	Our leaders provide support for team efforts.
4.18	HRM	22.	Our quality efforts are helped by training–especially ongoing training and on-the-job training.
4.09	Customer	43.	Our main focus in creating customer value is also creating value for the end-consumer.

impacted this quality culture by creating objective job standards that focused on process improvement, teamwork, and customer satisfaction. Much of the quality efforts were helped by ongoing and on-the-job training.

"Continuous flow manufacturing" and years of other process improvement efforts has yielded world-class results (confirmed by internal quality audits) in reducing process variation, increasing product reliability, and eliminating errors.

Creating customer value involved assessing and satisfying the needs of the end-customer as well as internal customers. All quality effort focused on creating customer value.

4.4 HiTech/Medical

Discussions with presidents of several high-technology companies and with consultants who specialize in technology-based firms compelled the researcher to study HiTech/Medical and HiTech/Internet. This section and the next give within-case analyses of these two business units.

Located in the Southeast USA, HiTech/Medical is a major manufacturer of medical diagnostic units. It has developed every major technological innovation for its core technology and enjoys a world-wide majority market position for its main product line.

HiTech/Medical was a good candidate for this research for several reasons:

- It has won several customer quality awards.

- Its innovations in the Internet and E-mail technologies allowed the researcher to study the possible impact of the Internet and E-mail on quality strategy.
- It has a high percentage of managers with Ph.D.'s, including its two top officers; these managers were very receptive to participating in this Ph.D. research.
- Its managers, especially its quality manager, were open, candid, and receptive to outside research to help them improve their quality efforts.

This company had recently undergone a reorganization to minimize its financial dependence on a European partner. The reorganization had created a more efficient company that was financially independent of its partner. In spite of constraints on its resources, HiTech/Medical had strengthened its quality efforts during this period. Although this company had reduced its work force by forty percent, it continued to develop innovative products and win customer quality awards.

HiTech/Medical manufactures approximately 100 medical diagnostic units a year, with 200 workers and 17 managers. Most of the employees are from the southeast US.

Its quality efforts have focused on research markets and include exceptionally close customer relationships, with customers helping it develop and market its products. Because of the uniqueness of its technologies, HiTech/Medical has experienced very little competition in research markets. It realizes, however, that growth opportunities are in

clinical markets, rather than research markets. HiTech/Medical has undergone a major reorganization to ensure financial stability to move from research markets to clinical markets. These clinical markets are very competitive but are more responsive to successful quality strategies. Therefore, HiTech/Medical's managers are particularly interested in an opportunity to benefit from research that might help them successfully move into clinical markets.

4.4.1 HiTech/Medical: Leadership

The leaders of this business unit successfully influenced others to understand and commit to their long-term corporate visions. A major part of their long-term vision was to shape a quality culture.

Attribute # 1. Our leaders influence others to understand and commit to their long-term corporate visions.

> *** has got a vision that he has conveyed to all of us about what HiTech/Medical can be. We've all, probably all of us here, internalized it and believe it. I don't think that we would still be here if we didn't. *** did a good job of laying out a basic vision and getting us all to buy in to where the product can be. [HiTech/Medical–36]

> This is why I feel that I am here, is to lead us to a set of visions and values. I help us all understand and commit to them. [HiTech/Medical–36]

Attribute # 2. Our leaders help shape a quality culture.

> Quality isn't numbers, it isn't processes, quality is people. Our quality culture is our emphasis on people. *** has always valued our people and that has shaped our quality culture. [HiTech/Medical–36]

This business unit just experienced a major reorganization. One of the successful practices in adjusting to the reorganization was to provide open access to the firm's performance information.

Attribute # 3. Our leaders provide open access to information about the firm's performance.

> *** is honest and open with everybody. His Friday announcements many times give us our financial status. [HiTech/Medical–36]

A major success attribute, especially for this high technology firm, was for leaders to support innovative entrepreneurial activities while keeping the customer in mind.

Attribute # 5. Our leaders provide support for individual entrepreneurial efforts.

> He's continually found ways for them to be creative and do new stuff and there isn't anything an engineer likes better than to do something new and creative. [HiTech/Medical–36]
>
> *** keeps pushing his guys to be innovative and imaginative,

finding new ways to use the technology, and a big chunk of that is getting feedback from the customer into what's working, what's not working. [HiTech/Medical–36]

Attribute # 7. Even though our products are customer-driven, we do a good job at motivating our customers to want our technological innovations.

The features initially come from our customers but we work with other customers to demand a product with those features. They see how it helps them. They want it. [HiTech/Medical–36]

So I don't want to imply that we're trying to do something without being driven by the customer because we have to be customer-driven. We have to have market understanding. What I'm saying is that our unfair advantage in that market is our technical strength and we make the customer want our technology. [HiTech/Medical–21]

Leaders in this business unit supported the "means" of the planning process. Less emphasis was placed on the end result of planning. To the business unit, many of its creative activities came from team problem solving.

Attribute # 8. We place more emphasis on the "means" of planning than on the "ends" of planning.

The goal of most planning is the process of getting the team

> together to discuss, argue, analyze, and reach a consensus. We place more emphasis on the team problem solving and team planning than any solution or plan. [HiTech/Medical–22]

This smaller high-technological firm placed a premium on corporate values being consistent with personal values. Most of the managers felt that producing quality products was consistent with being good members of their communities (local and corporate).

Attribute # 10. We succeed because we make all of our actions accountable to internal and external stakeholders, including our families, our communities, each other, and our religious beliefs.

> Good quality is benefiting individuals, their families, their communities and their religious convictions. We've seen it happen here. It all fits together. [HiTech/Medical–21]

The ability to be flexible and embrace change was supported by managers at all levels. This flexibility was a source of many of the innovative activities.

Attribute # 11. A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.

> *** and *** are the types of leaders who create innovation. They hire the kinds of people who also want to change and be creative. We don't have habits, and we thrive on change. We want to be creative and innovative, so we can't have these preformed ideas.

[HiTech/Medical–24]

Attribute # 13. Our leaders possess flexible leadership styles that adapt to changing environments.

> We had the flexibility of being able to make changes in a hurry, so we went from that mindset and got things done here. [HiTech/Medical–36]

Empowerment of employees at lower levels was part of this flexible leadership.

Attribute # 18. Our leaders empower employees to make decisions at lower levels.

> Leadership can be shared; leadership should be shared. Give them what it takes to make decisions without needing your approval. [HiTech/Medical–36]

This high-technological firm was an example of strong, effective leadership. Its two upper managers were also founders and major financial investors. These two managers possessed high personal ideals that effectively motivated others to understand and commit to their long-term corporate visions. Their ideals included making all of our actions accountable to internal and external stakeholders, including their families, their communities, each other, and their religious beliefs. Their ideals also included providing open access to information about the firm's performance. This open access helped the business unit maintain the morale of its employees during unexpected layoffs.

Success factors were associated with the leaders' ability to support and motivate individual entrepreneurial efforts. Leaders placed more emphasis on the "means" of planning than on the "ends" of planning. Planning discussions and arguments (that is, the "means" of planning) often initiated creative thinking. Creative ideas also came from customer interactions. Even though their products were customer-driven, they often motivated their customers to want their technological innovations. The leaders' flexibility often motivated others to seek innovation and embrace change.

4.4.2 HiTech/Medical: Human Resource Management

Much of the positive comments about the human resource activities were focused at the human resource department being a strong advocate for the rights of employees.

Attribute # 24. Our human resource department relates well to the interests and concerns of our employees.

> *** relates well with all of our employees. That's a real strength. [HiTech/Medical–36]

> *** has added a lot ...she fights or tries to represent us. From an employee's point of view, she is real approachable; people feel comfortable. [HiTech/Medical–32]

Attribute # 25. Our human resource department is a strong advocate for the rights of employees to upper management.

*** fought many battles for our workers. She saw the problem, she had a solution, she pressed it until she got the solution accepted and delivered. [HiTech/Medical–36]

*** had to fight, I think, for some of the things we have gotten. She played a big role. [HiTech/Medical–32]

Also, this business unit expressed positive comments about the importance of keeping employees informed. This was especially important in maintain high employee morale during unexpected layoffs.

Attribute # 27. We excel at how people get and give information–for example, how employees are informed and how employees give suggestions to their managers.

*** meetings have kept us informed of our financial situation. Even when the news was not good, they have kept us informed. [HiTech/Medical–23]

A major strength of this business unit was its ability to match jobs to overall lifestyles of its employees. This was particularly evident for employees who needed extended stays at home.

Attribute # 28. We fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home.

Many of our developers have remote ISDN connections so they can continue their work at home. [HiTech/Medical–32]

> We try to match the jobs to the person. We have several female managers ... some of our best managers .... We are flexible, adaptable for working mothers. [HiTech/Medical–24]

Many of the success factors in human relations came directly from the high personal ideals of the upper managers. These ideas supported efforts to fit jobs to overall lifestyles of employees. These ideals also supported a strong employee advocacy role by the human resource department.

4.4.3 HiTech/Medical: Strategic Quality Planning

Quality improvement strategy was a continuous learning process.

Attribute # 32. Our business unit learns and continually improves quality.

> We are constantly updating our understanding about quality programs, quality systems and values within. We use that knowledge to improve our programs. [HiTech/Medical–36]

The leadership placed a premium on corporate and family values. Quality improvement comfortably conformed with these values.

Attribute #34. Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."

> Feeling good about the quality of our products and knowing they are helping people is what defines our corporate values. Yes, it is having principles, it is having values, it is having the ability to

provide something that someone else wants. That is what it is all about. [HiTech/Medical–36]

The main emphasis of their quality strategy was constant learning and innovating. Because high quality of their medical diagnostic products mean saving lives, their quality strategy fit comfortably with their "corporate values" and their family values.

4.4.4 HiTech/Medical: Process Management

This business unit emphasized simple statistics to monitor, control and improve processes.

Attribute # 35. We use "simple" (easy to use and understand) ways to monitor, control, and improve processes.

> The last three or four months here, we have been doing some very simple step things. There were no statistics here to speak of. It's a run chart of production. And again, nothing more finessing than a run chart, and a two-column count. Sure. Simple, easily understood stuff. [HiTech/Medical–36]

> We are probably a factor of ten simpler than we were five years ago. [HiTech/Medical–22]

Process improvement usually involved benchmarking their processes with the best practices in their industry. They were able to benchmark with the help of their major customers.

Attribute # 38. We continually "benchmark" with the best quality practices in our industry.

> We continually benchmark through some contacts both formal and informal. We also look at market results and market penetration. [HiTech/Medical–36]

A success attribute was to maximize the number of parallel processes.

Attribute # 39. We excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.

> We have a horizontal organization ... lots of parallel processes. [HiTech/Medical–21]

This business unit did not use the traditional process improvement techniques other than simplifying processes and creating as many parallel processes as possible. Previous efforts to bring in quality improvement consultants had achieved only modest success.

4.4.5 HiTech/Medical: Customer Focus

The bottom line key to the success of the business unit was their close customer relationships. Their success was defined by their ability to understand, measure, and create customer value better than their competitors. This ability was directly related to their close customer relationships.

Attribute # 41. We stay close to our customers and suppliers.

I think that there is no substitute for keeping close contact with your customers and suppliers. [HiTech/Medical–22]

Attribute # 43. Our main focus in creating customer value is also creating value for the end-consumer.

With an emphasis on internal customers and no company boundaries, we all know that our bottom line is impacted by the final customer. TQM works only if the final customer values your products. [HiTech/Medical–31]

Attribute # 44. We create customer value better than our competitors.

Every staff person in the company, as you walk down the hall and ask, has been to a customer in the last few months. So I think that getting to know people, getting to know their families, it is amazing how easy it is to get to know somebody ... likes it and is a good customer .... We do that better than anybody else in our industry. The key to creating value is really getting to know the customer. [HiTech/Medical–22]

Attribute # 45. We have an ability to understand and measure customer value.

I think we have a full understanding of the customer, customer value, customer satisfaction. We can measure it. [HiTech/Medical–36]

This business unit enjoyed exceptionally close relationships with customers. They had an excellent ability to understand what their customers wanted and needed and translate those wants and needs into technological innovations.

4.4.6 HiTech/Medical: Information Technology

This business unit attributed some success in relationships with customers and suppliers by their use of the Internet and E-mail.

Attribute # 47. Internet and E-mail has improved communications with customers and suppliers.

> We are in communication directly by E-mail to most of the customers and suppliers. It is a very rapid cycle and that information cycle is very, very important. [HiTech/Medical–22]

> Well, we pioneered the Internet in this area. We exchange large datasets with customers all over Europe. [HiTech/Medical–21]

They also credited the Internet and E-mail for helping to reduce management layers.

Attribute # 50. Internet and E-mail has reduced the need for many management layers.

> We've pancaked the organization ... not many layers. E-mail helps. [HiTech/Medical–21]

Even though this firm pioneered the Internet and E-mail, the researcher noticed only modest evidence that the use of the Internet and E-mail

contributed to the success this business unit's quality improvement programs. A follow-up survey and management team presentation confirmed lackluster benefits of the Internet and E-mail.

4.4.7 HiTech/Medical: Overall

This business unit demonstrated strong leadership where the ideals of its upper managers shaped every business activity. Leaders effectively helped employees understand and commit to their long-term visions. One of their visions was to honestly create good products for their customers. Their main products provided medical diagnostics that saved lives. This was consistent with the CEO's conviction to make all actions accountable to internal and external stakeholders, including families, communities, each other, and religious beliefs.

Leaders indicated that innovation was part of their long-term visions. They also helped employees seek innovation by effectively changing the perception of change-related problems associated with innovation. While leaders supported teams, they also supported individual entrepreneurial efforts to create new products. While many technical innovations resulted from team efforts, several major products and ideas came from highly-motivated individual achievers. Leaders firmly believed that experimenting and learning from mistakes generated innovative breakthroughs.

Leaders showed flexible leadership styles in dealing with the many changes and failures in their high-technology environment. Although the

previously mentioned reorganization initially necessitated tight managerial controls, the managers showed flexibility by conscientiously empowering employees by providing them open access to the firm's performance and allowing them to make decisions at lower levels. Increased empowerment and access to performance helped the firm's transition from a reorganization back to normal operations.

A effective human resources department that related well to the interests of the the employees and advocated for their interests also helped the firm deal with many of the changes in their high-technology environment. The human resource activities also facilitated how employees got information and gave suggestions. This business unit considered the interests of its employees with its efforts to fit jobs to overall lifestyles. Human resource activities were also consistent with leaders' visions to seek innovation and support individual entrepreneurial efforts. Discussions with human resource management and a study of internal human resource surveys and evaluations confirmed that the human resource department sought, recognized, and rewarded entrepreneurial as well as team activities.

HiTech/Medical's quality strategy focused on serving its research customers' need for quality products which give reliable diagnostic results. Its strategy also included providing leading-edge technologies for its research customers. These new technologies generated new and exciting products and features that its customers expected.

Innovation dominated many of its process and customer activities.

Upper managers encouraged experimenting and learning from making mistakes. Mistakes stimulated many of its innovations. The "means" of planning was more important than the "ends" because many new products have come from experimental means.

Process management activities included limited use of statistics. Many of the traditional process management activities to reduce variation and eliminate errors in stable processes were not appropriate for this business unit's innovative processes. Many of the processes associated with its leading-edge technologies were continually changing. However, it was able to achieve some parallel processing and assess process performance with "simple" (easy to understand) measures.

Innovation activities significantly influenced customer relations. This business unit was very close to its customers, entering into joint ventures and co-marketing agreements with its major customers. It better understood and created value for its end-consumers than its competitors. Some of this customer value was defined in terms of creating innovative products. Many of its research customers expected innovative features. HiTech/Medical was able to motivate many of its research customers to want its technological innovations. Customer activities included searching for new customer markets and creating new customers in existing markets, as well as measuring, understanding, and creating value for existing customers. Although HiTech/Medical was successful in research markets, this business unit was venturing into highly competitive (and riskier)

clinical markets.

This business unit also mentioned that E-mail and the Internet had improved communication with customers and suppliers and helped reduced management layers. E-mail and the Internet helped the researcher communicate with most of the managers of this business unit. Except for one manager who did not use E-mail, the researcher administered the follow-up survey to the managers using E-mail.

4.4.8 HiTech/Medical: Highest Rated Attributes

Table 4.9 shows that the top rated attribute addressed "leadership" and "personal characteristics" that "motivates us to seek innovation." This attribute was consistent with leaders' ability to influence others to commit to their corporate visions. This business unit reflected the visions of its top leaders. The fact that these attributes rated highly says that employees believe that their innovative efforts relate to their success. Employees also believe that leaders effectively influence them to understand and commit to the leaders' visions.

Several data sources provided the researcher evidence of HiTech/Medical's ability to motivate customers to want its innovations. For example, the researcher noticed this motivation in video tape testimonials by satisfied customers and in newspaper articles reporting customer reactions to HiTech/Medical's products.

It is noteworthy that HiTech/Medical rated highly its ability to fit jobs to overall lifestyles as an attribute important to its quality efforts. This

Table 4.9: Ten Highest Scoring Attributes: HiTech/Medical

Score	Construct	#	Attribute
4.24	Leadership	11.	A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.
4.06	Leadership	01.	Our leaders influence others to understand and commit to their long-term corporate visions.
4.06	Leadership	07.	Even though our products are customer-driven, we do a good job at motivating our customers to want our technological innovations.
4.06	HRM	28.	We fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home.
4.00	Customer	41.	We stay close to our customers and suppliers.
3.94	Customer	44.	We create customer value better than our competitors.
3.76	Strategy	34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."
3.76	Leadership	5.	Our leaders provide support for individual entrepreneurial efforts.
3.76	Leadership	13.	Our leaders possess flexible leadership styles that adapt to changing environments.
3.71	Customer	43.	Our main focus in creating customer value is also creating value for the end-consumer.

attribute reflected its support of families.

One also notices support of individual effort is mentioned but teamwork is not in the ten highest scoring attributes. This suggests that in innovative firms, individual entrepreneurial efforts are important. This was confirmed by performance appraisal forms. Conversations with liaison managers confirmed that while many innovations came from team efforts, several highly creative individuals contributed greatly to their product development efforts.

Flexible leadership came out of several data sources. This leadership quality was important because leaders needed to respond rapidly to the quickly changing high-technology environments.

Four of the ten highest scoring attributes address customer value. This business unit had extremely close relationships with its customers. These relationships included joint ventures, co-marketing, and co-developing ventures with customers.

Although this business unit was an Internet pioneer, no information technology attribute made the top-ten list attributes. A liaison manager pointed out that the Internet technology is new and its potential is not yet understood.

4.5 HiTech/Internet

Located in the southeastern US, HiTech/Internet is a developer of imaging hardware and software. It is now focusing on Internet imaging software. Its

unique software provides important new Internet capabilities that are causing much excitement among computer software and hardware companies.

HiTech/Internet was a good candidate for this research for several reasons:

- It won "R & D 100" and "NASA SBIR (Small Business Innovation Research) technology of the year" awards and is also partially owned by a Malcolm Baldrige Quality Award winner.
- Its focus on Internet technology allowed the researcher to study the Internet and E-mail as components of quality strategy.
- Its founder/CEO has a Ph.D., has participated in management training, and was very receptive to committing his firm to this research.
- Its managers were refreshingly independent and candid, and were amenable to supporting research that might help them improve their future quality efforts.

HiTech/Internet will manufacture approximately 10,000 units a year, with 50 employees and 7 managers. Most of the employees are from the southeastern US.

Because of the uniqueness of its technology, HiTech/Internet dominates its markets with minimal competition. Its managers were interested in an opportunity to benefit from quality research that might help them contend with future competition.

4.5.1 HiTech/Internet: Leadership

This business unit had recently undergone major reorganization. They, in essence, transformed into an entirely different company. They initially had been a hardware company providing software to support the hardware. They transformed into an Internet software company.

Rather than comment on past quality efforts, the managers of this business unit focused on success attributes that made this transformation possible. All of the managers interviewed emphasized their ability to hire talented, creative people and provide an atmosphere that fostered their creativity. Their CEO was the impetus behind most creative activities. He was the embodiment of creative energies and he surrounded himself with other creative talent. Many of their success attributes centered around their leaders' ability to support entrepreneurial efforts.

Attribute # 5. Our leaders provide support for individual entrepreneurial efforts.

> We have ... an arrangement whereby people for their team activities will be evaluated for creation activities. We support teams and individuals who come up with new ideas.
> [HiTech/Internet-41]

A major part of their effective leadership was an ability to create an atmosphere where employees could freely express their ideas and opinions.

Attribute # 9. We create an environment where employees freely express ideas and opinions–that is, an environment to freely

challenge the "status quo."

> Its written in our mission statement that we're encouraging people to argue and to question the "status quo." [HiTech/Internet–43]

> The fact that you can go and sit across the room from the CEO and argue your point and it be 180 degrees from him. If you have a valid point, then it doesn't diminish his opinion of the person, doesn't become a personal issue. [HiTech/Internet–43]

This firm viewed quality in terms of systems that provide reliable software to satisfy customers' needs. Leaders were the systems designers. Because customer needs were constantly changing, leaders supported entrepreneurial efforts and played a major role in generating customer needs and demands.

4.5.2 HiTech/Internet: Human Resource Management

Their ability to find talented, creative people was a major success attribute.

Attribute # 23. We excel at job analyses, selection of the best candidates, and performance appraisal.

> I'll have to say the best thing we have going for us is the people we have. We have incredibly talented people, bright, flexible, hard working, enthusiastic people. I have heard one of the most difficult challenge for a company is finding good people. That is

> the key factor in success. We are good at getting the best people and getting the best work from them .... [HiTech/Internet–40]

> We do a pretty good job at performance appraisals. We look at each person's part in our quality systems. Leadership, teamwork, and customer satisfaction are part of the performance appraisal. [HiTech/Internet–40]

They excelled at recognizing and fostering the creative efforts of these talented people.

Attribute # 30. Our recognition system recognizes employees for contributing to customer value.

> We recognize them for customer satisfaction. These guys would rather have *** come buy and shake their hand in their office in private and say "you did a really good job." [HiTech/Internet–43]

The recognition system focused on being creative. Creating customer value involved new tools and capacities to their customers.

Because this business unit was last to be interviewed, many of the success attributes under processes, customers, and strategies were mentioned in previous business-unit discussions. Also, because HiTech/Internet was entering entirely new markets with new products, the managers felt that their processes, customers, and strategies were in flux.

4.5.3 HiTech/Internet: Overall

Practically everything about this business unit was changing. When the researcher started interviewing HiTech/Internet, it was a hardware company; when he finished the interview process, it was a software company. During his investigation, some products, some processes, some strategies, and some customers changed. Its leaders, its basic core values, its dominant software product, its most important customers, and the visions of its leaders did not change.

Because of the transition, interview data were not as plentiful as the data from the other business units. However, the data from HiTech/Internet were important because this business unit's basic core values (and strengths) did not change. A liaison manager and a consultant to high technology firms confirmed that the data were important. Both sources stated that the interview data should not be discounted because HiTech/Internet was making major changes. Its situation represented the volatility that they had seen in many high technology environments.

Leaders of HiTech/Internet emphasized their ability to explore new areas and provide customers new software tools. Leaders also stressed their ability to learn from mistakes and to turn mistakes into new products. Leaders (and all employees) displayed a remarkable flexibility and resilience during this transition. Many employees, including some of its top leaders, changed their job responsibilities during the transition to prevent lay-offs.

Human resources activities focused on identifying and hiring creative

skills and supporting creative resources in people. Their recognition and reward systems all focused on individual entrepreneurial as well as team activities.

Processes management emphasized experimentation rather than decreasing error rates. While producing reliable customer solutions was important, producing novel customer solutions was a major reason for this business unit's success.

HiTech/Internet's customer mix was constantly changing. The two top leaders undertook major efforts to find new customers, test customer's needs, and influence customers as well as assess the needs of existing customers.

The researcher saw several new financial partnerships form with major customers. One financial arrangement provided funds to relocate their corporate headquarters.

4.5.4 HiTech/Internet: Highest Rated Attributes

As one looks at the the highest rated attributes in Table 4.10, one notices the importance of leaders' ability to create a quality culture by influencing others to understand and commit to their long-term visions. Quality improvement was part of their overall business strategy.

Leaders nurtured quality efforts by empowering of employees with the financial resources to do their jobs with minimal need for management approval. They also encouraged free expression of ideas and fostered challenges to the "status quo."

Table 4.10: Ten Highest Scoring Attributes: HiTech/Internet

Score	Construct	#	Attribute
4.33	Leadership	2.	Our leaders help shape a quality culture.
4.17	Strategy	31.	Quality improvement is an important part of our overall business strategy.
4.17	Leadership	9.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
4.17	Leadership	19.	Our leaders empower employees with the financial resources to do their jobs with a minimal need for management approval.
4.00	Leadership	01.	Our leaders influence others to understand and commit to their long-term corporate visions.
4.00	Customer	43.	Our main focus in creating customer value is also creating value for the end-consumer.
4.00	Strategy	33.	We have a strong culture that focuses on continually improving quality.
4.00	HRM	22.	Our quality efforts are helped by training–especially ongoing training and on-the-job training.
3.83	Stragegy	34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."
3.83	Leadership	3.	Our leaders provide open access to information about the firm's performance.

Several attributes that did not come out of the survey were confirmed by other data sources, including their ability to look for and hire creative innovative employees. Their customer relations were extremely close. They formed joint ventures with and made major investments in HiTech/Internet. After the researcher finished collecting data, a major cable channel invested in this business unit.

It is interesting that no E-mail and Internet attribute made the list. Although this firm offers Internet products, several managers indicated in informal conversations that the Internet's' potential for helping quality strategy will come later.

Chapter 5

Cross-Case Analysis

The researcher followed Eisenhardt's (1989a, p. 540) recommendation to "become intimately familiar with each case as a stand-alone entity" and allow the "unique patterns of each case to emerge" before they "push to generalize patterns across cases."

Looking at each business unit individually, Chapter 4 analyzed within each case. Comparing the business units, this chapter analyzes across the cases. To minimize the reader's difficulty, Chapter 4 presented aggregate constructs and attributes before it presented detailed quotes. This chapter uses a similar organization for within-case analysis. It starts by analyzing constructs across business units, it then analyzes within constructs, and finally discusses overall themes. It strengthens the analysis by presenting feedback from management-team presentations and liaison-manager discussions, and external-reviewer comments.

Most of the cross-case themes came from interviews, were assembled before the follow-up survey, and are consistent with many of the literature

sources in Chapter 6. Innovation themes also came from the interviews. These themes help explain differences between Elec and HiTech business units. They also help explain the contradictions with the extant literature.

A unifying framework from this research at the end of this chapter ties together this research effort. It also provides a model for future research. (See Section 7.5.)

5.1 Cross-Case Construct Analysis

The follow-up survey was added to this research project to strengthen the interview data. The small sample size of forty-three managers prevents using factor analysis to study the constructs. The small sample size also prevents using analysis of variance to infer associations among the attributes or constructs. However, the researcher is able to find interesting relationships by analyzing the ratings of attribute scores within constructs across the four business units. The high rated individual attributes also provided important information.

Table 5.1, Figure 5.1, and Figure 5.2 show the average attribute scores within constructs across the four business units. Table 5.2 shows the highest rated attributes from the survey. Tables 4.7 through 4.10 show the highest rated attributes for each of the business units.

Table 5.1, Figure 5.1, and Figure 5.2 show that strategic quality planning is the highest rated construct for all four business units. This is consistent with the fact that, in most of the interviews, managers

Table 5.1: Overall Survey Results

Construct	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int	Construct Avgs
Strategic Quality Planning	4.5	4.4	3.5	3.9	4.0
Customer Focus	4.2	3.8	3.5	3.4	3.7
Leadership	4.0	3.7	3.4	3.4	3.6
Process Management	4.0	3.7	3.0	3.3	3.5
Human Resourse Management	3.9	3.4	3.2	3.2	3.4
Information Technology	3.0	2.2	3.1	3.3	2.9
Grand BU Avgs	3.9	3.5	3.3	3.4	3.5

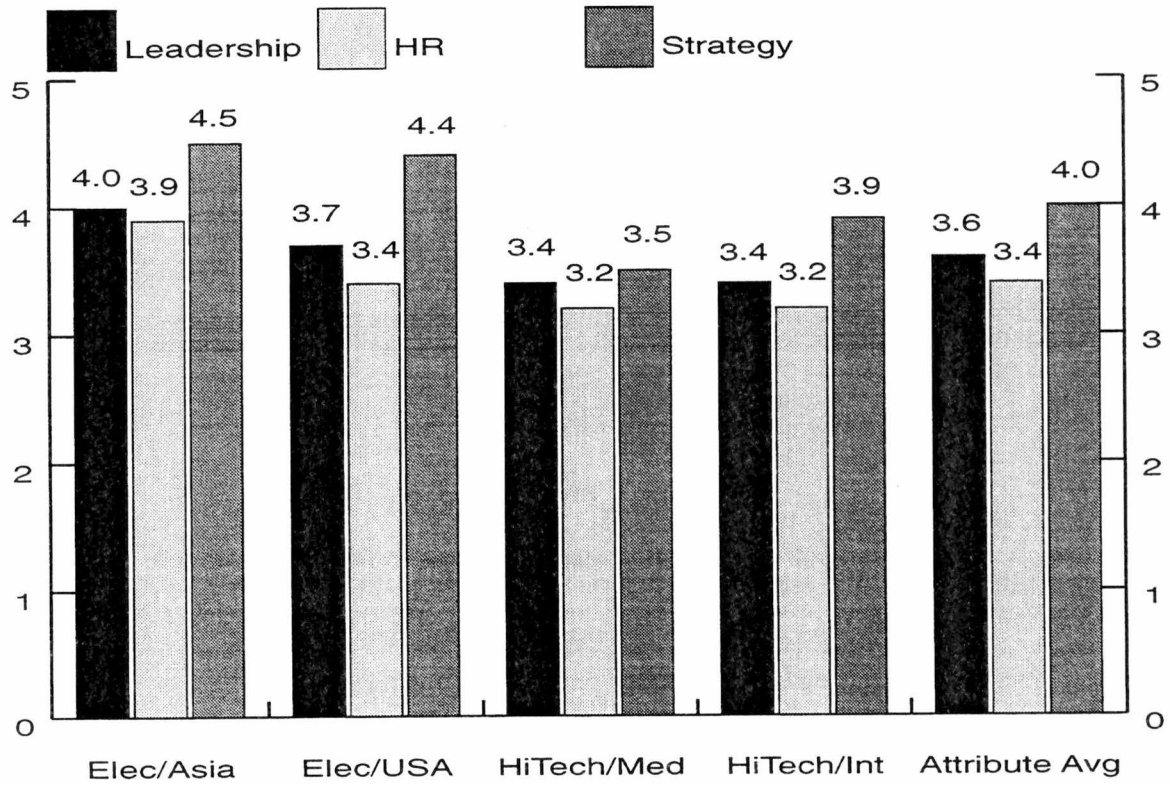


Figure 5.1: Cross-Case Survey Results

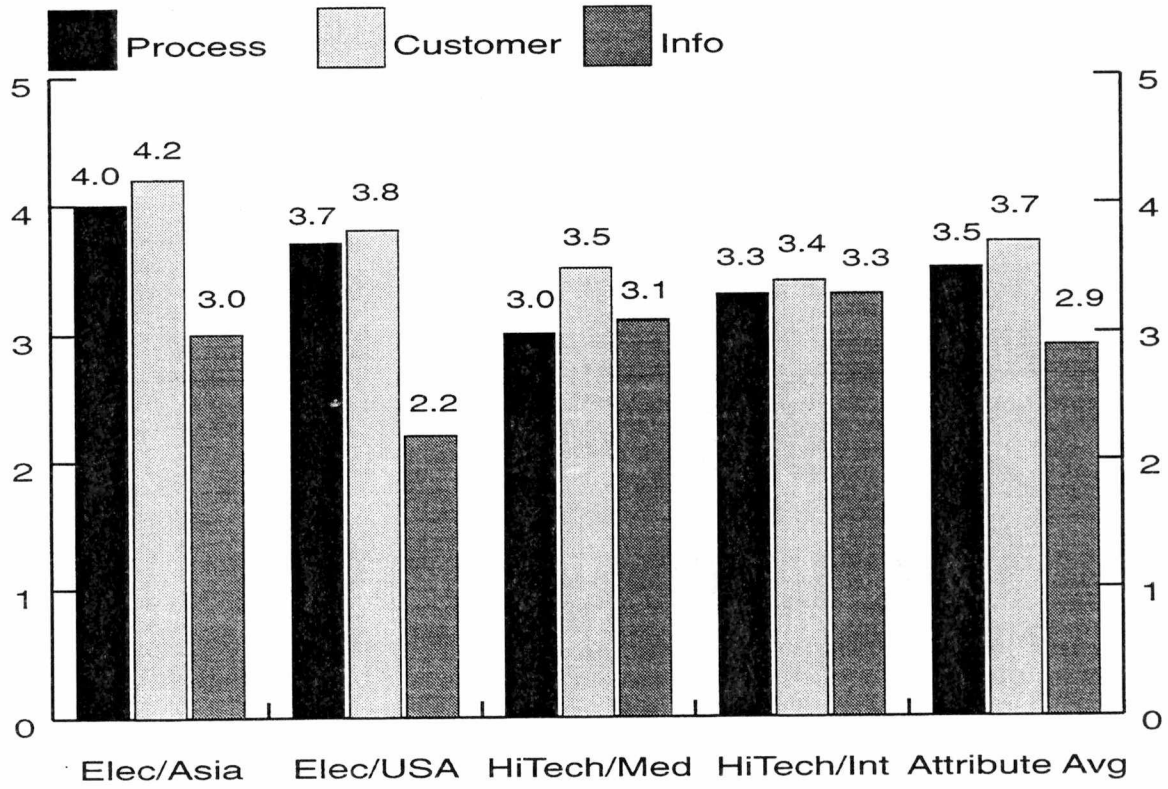


Figure 5.2: Cross-Case Survey Results (Continued)

Table 5.2: Ten Highest Scoring Attributes: All Business Units

Score	Construct	#	Attribute
4.14	Strategy	31.	Quality improvement is an important part of our overall business strategy.
4.14	Leadership	11.	A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.
4.05	Customer	41.	We stay close to our customers and suppliers.
4.02	Leadership	09.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
4.00	Strategy	32.	Our business unit learns and continually improves quality.
3.98	Leadership	01.	Our leaders influence others to understand and commit to their long-term corporate visions.
3.98	Strategy	34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."
3.95	Strategy	33.	We have a strong culture that focuses on continually improving quality.
3.93	Customer	43.	Our main focus in creating customer value is also creating value for the end-consumer.
3.91	Leadership	02.	Our leaders help shape a quality culture.

emphasized the importance of strategic quality planning. Many managers said that quality improvement strategy drove other quality systems:

- They chose their leaders to match their quality strategy.
- Quality strategy determined their human relations policies.
- Quality strategy controlled how they managed their processes.
- Quality strategy influenced their potential use of information technology with customers and suppliers.
- Quality strategy dominated their focus on creating value for customers.

Table 5.2 shows that the highest scoring attribute across all business units says that "quality improvement is part of our overall business strategy." Four of the top ten scoring attributes are part of the construct "strategic quality planning."

Table 5.1, Figure 5.1, and Figure 5.2 show that customer focus is the second highest rated construct for all four business units. All of the data sources including the interviews confirmed that creating customer value was the major focus of most quality efforts. Table 5.2 shows that two of the top rated attributes are part of the construct "customer focus."

Table 5.1, Figure 5.1, and Figure 5.2 show that leadership is the third highest rated construct for all four business units. All of the data sources, including the interviews, confirmed that leaders are "systems designers" who impact quality systems. Table 5.2 shows that four of the top rated attributes are part of construct "leadership."

Table 5.1, Figure 5.1, and Figure 5.2 show that information technology is the lowest rated of all of the constructs. Many managers talked about E-mail and the Internet's potential but most felt its impact on quality strategy will come in the future. Table 5.2 shows that none of the ten top rated attributes included attributes that were part of the construct "information technology."

Table 5.2 also shows that none of the process management attributes were in the top ten list. Table 5.1, Figure 5.1, and Figure 5.2 show that process management was rated higher for the Elec business units than for the HiTech business units. Tables 4.7 through 4.10 show high rated process management attributes with the Elec business units but none with the HiTech business units. This is consistent with the possible moderating effects of innovation on the construct "process management" (see Sections 6.2.2 and 7.5).

Table 5.1, Figure 5.1, and Figure 5.2 show that human resource management was the second lowest rated construct. Table 5.2 also shows that none of the human resource management attributes were in the top ten list. A scan of Tables 4.7 through 4.10 shows several highly rated human resource management attributes. These tables and figures provide no evidence that other attributes scored higher than human resource management in the overall top ten list. All data sources supported the importance of human resource management in quality strategy.

Table 5.3 provides an important profile of the business units. The

Table 5.3: Overall Survey Rankings

Construct	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int	All
Strategic Quality Planning	1	1	1.5	1	1
Customer Focus	2	2	1.5	2.5	2
Leadership	3.5	3.5	3	2.5	3
Process Management	3.5	3.5	6	4.5	4
Human Resourse Management	5	5	4	6	5
Information Technology	6	6	5	4	6

construct order for both Elec business units is identical. This is consistent with the fact that they both have the same parent company. Quality audits from both business units showed very similar quality strategies.

Table 5.3 also shows that the order of the three highest ranked constructs is the same across all four business units. It is remarkable that the construct order for strategic quality planning, customer focus, leadership, and human resource management is the same across all four business units. Also, the order of process management and information technology is the same for the two HiTech business. These similarities in constructs could be consistent with the fact that all four business are pursuing quality improvement strategies. The similarities in the process management/information technology order could reflect similarities between the two high-technology firms.

Tables 4.7 through 4.10 confirm some of the evidence in Table 5.3. Both Elec business units show strategic quality planning attributes # 31, # 32,

and # 33 in their top ten lists. Both Elec business units also have leadership attribute # 9 and human resource attribute # 21 in common. These common attributes are consistent with the fact that both business units have similar quality improvement strategies.

These cross-case comparisons indicate that the relative importance of the major constructs is nearly identical across the four business units. This further demonstrates the importance of these constructs in the quest for quality.

5.2 Within-Construct Analysis

The researcher was able to find many interesting relationships by looking at the rankings of the attributes within the constructs. Many of these relationships give added insight into the quality efforts of the four business units.

Table 5.4 shows the rankings of the attributes within the construct "leadership." Analysis of this table gives the following information:

- No universal attribute ranked highly by all business units.
- Although "quality culture," "challenge status quo," (# 9.) and "seek innovation" (# 11.) are ranked highly on three of four business unit's, only HiTech business units ranked "vision" (# 1.) in their top five.
- Only Elec business units ranked "team efforts" (# 4.) and "crisis" (# 15.) highly.

Table 5.4: Within-construct Rankings: Leadership

#	Attributes	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
1.	Our leaders influence others to understand and commit to their long-term corporate visions.			2.5	3
2.	Our leaders help shape a quality culture.	1.5	4.5		1
3.	Our leaders provide open access to information about the firm's performance.		4.5		4
4.	Our leaders provide support for team efforts.	6	2		
5.	Our leaders provide support for individual entrepreneurial efforts.			4.5	
6.	Many innovations result from our firm's ability to take advantage of our cultural diversity.				
7.	Even though our products are customer-driven, we do a good job at motivating our customers to want our technological innovations.			2.5	
8.	We place more emphasis on the "means" of planning than on the "ends" of planning.				
9.	We create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."	3.5	1		2.5
10.	We succeed because we make all of our actions accountable to internal and external stakeholders, including our families, our communities, each other, and our religious beliefs.				
11.	A combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.	1.5	4.5	1	
12.	Our diverse mix of leadership styles helps us quickly adapt to changing environments.	6			
13.	Our leaders possess flexible leadership styles that adapt to changing environments.			4.5	
14.	Our leaders create incentives for change by changing others' perceptions of problems to create a willingness to change.				
15.	Our firm has a healthy "sense of urgency" due to our condition of crisis management.	6	4.5		
16.	We have increased competencies, increased awareness, increased energy, and increased desire–simply put, increased productivity–due to our condition of crisis management.				
17.	Empowerment has helped minimize the disruptive effect of management changes.	3.5			
18.	Our leaders empower employees to make decisions at lower levels.		4.5		
19.	Our leaders empower employees with the financial resources to do their jobs with a minimal need for management approval.				2.5
20.	Empowerment has reduced time pressures on managers, allowing employees to have easier access to them.				

- Elec/USA's leaders ranked higher on "openness" and bottom-up ideas; Elec/Asia is similar but is more leader-driven, less team-driven.
- HiTech/Medical had three highly ranked items not ranked highly by other business unit's.

Table 5.5 shows the rankings of the attributes within the construct "human resource management." Analysis of this table gives the following information:

- "Objective job standards" (# 21.) is the only highly ranked attribute across all four business units.
- Elec business units rank "process improvement" (# 21.) higher than HiTech business units.
- HiTech business units rank "selection of the best candidates" (# 23.) higher.
- HiTech/Medical ranks highly the attributes dealing with treating employees well.
- Recognition ranked highly for three out of four business units.
- Elec/USA and HiTech/Internet have remarkably similar rankings.

Table 5.6 shows the rankings of the attributes within the construct "strategic quality planning." Analysis of this table gives the following information:

- "Part of our overall business strategy" (# 31.) ranked highly for all business units.

Table 5.5: Within-construct Rankings: Human Resource Management

#	Attributes	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
21.	We have objective job standards that focus on process improvement, teamwork, and customer satisfaction.	1	1	4.5	4
22.	Our quality efforts are helped by training–especially ongoing training and on-the-job training.	2.5	2		1
23.	We excel at job analyses, selection of the best candidates, and performance appraisal.			4.5	2.5
24.	Our human resource department relates well to the interests and concerns of our employees.			2.5	
25.	Our human resource department is a strong advocate for the rights of employees to upper management.			2.5	
26.	We emphasize "follow-up" in all of our human resource activities.	4			
27.	We excel at how people get and give information–for example, how employees are informed and how employees give suggestions to their managers.	5	3.5		
28.	We fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home.			1	
29.	Our reward system rewards employees for contributing to customer value.		3.5		5
30.	Our recognition system recognizes employees for contributing to customer value.	2.5	5		2.5

Table 5.6: Within-construct Rankings: Strategic Quality Planning

#	Attributes	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
31.	Quality improvement is an important part of our overall business strategy.	2.5	2	2	1
32.	Our business unit learns and continually improves quality.	2.5	2	3	4
33.	We have a strong culture that focuses on continually improving quality.	1	2	4	2
34.	Quality improvement is a way of honestly creating good products that are consistent with our "corporate values."	4	4	1	3

- Rank order of all strategy attributes is similar for both Elec business units.
- "Honestly creating good products" (# 34.) ranked the highest for HiTech/Medical, ranked lowest for other business units.
- "Strong culture" (# 33 .) ranked the lowest for HiTech/Medical, ranked the highest for other business units.

Table 5.7 shows the rankings of the attributes within the construct "process management." Analysis of this table gives the following information:

- Elec business units ranked "'simple' ... ways to ... improve processes" (# 35.) highest.
- HiTech business units ranked "organize our processes around outcomes" (# 36.) highest.
- Elec/USA ranked "parallel process activities" (# 39.) dramatically higher than other business units.
- "Benchmarking" (# 4.) was ranked similarly across all business units.
- "Training standardization" (# 40.) was ranked last across all business units.

Table 5.8 shows the rankings of the attributes within the construct "customer focus." Analysis of this table gives the following information:

- "Stay close to customers and suppliers" (# 41.) attribute is ranked high across all business units.

Table 5.7: Within-construct Rankings: Process Management

#	Attributes	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
35.	We use "simple" (easy to use and understand) ways to monitor, control, and improve processes.	1	2	3	4
36.	We organize our processes around outcomes–versus tasks or departments.	2	5	1	1
37.	We find the root causes of systems problems.	3.5	4	2	2.5
38.	We continually "benchmark" with the best quality practices in our industry.	3.5	2	4	2.5
39.	We excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.	5	1	5	5
40.	We minimize human sources of process variation by training standardization.	6	6	6	6

Table 5.8: Within-construct Rankings: Customer Focus

#	Attributes	Elec/Asia	Elec/USA	HiTech/Med	HiTech/Int
41.	We stay close to our customers and suppliers.	1	2	1	3
42.	We have customer-driven versus a technology-driven products.	4	6	6	6
43.	Our main focus in creating customer value is also creating value for the end-consumer.	4	1	3	1
44.	We create customer value better than our competitors.	6	4	2	4
45.	We have an ability to understand and measure customer value.	4	5	4	5
46.	Our leaders plan and continually improve processes to promote customer value.	2	3	5	2

- "Customer-driven versus ... technology-driven" (# 42.) attribute has similar low ranking across all business units.
- "Create customer value better than competitors" (# 44.) has low rankings for all business units except HiTech/Medical.
- "Ability to understand and measure customer value" (# 45.) attribute has similar rankings across all business units.
- "Creating value for the end-consumer" (# 43.) attribute is ranked highly for Elec/USA and HiTech/Internet, who sell primarily to end-consumers.

This within-construct analysis shows that firms are different in the particular attributes that contribute the most to quality. This is consistent with the systems principle of *equifinalify*, that there are many "means" to achieve a particular "end." (See Section 6.1.3.)

5.3 Cross-Case Themes

The interviews uncovered success attributes which fell into six distinct categories:

- leadership,
- human resource management,
- strategic quality planning,
- process management,
- customer focus, and

- information technology.

These categories coincide with the main constructs developed in Chapter 4 which will be further explored in Chapter 6's literature review.

Because all four business units were selected for their documented quality strategy success, (see Section 3.2) the attributes describing their quality strategy are assumed to be "success attributes." Also, because the researcher's explicit goal was to explore success attributes, he started most interview sessions with the statement, "tell me why your quality program is successful." Managers in the management-team presentations, liaison managers, and external reviewers agreed with this assumption. Section 7.2 discusses the limitations of this assumption.

The researcher found several themes across all four business units before conducting a follow-up survey. The researcher also listed these themes before he surveyed the literature; however, agreement with the literature sources increased the reliability of these themes. (See Section 6.2.3 for more detailed discussions on agreement with extant literature.)

It was no surprise that many of the cross-case themes coincided with success attributes. Part of the reason for conducting a follow-up survey was to increase the reliability of the interview data. Below is a list of cross-case themes:

- All of the managers viewed their strategic quality planning as the most important part of their quality success. Their quality strategy determined, for example, the types of leaders they chose, the human

resource polices they developed, the ways they changed their processes, and the extent to which they focused on customer satisfaction.

- Effective strategic quality planning included quality improvement as part of the overall business strategy. Effective quality strategy was a process of continuous learning and continuous improvement that was deeply part of the corporate culture. Its principles were consistent with the corporate and personal values "of honestly creating good products."
- All of the managers viewed their companies as systems. All attributes for success in quality improvement were attributes which improved quality-related systems.
- The constructs of leadership, human resource management, strategic quality planning, process management, customer focus, and information technology (to a lesser extent) all contributed to the success of quality improvement programs.
- All of the managers viewed leaders as "systems designers" who could influence human resource management, strategic quality planning, process management, information technology, and customer focus. Leaders could bring about changes to the quality culture by changing others' perceptions of change. Effective leaders possessed personal characteristics and flexible leadership styles which motivated and empowered others to embrace change.

- Human resource management activities were very important to the success of quality strategy. Human resource activities were part of overall quality systems. Effective human resource activities included objective job standards, training, selection, job analyses, follow-up, reward systems, and recognition systems. Effective human resource departments related well to the interests of the employees and represented those interests to upper management. They also facilitated the ways employees got and gave information.
- The end result of all quality improvement activities was improving customer satisfaction. Effective customer focus meant being close to customers and suppliers, being able to understand and measure customer value, and being better at creating customer value than competitors.
- Effective process management included using "simple" (easy to use and understand) ways to monitor, control, and improve processes. Effective process management also included organizing processes around outcomes, finding root causes to systems problems, and benchmarking with the best quality practices.
- Information technology was discussed by all four business units as contributing to their success. Internet and E-mail was described as improving communications with customers and suppliers, reducing functional barriers and management layers, and contributing to process design improvement. The researcher was able to see modest

tangible benefits from the use of the Internet and E-mail, especially for the two business units who were E-mail and Internet innovators (HiTech/Medical and HiTech/Internet).

The researcher discussed these overall themes with the liaison managers in formulating the follow-up survey. Section 5.6 further elaborates on liaison-manager discussions and external-reviewer comments.

5.4 High Scoring Attribute Analysis

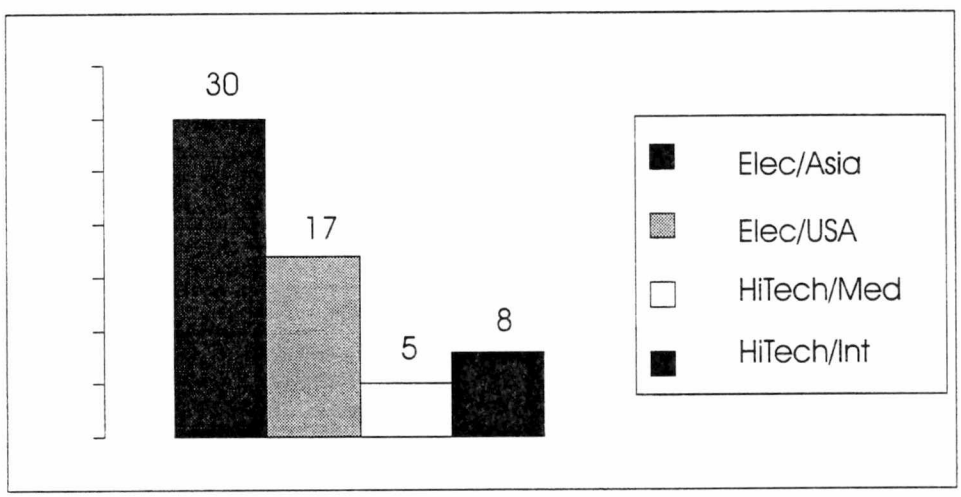


Figure 5.3: Number of Attributes Averaging "4" or Higher

Figure 5.3 shows the number of attributes averaging "4" or higher in the follow-up survey. The graph shows that Elec/Asia had thirty attributes that rated between "agree" and "strongly agree" when the managers answered the question: "Given that the 50 statements are success

attributes, how strongly do you feel that each attribute exists in your organization?" This graph shows that Elec/Asia scored higher than Elec/USA and that the Elec business units score higher than the HiTech business units.

When comparing the two Elec business units, an initial reaction was to relate the number of high scoring attributes to success in quality strategy. After carefully looking at all data sources and talking to liaison managers, the researcher did not infer significant differences in quality strategy between the two Elec business units. As mentioned earlier, the researcher did not see differences in leadership styles between the two business units. The only perceived difference between the two business was labor costs, which was beyond the scope of this study. Both business units were very positive about their quality programs, but Elec/USA had labor cost pressures that may have dampened the survey responses. There were rumors of a reorganization that would move some of Elec/USA's manufacturing to a location with lower labor costs. If quality success were measured in terms of the success attributes, there were no significant differences between the two business units. There were no significant differences in customer focus. Cost of quality differences were beyond the scope of this study.

When comparing the two Elec business units with the two HiTech business units, the researcher noticed innovation attributes in the high technology firms that were not captured in the survey. Innovation may have

had a moderating effect on the other constructs. Innovation is discussed in Section 5.7.

5.5 Management-Team Presentations Feedback

The researcher presented preliminary interview results to all four business-unit management teams. He also presented survey results to the three US business units.

Discussions with liaison managers, external reviewers, and management teams (after management-team presentations) gave the researcher the following interpretations of the survey results:

- The success attributes captured *the success* (according to the managers) at Elec/Asia. The survey results were consistent with a recent internal quality audit. Although information technology scored lower than the other constructs, the managers at Elec/Asia felt that future success in quality efforts would be helped by their use of the Internet and E-mail.
- The success attributes captured the success at Elec/USA. The survey results were consistent with a recent quality audit done by a "big six" consulting firm. The lower scores for information technology expressed the frustration the managers had with the parent company's inability to quickly bring the company online with the Internet. Lower scores in human resource management expressed a frustration with the human

resource department's ability to adequately fight for the rights of employees. Recent reorganizations had left employees frustrated that their interests were only moderately being considered by corporate management.

- The success attributes "fairly well" captured the success at HiTech/Medical and HiTech/Internet. Even though many of the attributes came from interviews at these high technology firms, follow-up discussions later indicated that there were other attributes for success that were *not* captured in the survey. See Section 5.7.
- The low score for information technology reflected the fact that, although all of the business units saw great potential in the Internet and E-mail, none of the business units had realized significant success from the new technologies.

5.6 External-Reviewer and Liaison-Manager Feedback

In this research effort, the researcher worked with liaison managers, consultants, external reviewers (including members of the Ph.D. dissertation committee), and the dissertation committee chairman. Liaison managers set up the interview sessions and helped the researcher understand the interview data. They provided the researcher all other sources of data. They also helped the researcher fine-tune the wording of the follow-up survey. Liaison managers at Elec helped the researcher

understand possible differences in high scoring attributes shown in Figure 5.3. Liaison managers and consultants helped the researcher understand possible differences in high scoring attributes shown in Figure 5.3 and the possible effect of innovation.

Suggestions by external reviewers helped the researcher craft the initial interpretations of the data into credible research. Suggestions from the reviewers included the following:

- help with the wording of survey items,
- advice on overall themes coming from business units,
- suggestions on ways to present survey results to business unit managers,
- suggestions for improvement of dissertation proposition topics,
- help with translation of manager quotes into survey items,
- suggestions for construct development including fitting the success attributes into constructs,
- suggestions for improving Cronbach's α calculations,
- suggestions for improving cross-case comparisons, and
- suggestions for improving the unifying framework.

5.7 Innovation Themes

The survey results and follow-up discussions with liaison managers and consultants indicated that there were success attributes in the high

technology firms that were not captured in the survey. (See Section 5.1.)

The researcher discovered many of the attributes described in Section 6.1.9.

The researcher noticed that innovation moderated the constructs of leadership, human resource management, strategic quality planning, process management, customer focus, and information technology systems in the high technology business units.

In the high technology firms, the researcher noticed the following:

- Leadership focused on enhancing experimentation as well as decreasing error rates.
- Customer focus meant looking for new customers, changing customers' needs, or testing customers' needs, as well as assessing and responding to customers' needs.
- Process management meant experimenting and making mistakes. Systems were often not stable; traditional process management tools were often not appropriate.
- Human resource activities focused on finding and motivating creative people. Entrepreneurial activities were recognized and rewarded as well as team activities.
- The "means" was more important than the "ends" in strategic quality planning because the "means" was often the source of innovations.
- Relationships with customers were extremely close, often forming joint ventures.

- Strategy history was dominated by resilience from reorganizations resulting from previous (sometimes risky) ventures.

The above attributes presented opportunities for future theory testing. (See Sections 6.2.2 and 7.5.)

5.8 Unifying Framework

Figure 5.4 indicates the relationships that came from this research. All of the constructs were part of quality systems. Strategic quality planning drove the other constructs. The end result was customer focus. Although financial performance was mentioned, customer focus was the dominant measure of success in quality improvement strategy. Although flows could go in both directions, the arrows indicate the primary directions of activities. This model is also consistent with the survey results in Section 5.1.

Innovation as a moderation variable explained many of the attributes discussed in Section 5.7.

This model was discussed with several liaison managers who agreed that it captured their quality strategy programs. The strengths of the relationships are left for others to test. Section 7.2 discusses the limitations of this model.

Chapter 7 summarizes the findings in this research and provides propositions for others to test. (See Section 7.5.)

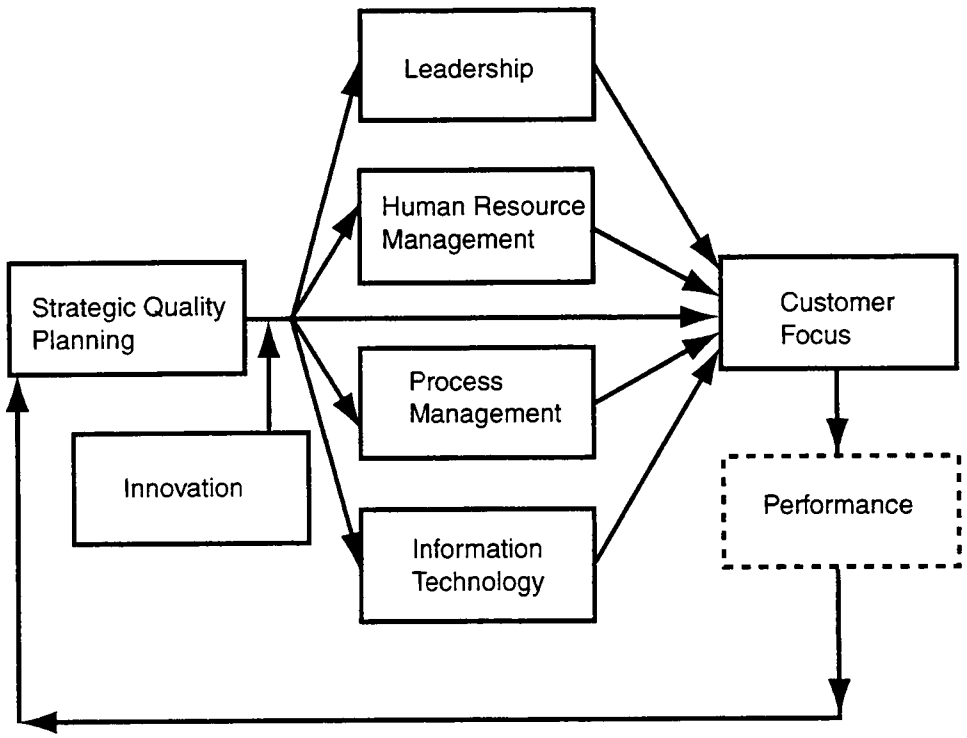


Figure 5.4: Unifying Model

Chapter 6

Literature Review

The goal of this dissertation is to investigate the components of quality strategy and to create a unifying framework. To do this, Eisenhardt (1989a) and Yin (1994) recommend simultaneous processes of collecting data, analyzing data, and generating theory. These processes start with no *a priori* hypotheses and a literature review *after* data collection, rather than before.

Observing these recommendations, this chapter presents a literature review consistent with generating theory for quality strategy. It looks at the components of quality strategy in the extant literature, allowing the researcher to compare the literature discussions with results. These comparisons enable the researcher to generate theory.

Specifically, *contradictions* between extant literature and results provide theory-building opportunities. *Agreement* between extant literature and results accomplishes the following:

- sharpens internal validity,

- widens generalizability, and
- raises theoretical levels of abstraction

of emerging relationships (Eisenhardt, 1989a, p. 544). (See Section 2.2.)

This chapter is divided into two sections. It first presents a review of the literature and then compares the literature with the research results, looking for contradictions and agreement.

6.1 Extant Literature

This section presents the traditional content areas recommended by Dean and Bowen (1994), but also includes innovation literature. The interviews with HiTech/Medical and HiTech/Internet uncovered non-traditional quality activities related to leadership, information systems, strategic quality planning, human resource management, process management, and customer focus. Many of the activities of these innovative firms fall under the rubric of "total quality learning" rather than "total quality management."

6.1.1 Content Areas

Dean and Bowen (1994) recommend using the following Malcolm Baldrige National Quality Award criteria as content areas for a literature review:

- leadership,
- human resource management,
- strategic quality planning,

- process management,
- customer satisfaction, and
- information systems.

(They recommend excluding the remaining Baldrige criterion, *quality and operation results*, because it is an effectiveness measure of the other categories.) They give compelling reasons:

- "First, the conceptual framework underlying the award addresses the principal domains TQ (Total Quality);
- Second, it is repeatedly updated by a team of experts to reflect the current thinking on TQ; and
- Third, the award framework is not limited to a single quality perspective (e.g., Deming's or Juran's) but rather incorporates a diversity of viewpoints." (p. 397)

Other researchers recommend using the Baldrige criteria because they are consistent with the key elements of the total quality literature (Waldman, 1994).

Because two of the case studies examine innovative high technology firms, this literature review will also look at innovation as it relates to quality strategy. It will use the same names used by the Baldrige committee. The literature review looks at "information systems" even though this study looked more narrowly into "information technology," specifically E-mail and the Internet. When the research opened discussions

about information systems, managers talked about E-mail and the Internet.

6.1.2 Literature Sources

This literature review uses literature from several sources:

- total quality,
- management theory, and
- marketing.

Total quality literature is important to this literature review because:

- Total quality literature covers much of the same ground as the management theory literature.
- Quality strategy research started from the total quality literature rather than from the management theory literature.
- Total quality is an "ubiquitous organizational phenomenon that has been given little research attention"(Dean & Bowen, 1994, p. 393) in management theory literature.

Much of the research attention on customer value comes from marketing literature.

6.1.3 Leadership

Much of the literature views organizations as systems (Katz & Kahn, 1966). Organizations are open systems with inputs, transformations, outputs, and feedback; systems strive for equilibrium and experience equifinality (more

than one means to achieve a particular end). Managers can make a significant impact on these organizational systems (Deming, 1986). Broad sources of power and influence (Mintzberg, 1983) give upper managers the ability to influence organizational systems (Deming, 1986). However, managers " need to use their power to empower others and to further organizational goals" (Waldman, 1994, p. 525) and challenge and improve the "status quo" (Spencer, 1994).

Upper managers can be "systems designers" who create visions and systems to improve quality (Senge, 1992):

- communicating and reinforcing values,
- articulating and implementing visions, and
- aligning organizational members' values with quality values of customer focus, continuous improvement, and teamwork

(Bass, 1985; Burns, 1978; Tichy & Devanna, 1986). Their visions and values encourage change, continuous improvement, and learning. The results are systems that produce quality outcomes (Deming, 1986).

Leaders can change systems in spite of constraints. Dysfunctional elements in an organization's culture can constrain leadership, but leaders are able to perceive, change or recreate them (Katz & Kahn, 1966; Schein, 1987). Bureaucratic control processes can also constrain many leadership activities, but do not constrain leaders' abilities to make choices. Executives are free to choose from many courses of action that can make significant impacts on the organization (Donaldson & Lorsch, 1983).

Leaders can make more effective choices if they give up their "sacred cows" of quick profits and focus on long-term consistency of purpose within the organization (Deming, 1986). Systems, not workers, cause the constraints responsible for poor quality; managers can make choices that change systems to improve quality (Juran, 1989).

Leaders play different roles in organizations than described in earlier management theory literature. Classical management literature says that managers plan, organize, direct, and control (Barnard, 1938). Other than Pfeffer's (1977) article on the ambiguity of leadership, early literature sources describe leaders' significant impact on organizations.

TQ literature points out that managers "lead rather than plan, empower rather than direct, partner rather than organize, assess rather than control" (Spencer, 1994, p. 450). Other changes recommended by the TQ literature:

- Shared vision and values replace fear as motivators (Burns & Stalker, 1961).
- *Relationships and tasks* replace *tasks* and instruments for accomplishing goals (Deming, 1986).
- Rather than manage parts (functions and departments), leaders manage the whole organization (organizational systems) (Deming, 1986).
- Leaders focus on desired results rather than methods (Deming, 1986).
- Leaders give clear expectations rather than miscommunication and hidden agenda (Deming, 1986).

Table 6.1: Summary of Literature Sources: Leadership

Source	Theory
(Bass, 1985; Burns, 1978; Tichy & Devanna, 1986)	Leaders communicate and reinforce corporate values
(Dean & Evans, 1994)	Leadership at lower levels (empowered workgroups) is important
(Deming, 1986; Juran, 1989)	Senior leadership is important
(Pfeffer, 1977)	Leadership can be ambiguous
(Deming, 1986)	System factors are more important than individual factors

- Decisions based on knowledge and organizational needs replace decisions based on power and position (Deming, 1986).
- Control of systems and processes replaces control of management behavioral patterns (Deming, 1986).
- Leaders proactively serve the needs and expectations of stakeholders rather react to stakeholders' needs and expectations (Starbuck, 1992; Spencer, 1994).

Table 6.1 summarizes the leadership literature sources.

6.1.4 Human Resource Management

Many of the areas within the Baldrige criteria are addressed in management literature: " human resource planning, employee involvement, employee education and training, employee performance and recognition and employee well-being and satisfaction" (Dean & Bowen, 1994, p. 399).

As with leadership, much of the literature on human resource

management addresses *person* or *systemic* determinants of work performance.

Human Resource Planning and Management

Dobbins et al. (1991) say that the primary influencers of job performance are interactions between "person" or "systemic" factors, although much of the earlier literature debates this issue (Waldman, 1994). With this interaction in mind, all of human resource activities should include individual (person) and systems perspectives.

The overall human resource management plan should be aligned with the corporate strategy (Fombrun et al., 1984; Tichy & Devanna, 1986; Wright & McMahan, 1992) and should include selection, employee involvement, training, performance management, and employee retention.

This alignment, the "person-organization fit, " should include selection activities. Employees should be selected for personality traits that fit well with the organization as well as for technical skill (Bowen et al., 1991; Rynes & Gerhart, 1990; Dobbins et al., 1991).

Employee Involvement

Early literature sources affirm that empowered workgroups and motivated collaborative teams are capable of doing good work on their own. "System 4" organizations (McGregor, 1960) and "Theory Y" (Likert, 1967) provide the roots of employee involvement. Other sources posit that employee

involvement is important to most work activities. They insist that teams, especially cross-functional teams, enhance employee involvement (Trist & Bamforth, 1952; McGregor, 1960).

The literature shows two directions that employee involvement should take. Some of the literature sources suggest that employee involvement and participative decision making should emphasize job enrichment and employee discretion. Other literature points out that employee involvement and participative decision making should simplify work processes (Lawler, 1994).

While some literature sources positively correlate employee involvement with company performance (Conger & Kanungo, 1988; Thomas & Velthouse, 1990), other literature takes a contingency approach. Bowen and Lawler (1992a) and Lawler (1988) suggest that employee involvement's effectiveness is contingent on business strategy, customers, technology, and the environment. Spencer (1994) elaborates by stating that the effectiveness of teams is greater in well-defined and stable processes. Still other articles point out that participative decision making is no guarantee of increased performance (Cotton et al., 1988). They say that empowerment and participative decision making is not new but is a modern repackaging of Taylor's Scientific Management. Team control is tighter and more oppressive than is hierarchical control (Hetrick & Boje, 1992; Spencer, 1994).

Employee Education and Training

As managers design quality systems with greater employee involvement, they should plan for additional training to facilitate the processes (Spencer, 1994). They should also continually evaluate training to facilitate the systematic needs of quality strategy (Blackburn & Rosen, 1993).

One of the needs is moving employees through horizontal career assignments. Careers progress horizontally, rather than vertically, as more employees participate in cross-functional teams (Bowen et al., 1991) and baby-boomer middle managers reach "career plateaus" (Bardwick, 1986; Driver, 1988; Hall, 1993). Comprehensive training over a broad range of skills facilitates horizontal career paths movement (Snell & Dean, 1992).

Employee Performance and Recognition

Much of the literature is divided between "person" or "systemic" factors as primary influencers of job performance (Waldman, 1994).

Early human resource management literature sources suggest that individual differences in people are important. Therefore, accessing individual differences in performance is also important (Dean & Bowen, 1994). Quality literature sources point out that many systemic factors that are beyond the control of individuals and individual assessment should be eliminated (Deming, 1986). Less extreme recent human resource management literature sources says that if appraisals are done, they should consider systemic as well as individual factors (Dobbins et al., 1991).

Employee Well-Being and Satisfaction

The total quality literature sources suggest that employee satisfaction should support continuous improvement. It discusses a strong correlation between job satisfaction and work performance (Juran, 1989). However, human resource management research shows only a modest correlation between job satisfaction and performance (Iaffaldano & Muchinsky, 1985).

Table 6.2 summarizes the human resource management literature sources.

6.1.5 Strategic Quality Planning

This category includes quality as a business strategy (quality strategy), quality implementation, strategic focus, and strategic processes.

Quality as a Business Strategy

Quality strategy requires a large-scale multidimensional change (Katz & Kahn, 1966) including redistribution of resources and power. (Pfeffer & Salancik, 1978) The dimensions of quality strategy are "distinguishable but intertwined threads that give (quality strategy) its strength" (Sitkin et al., 1994, p. 541).

Quality can be an important source of competitive advantage but does not guarantee competitive success (Garvin, 1988). It can help improve a differentiation strategy (Porter, 1980; Porter, 1985) and also improve other sources of competitive advantage including cost (Belohlav, 1993; Phillips

Table 6.2: Summary of Literature Sources: Human Resource Management (HRM)

Sub-Category	Source	Theory
HRM Planning and Management	(Fombrun et al., 1984; Tichy & Devanna, 1986; Wright & McMahan, 1992)	The overall HRM plan including selection, employee involvement, training, performance management, and employee retention should be aligned with the corporate strategy
	(Chatman, 1989)	Many systemic factors such as training, reward systems, and socialization are stronger influences on performance than individual differences
	(Bowen et al., 1991; Rynes & Gerhart, 1990; Dobbins et al., 1991)	The person should be selected for technical skills and personality traits that fit well with the organization
Employee Involvement	(McGregor, 1960; Likert, 1967)	Empowered workgroups and collaborative teams which are motivated and are capable of doing good work on their own
	(Trist & Bamforth, 1952; McGregor, 1960)	Teams, especially cross-functional teams, enhance employee involvement
	(Bowen & Lawler, 1992b; Lawler, 1988)	Empowerment effectiveness is contingent on the business strategy, and the customers, technology, and the environment
	(Lawler, 1994)	Employee involvement and participative decision making should emphasize job enrichment and employee discretion
	(Lawler, 1994)	Employee involvement and participative decision should simplify work processes
	(Cotton et al., 1988)	Participative decision making does not guarantee increased performance
	(Hetrick & Boje, 1992; Spencer, 1994)	Empowerment and participative decision making can be tight and oppressive team control
Employee Education and Training	(Blackburn & Rosen, 1993)	Training evaluation and systematic needs analysis are important
	(Snell & Dean, 1992)	Training should be comprehensive over a broad range of skills
	(Bowen et al., 1991)	Careers should progress horizontally, rather than vertically, to accommodate systematic cross-functional and horizontal job assignments
	(Bardwick, 1986; Driver, 1988; Hall, 1993)	Careers should progress horizontally to solve the problem of "career plateaus"
Employee Performance and Recognition	(Dean & Bowen, 1994)	Individual differences and the ability to access individual differences is important to job performance
	(Deming, 1986)	Individual assessments should be eliminated because of systemic factors that are beyond the control of individuals
	(Dobbins et al., 1991)	Appraisals are should consider systemic as well as individual factors
Employee Well-being and Satisfaction	(Juran, 1989; Deming, 1986)	Employee satisfaction is needed to support continuous improvement
	(Juran, 1989)	Job satisfaction and performance are strongly correlated
	(Iaffaldano & Muchinsky, 1985)	Job satisfaction and performance are only moderately correlated

et al., 1983; Crosby, 1979). However, quality strategy does not guarantee a low-cost position or a successful differentiation strategy (Porter, 1980; Porter, 1985).

Importance of Strategy Implementation

Quality strategy *implementation* may be more important than quality strategy *formulation* (Egelhoff, 1993). For quality strategy implemention to be successful, the following conditions must exist:

- All of the dimensions of quality strategy must be aligned with competitive environments.
- All parts of the organization should be involved in quality strategy implementation (Juran, 1989; Imai, 1986).

The literature is not clear whether quality strategy implementation is:

- a *top-down process* as total quality literature suggests (Juran, 1989), or
- a *consensus-oriented process* as management theory literature suggests (Floyd & Wooldridge, 1992).

Strategic Focus

Many literature sources define quality strategy in terms of customer focus:

> [Quality] strategy consists of understanding what customers want and aligning the organization with a set of plans to deliver it to them (Dean & Bowen, 1994, p. 405).

Other sources say that customer focus is necessary, but not sufficient, for quality strategy success. They explain that companies must also focus on their core strengths and weaknesses, as well as customer needs, to effectively implement quality (Hall, 1993; Prahalad & Hamel, 1990; Schonberger, 1992). This might explain why different firms, within the same industry, focusing on the same customers, using similar quality strategies *have different success in implementing the quality strategies* (Cool, 1993; Ketchen et al., 1993; Lewis, 1990; Miles & C., 1978).

Strategic Process

Many of the literature sources define the organization in terms of strategic processes:

- a flow of interdependent processes (Spencer, 1994),
- purposeful systems of coordinated processes (Barnard, 1938), or
- "a set of horizontal processes that begin with the supplier and end with the customer" (Spencer, 1994, p. 477).

Considering these definitions, organizations should continually analyze and improve strategic processes by organizing teams and work flow around horizontal processes (Egelhoff, 1993; Fredrickson, 1986; Miller & Friesen, 1983). This is particularly effective if these horizontal processes focus on quality outcomes (Bounds et al., 1995; Bounds et al., 1994; Spencer, 1994). An example would be cross-functional teams from marketing, engineering, purchasing, manufacturing, and logistics coordinating their activities to

create customer value.

Continuous process improvement strategy does not assume that processes are always easy to change (Hannan & Freeman, 1984). For example, in many continuous process organizations (such as chemical companies) some process variation cannot be eliminated but can only be moved to benign locations. This relocation of process variation minimizes its negative effect.

Also, continuous process improvement strategy does not assume that process control is always an appropriate goal. In repetitive process firms, continuous improvement strives to achieve stable processes. This is particularly important to firms with mass production systems such as automotive firms (Sitkin et al., 1994). In innovative firms with more uncertain environments, goals of process learning should sometimes replace process control. "Thoughtfully planned, well-executed, but inherently risky failures, ... are likely to foster both learning and innovation" (Sitkin et al., 1994, p. 553). (See Section 6.1.9.)

Table 6.3 summarizes the strategic quality planning literature sources.

6.1.6 Process Management

The literature is united in its treatment of quality process management. The themes across the literature sources are:

- The fundamental objective of quality management is continuous process improvement to increase customer value (Deming, 1986; Juran,

Table 6.3: Summary of Literature Sources: Strategic Quality Planning

Sub-Category	Source	Theory
Quality as a Business Strategy	(Katz & Kahn, 1966; Pfeffer & Salancik, 1978)	Quality strategy requires a large-scale multidimensional change including redistribution of resources and power
	(Garvin, 1988; Porter, 1980; Porter, 1985)	Quality can be an important source of competitive advantage
Importance of Strategy Implementation	(Egelhoff, 1993)	Quality strategy implementation may be more important than quality strategy formulation
	(Juran, 1989; Imai, 1986)	All of the dimensions of quality strategy must be aligned with competitive environments
	(Juran, 1989)	Quality strategy implementation is a top-down process
	(Floyd & Wooldridge, 1992)	Quality strategy implementation is a consensus-oriented process
Strategic Focus	(Dean & Bowen, 1994)	Quality strategy is aligning the organization to satisfy the customer
	(Hall, 1993; Prahalad & Hamel, 1990; Schonberger, 1992)	Companies must focus on their core strengths and weakness, as well as customer needs
Strategic Process	(Spencer, 1994)	Companies are sets of horizontal processes that begin with the supplier and end with the customer
	(Egelhoff, 1993; Fredrickson, 1986; Miller & Friesen, 1983)	Organizations should continually analyze and improve strategic processes by organizing teams and work flow around horizontal processes
	(Hannan & Freeman, 1984)	Continuous process improvement is not an easy change process
	(Sitkin et al., 1994)	In innovative firms with more uncertain environments, goals of process learning should sometimes replace process control

Table 6.4: Summary of Literature Sources: Process Management

Source	Theory
(Deming, 1986; Juran, 1989)	The fundamental objective of quality management is continuous process improvement to increase customer value
(Deming, 1986)	A systems approach is key to successfully understanding and improving processes
(Dean & Bowen, 1994)	Process improvement should move away from "management-centered and efficiency-obsessed" approaches
(Mayo, 1933; Trist & Bamforth, 1952)	Process improvement should improve social as well as technical systems

1989).

- All companies are systems of interlinking processes. A systems approach is key to successfully understanding and improving processes (Deming, 1986).
- Process improvement should move away from "management-centered and efficiency-obsessed" approaches (Dean & Bowen, 1994, p. 408) to approaches that improve social as well as technical systems (Mayo, 1933; Trist & Bamforth, 1952).

Table 6.4 summarizes the process management literature sources.

6.1.7 Customer Focus

The Baldrige committee uses "customer focus" to mean focusing all quality efforts on creating customer satisfaction. This report will use customer focus to include all efforts to create customer satisfaction.

Customer satisfaction is the central focus in the quality literature (Deming, 1986; Juran, 1989). In fact, the Baldrige criteria give customer focus and satisfaction the highest weighting (Dean & Bowen, 1994). Several elements are involved in customer focus and satisfaction:

- assessing customer expectations,
- measuring organization performance in terms of meeting customer expectations,
- managing customer relationships, and
- committing the total organization to focusing on customer value (Dean & Bowen, 1994).

Part of the reason for this central focus can be traced back to early management theory. Organizations are social systems that incorporate within their boundaries the external resources necessary for survival (Katz & Kahn, 1966); customers are a primary source of resources (Pfeffer & Salancik, 1978).

Recent literature describes a blurring of the boundaries between the organization and the environment. This is particularly apparent in service industries. Service industry literature describes organizations and customers reaching congruence of goals (Bowen & Jones, 1986). Organizations manage customers as "partial employees" in a coproduction of the services that they consume (Bowen, 1986; Mills et al., 1983; Mills & Morris, 1986). Organizations gain their commitment by involving them in the design and planning of their practices and products (Ulrich, 1989). The

customer can actively produce a service. For example, clients and consultants jointly collaborate to re-engineer the clients' organization. In this case the client also measures customer satisfaction (Dean & Bowen, 1994). A customer may even exist within the boundaries of the organization; a patient within the boundaries of a hospital is an example. Manufacturers are now trying many of the service-oriented customer innovations. Many manufacturing firms are finding ways that customers can increasingly participate in their operations (Chase & Garvin, 1989).

The stakeholder literature views the customer as one among many important stakeholders. "Certainly, customer needs must be served if the organization is to survive, but...equal attention is given to employees and their families, suppliers, communities, and other vital stakeholders" (Spencer, 1994, p. 463). Much of the quality literature views employees as internal customers. This is important because employees' perceptions and attitudes can be positively related to customer satisfaction (Tornow & Wiley, 1991).

The marketing literature thoroughly discusses customer satisfaction. Much of the success in creating customer satisfaction is understanding customer perception about quality and customer value (Oliver, 1993). Grönroos (1990, p. 37) argues that "it should always be remembered that what counts is quality as it is perceived by the customers."

Customers' expectations change as the organization performance improves; thus, if an organization is to stay competitive it must continually

Table 6.5: Summary of Literature Sources: Customer Focus

Source	Theory
(Dean & Bowen, 1994)	The total organization should commit to focusing on customer value
(Bowen & Jones, 1986)	Organizations and customers can reach a congruence of goals
(Bowen, 1986; Mills et al., 1983; Mills & Morris, 1986)	Organizations can manage customers as "partial employees" in a coproduction of the services that they consume
(Ulrich, 1989)	Organizations gain customers' commitment by involving them in the design and planning of their practices and products
(Chase & Garvin, 1989)	A customer may even exist within the boundaries of the organization and increasingly participate in its operations
(Tornow & Wiley, 1991)	Employees should be viewed as internal customers because employees' perceptions and attitudes can positively affect customer satisfaction
(Oliver, 1993)	Creating customer satisfaction is understanding customer perceptions about quality and customer value
(Spencer, 1994)	Organizations can actively shape customers' expectations

improve (Sitkin et al., 1994). Companies can also affect that change. Because of the social interactions between customer and suppliers, organizations can "actively shape customer's expectations" (Spencer, 1994, p. 464).

Table 6.5 summarizes the customer focus literature sources.

6.1.8 Information Systems

The literature suggests that organizations that consistently collect and analyze information will be more successful than those who do not (Deming, 1986; Juran, 1989; Daft & Weick, 1984; Galbraith, 1991). Here are some of the reasons for success:

- Information analysis facilitates rational decision making (Langley, 1989).
- Information from an organization's environments helps it interpret external events (Lawrence & Dyer, 1983).
- Information sharing improves teamwork and cooperation (Bushe, 1988).

Many other literature sources take a less optimistic view on effectiveness of information systems. March and Simon (1958) suggest that managers have limited information-processing abilities, that they have limited definitions of situations, and that they make satisfactory choices in light of these limitations. Other theorists say that members of organizations, rather than data, strongly influence other organization members (Rice & Aydin, 1991; Salancik & Pfaffer, 1978; Zalesny & Ford, 1990).

Still other sources indicate that analysis of information serves political, rather than rational, motives. Managers may use information to support predetermined conclusions, rather than reach new solutions to problems (Petty et al., 1984; Pfeffer & Salancik, 1978). They may create an

appearance of rational decision making, but they are actually legitimizing their eventual courses of action (DiMaggio & Powell, 1983; Feldman & March, 1981; Langley, 1989).

Several literature sources take a contingency approach to information processing effectiveness. Fredrickson (1986) indicates that the correlation between information analysis and effectiveness is contingent on industry stability. His study showed a positive correlation between comprehensive information processing and performance in the *stable* paint industry, but a negative correlation in the *unstable* forest products industry.

Other studies suggest contingency situations where rational, comprehensive information processing has limited (even negative) usefulness:

- There are multiple problem definitions.
- Goals are ambiguous.
- Uncertainty is great.

(Daft & Macintosh, 1984; Lord & Maher, 1990; March & Simon, 1958; Daft et al., 1988).

In summary, the literature on information processing effectiveness is quite diverse, ranging from "useful in general" to "potentially irrelevant" to "even hazardous in specific situations" (Dean & Bowen, 1994, p. 407).

Table 6.6 summarizes the information technology literature sources.

Table 6.6: Summary of Literature Sources: Information Technology

Source	Theory
(Deming, 1986; Juran, 1989; Daft & Weick, 1984; Galbraith, 1991)	Organizations that consistently collect and analyze information will be more successful than those who do not
(Langley, 1989)	Information analysis facilitates rational decision making
(Lawrence & Dyer, 1983)	Information from an organization's environments helps it interpret external events
(Bushe, 1988)	Information sharing improves teamwork and cooperation
(March & Simon, 1958)	Managers have limited information-processing abilities
(Rice & Aydin, 1991; Salancik & Pfaffer, 1978; Zalesny & Ford, 1990)	Members of organizations, rather than data, strongly influence other organization members
(Petty et al., 1984; Pfeffer & Salancik, 1978)	Managers may use information to support predetermined conclusions, rather than reach new solutions to problems
(Fredrickson, 1986)	The correlation between information analysis and effectiveness is contingent on industry stability
(Daft & Macintosh, 1984; Lord & Maher, 1990; March & Simon, 1958; Daft et al., 1988)	Comprehensive information processing has limited (even negative) usefulness

6.1.9 Innovation

Recent literature sources suggest that many of the quality strategy components should be viewed differently in high technology firms (Sitkin et al., 1994). Rather than emphasize total quality management they discuss total quality learning. "Total quality learning... is the ability to explore the unknown and to identify and pursue novel solutions " (Garvin, 1988, p. 80). They further define total quality learning as:

- competence to identify new skills and to pursue new resources,
- ability to explore new arenas,
- capacity to learn from exploration, and
- resilience to withstand failures associated with exploration (Sitkin et al., 1994).

They say that high technology firms exist in different environments than that of traditional manufacturing firms. They contrast the two environments:

- "technology push" environments, where "effort is focused on building a better mousetrap regardless of customers' needs at the time" (Sitkin et al., 1994, p. 551) – the focus is on shifting customer's perceptions rather than finding new ways to meet their perceptions (Sitkin et al., 1994), and
- customer-driven environments, where the technology is well known and changes are adaptations of known technology – benchmarking is

more important in this environment (Sitkin et al., 1994).

They further posit that in "fundamentally uncertain contexts, continuous improvement should focus on enhancing experimentation rather than decreasing error rates" (Sitkin et al., 1994, p. 545). *Novelty* rather than *reliability* is key to competitiveness.

They describe a different relationship with customers. The learning-oriented organizations look for new pools of customers with needs for new products. The parameters for meeting the customers' needs are different. Time periods are different (Sitkin et al., 1994, p. 547). Sometimes customers' needs have changed before production routines are standardized. In essence, it is essential to keep the boundaries between the organization and customers as "permeable as possible" (Sitkin et al., 1994, p. 547).

Other differences include using training and education to alter customer perceptions of needs (Sitkin et al., 1994). Also, quality process management includes processes that may never be totally stable.

Examples of learning-oriented organizations are highly successful pharmaceutical firms that have achieved success in using mistakes as sources of new technology (Sitkin et al., 1994).

6.2 Comparisons Between Extant Literature and Results

This section compares the literature review in the previous section with the results of this research. It first presents contradictions between literature

and results that provide no opportunity for theory development. It then presents contradictions that do provide theory development opportunities. It finally presents agreement areas between extant literature and results. Chapter 5 elaborates on these contradictions in its cross-case analyses and Chapter 7 develops these contradictions into research propositions. Chapter 4 presents within-case findings that are strengthened by the agreement areas.

6.2.1 Contradictions Between the Literature and Results Which Do Not Provide Opportunities for Theory Development

The researcher looked for theory-building contradictions between the patterns found in the extant literature and patterns found in the data. The following list shows some contradictions that were interesting but provided no opportunity for theory development:

- The researcher saw corporate bureaucratic control processes with Elec/Asia and Elec/USA that could potentially constrain many leadership activities (Donaldson & Lorsch, 1983). Although Elec's managers stated that they were free to choose from many courses of action to significantly impact their organization, there was some evidence to the contrary. Evidence came in informal comments that some corporate policies limited manager's ability to choose. This evidence came from informal sources; no formal evidence supported this.

- Although Spencer's (1994, p. 450) article stated that total quality leaders should "lead rather than plan, empower rather than direct, partner rather than organize, assess rather than control," the researcher saw evidence of leading with planning, empowering with directing, partnering with organizing, and assessing with controlling. All four business units displayed some of the ideal behaviors of today's total quality leaders along with some of the non-ideal "command and control" behaviors of the past leaders.
- Burns and Stalker's (1961) book mentioned that shared vision and values should replace fear as motivators. The researcher saw shared vision and values as prime motivators for most quality improvement behavior. The researcher did see hints of fear as a motivator in Elec/USA. Elec/USA displayed a long history of exceptional quality efforts. The researcher heard in informal conversations that fear of a possible reorganization had heightened their quality efforts over the past year to even greater levels.
- Deming's (1986) book stated that decisions should be based on knowledge and organizational needs. Knowledge and organizational needs dominated most observed decision making in this research. The researcher did notice hints of decisions based on power and position with all four business units. The researcher saw traces of this with Elec's corporate policy toward its business units. The researcher also noticed hints of this with reorganizations at HiTech/Medical and

HiTech/Internet.

- Spencer (1994) stated that the effectiveness of teams is greater in well-defined and stable processes. The researcher saw effective teams in all four business units. The processes were more established and more predictable in the two Elec business units. The processes in the two HiTech business were less well established and less stable. The researcher saw no noticeable differences in the effectiveness of teams across the four business units.
- The researcher saw many benefits and essentially no negative performance results from participative decision making. Investigations into all four business units bore out none of the scepticism described by Cotton and others (1988). The researcher noticed none of the tight, oppressive control of Taylor's Scientific Management described by Hetrick and Boje (1992) or Spencer (1994).
- Although Deming (1986) recommended that individual assessment be eliminated, the researcher noticed the assessment of system and individual factors in human resource evaluations. System factors and teamwork performance were emphasized but the individual was also recognized. Usually the individual was recognized within the framework of team contributions.
- The researcher saw quality strategy implementation as both a *top-down process* as total quality literature suggested (Juran, 1989) and a *consensus-oriented process* as management theory literature

suggested (Floyd & Wooldridge, 1992). Both Elec business units mentioned limited top-down mandates from corporate management. Both HiTech business mentioned limited top-down directives by the top managers during reorganizations.

- Although most business-unit managers described their quality implementation as focusing on their core strengths and weakness on satisfying customer needs (Hall, 1993; Prahalad & Hamel, 1990; Schonberger, 1992), they hinted that they were closely watching the financial bottom-line. None mention managing "by the numbers," but the researcher noticed that most activities were carefully monitored for financial performance.
- The researcher did not see a consistent pattern of "equal attention ... given to employees and their families, suppliers, communities, and other vital stakeholders" (Spencer, 1994, p. 463) across the four business units. Although all firms emphasized suppliers and customers and said that other stakeholders were important, the researcher only noticed purposeful attention to families at the HiTech firms. In particular, HiTech/Medical's emphasis on families flavored most of the interview data.
- Although many literature sources (Deming, 1986; Juran, 1989; Daft & Weick, 1984; Galbraith, 1991) stated that organizations consistently collecting and analyzing information are more successful than those that do not, the researcher did not see conclusive data on information

systems. The researcher did see thorough record keeping on quality assurance, but when the researcher initiated interview discussions on informations systems, most discussions included the Internet and E-mail. No definitive patterns on the Internet and E-mail came out of this research.

- As mentioned in the previous item, the researcher did not see consistent patterns on information analysis. The researcher did see more analysis of information with the two Elec business units, but saw no patterns of correlation between comprehensive information process and performance related to the firm's stability (Fredrickson, 1986).

One of the reasons the above list of contradictions between extant literature and research results did not provide opportunities for theory development was that most of the data came from informal conversations and could not be substantiated by other data sources. The researcher clearly looked for data triangulation (see Section 3.2.1). Another reason was that the contradictions were adequately studied (in the researcher's opinion) by other literature sources. The researcher was looking for patterns from multiple data sources that had not been adequately researched.

6.2.2 Contradictions Between the Literature and Results Which Provide Opportunities for Theory Development

This section looks at contradictions between patterns in the literature and patterns in the results that provided opportunities for theory development.

Unlike contradictions in the previous section, these contradictions came from multiple data sources. Limited theory development in the literature also suggested theory-developing opportunities.

The contradictions below came from comparing the two Elec business units with the two HiTech business units. The contradictions suggested that innovation moderates[1] the effects of the components of quality strategy. Section 6.1.9 presents limited literature references on the subject. The references briefly describe innovation's moderating effects and suggest the need for theory development. Chapter 7 develops these contradictions into formal research propositions.

In comparing the two HiTech businesses with the Elec business units, the researcher noticed the following contradictions with the extant literature:

- Leadership focus was different for the HiTech business units than for the Elec business units. Leaders for all four business units focused on desired results rather than methods and gave clear expectations to their employees (Deming, 1986). The researcher noticed that the focus of the two HiTech business units was on experimenting and learning from mistakes while the focus of the two Elec business units was on reducing variation and eliminating errors (Sitkin et al., 1994). This contradiction suggested that innovation moderated leadership goals

[1]This means that innovation acts as a moderator variable. For example, if the effect of quality strategy on leadership is different with different levels of innovation, innovation acts as a moderator variable or innovation moderates the effect of quality strategy on leadership.

with business units pursuing quality strategy.

- The leadership characteristics of the HiTech business units were different from those of the Elec business units. Leaders for all four business units proactively served the needs and expectations of their stakeholders (Starbuck, 1992; Spencer, 1994). The leaders for all four business units also showed exceptional flexibility to respond to their stakeholders. The researcher noticed increased expectations to explore risky ventures by stakeholders of the HiTech business units than by stakeholders of the Elec business units. Correspondingly, the researcher noticed exceptional resilience to withstand failures associated with exploration by the leaders of the two HiTech business units. This contradiction suggested that innovation moderated leadership characteristics with business units pursuing quality strategy.
- Human resource activities of the HiTech business units were different from those of the Elec business units. "Person" factors and "systemic" factors were important human resource activities across the four business units (Dean & Bowen, 1994). The researcher noticed that in all business units, human resource activities included recognizing and rewarding team efforts and finding employees who were team oriented. However; the researcher noticed that human resource activities were more focused on finding, recognizing, and rewarding creative entrepreneurial people in the two HiTech business units than in the two Elec business units. This contradiction suggested that innovation

moderated human resource activities with business units pursuing quality strategy.

- Process management of the HiTech business units was different from that of the Elec business units. The process management objective for all four business units was continuous process improvement to increase customer value (Deming, 1986; Juran, 1989). However, the researcher noticed that with the HiTech business units process management included experimenting and making mistakes. Systems were often not stable; traditional process management tools were often not appropriate. This contradiction suggested that innovation moderated process activities with business units pursuing quality strategy.
- Customer focus of the HiTech business units was different of that of the Elec business units. Customer focus for all four business units meant assessing customer expectations and focusing the quality activities to meet those expectations (Dean & Bowen, 1994). However, the researcher noticed that with the HiTech business units there was more emphasis on testing the customers' needs or changing customers' needs than assessing and responding to customers' needs. This contradiction suggested that innovation moderated customer focus activities with business units pursuing quality strategy.
- Customer focus for the HiTech business units included different supplier/customer relationships than that of the Elec business units. The researcher saw close relationships with customers and suppliers

across all four business units. All four business units participated closely with customers and suppliers in product planning and product marketing activities. All four business units viewed customers and suppliers as "partial employees" in coproduction and co-marketing functions (Bowen, 1986; Mills et al., 1983; Mills & Morris, 1986). With the two HiTech business units, the researcher saw closer relationships to included joint ventures and partial ownership (Dean & Bowen, 1994). This contradiction suggested that innovation moderated customer relationships with business units pursuing quality strategy.

The above items present opportunities for future theory development. They all suggest that innovation moderates the effects on other variables impacting quality strategy. Although Dean and Bowen's (1994) article mentions all of the above contradictions, it formulates no propositions addressing innovation's moderating effect on quality strategy. Therefore, this research addresses these opportunities by presenting formal research propositions in Section 7.5.

6.2.3 Agreement Between the Literature and Results Which Increases Reliability of Results

As stated in earlier chapters, the researcher searched for areas of agreement with extant literature to increase the reliability of the results.

The researcher found many areas of agreement with the literature. Some of the more important areas of agreement are in the following list:

- All of the managers viewed the Baldrige criteria as consistent with the quality strategy of their business units. This view was even prevalent at Elec/Asia, where the quality award of their country was modeled after the Malcolm Baldrige Award. The local and state awards that several business units had won were also modeled after the Baldrige Award.
- Using total quality literature in this literature was justified during this research. As part of the data collection process, the researcher asked the managers which books and articles they used for reference in their quality programs. Most mentioned total quality gurus such as Deming (1986) and Juran (1989). A few of the quality managers referred to management theory literature. Several of the marketing managers referred to marketing books and articles for customer value information.
- The research saw the systems principle of equifinality (Katz & Kahn, 1966) in all of his observations; there were several "means" to achieve quality "ends."
- Most of the managers viewed their companies as systems (Katz & Kahn, 1966). Generally the managers believed in systems goals to empower others to further organizational goals (Waldman, 1994).
- Most managers felt that systems, not workers, were responsible for poor quality. Leaders should change systems to improve quality (Juran, 1989).

- Most of the managers viewed leaders as "systems designers" who encourage change, continuous improvement, and learning to improve quality (Senge, 1992).
- All managers believed leaders could change systems in spite of bureaucratic constraints (Katz & Kahn, 1966). Leaders could also bring about changes to the quality culture by changing others' perception of change (Schein, 1987).
- Employees of all four business units were motivated by shared visions of total quality improvement. That shared vision appeared to be the primary motivator of their efforts (Burns & Stalker, 1961).
- Human resource activities across all business units addressed both "person" and "systemic" determinants of work performance (Dobbins et al., 1991).
- Employee involvement through empowered workgroups (McGregor, 1960) was prevalent with both Elec business units.
- Participative decision making through cross-functional teams was prevalent across all four business units.
- Strong evidence in the interviews confirmed that all parts of the organization should be involved in quality strategy implementation (Juran, 1989; Imai, 1986).
- Strong evidence in the interview data defined quality strategy in terms of understanding what customers want and aligning the organization with a set of plans to deliver it to them (Dean & Bowen, 1994).

- The researcher found that customer satisfaction was the central focus of the quality efforts (Deming, 1986; Juran, 1989).
- To effectively implement quality strategy, all managers emphasized the importance of focusing on core strengths to satisfy customers better than competitors (Hall, 1993; Prahalad & Hamel, 1990; Schonberger, 1992).
- All four of the studied business units described a blurring of the boundaries between their business units and their customers. All were working cooperatively with their customers to improve quality.
- Most managers expressed the view that leadership, human resource management, strategic quality planning, process management, customer focus, and information technology all contributed to the success of quality improvement programs (Bass, 1985; Burns, 1978; Tichy & Devanna, 1986).

Chapter 7

Summary and Conclusion

Providing implications for managers as well as researchers, this last chapter summarizes this study, its limitations, and its contributions. An overview includes case selection criteria, exploration of the research question, and sources of the data.

Limitations point out this project's inability to show statistical inferences among the attributes and constructs. Limitations also include the need to link the success attributes and constructs to performance measures.

Contributions include a better understanding of the attributes and constructs of quality strategy in managers' own words. Implications include helping provide guidelines for other managers pursuing quality improvement efforts.

A future research section gives propositions for others to test. The propositions address the moderating effects of innovation on quality improvement strategy.

7.1 Overview of the Study

This study used an inductive, multiple case study approach to examine success factors in quality strategy. Four electronics-industry business units were selected who were actively pursuing a quality strategy.

The following research question guided the researcher's efforts:

> "What are the attributes for a successful continuous quality improvement strategy, and how do they combine together into a unifying framework?"

The researcher explored the research question through data from the following sources:

- liaison-manager interviews,
- consultant interviews,
- 100+ hours of business-unit manager interviews
- a survey, and
- feedback from management-team presentations.

Starting with Malcolm Baldrige criteria, and using the constant comparative analysis method (Glaser & Strauss, 1967), the researcher identified common themes, constructs, and success attributes across the four business units. He used the data to develop a unifying framework. The

researcher strengthened the reliability of the success attributes with a follow-up survey and feedback from management-team presentations. The survey also provided information to determine the internal consistency of the constructs. The researcher verified the attributes, constructs and the unifying framework with liaison managers, external reviewers, and consultants.

7.2 Limitations of the Study

The following limitations in this study require the reader to interpret the findings with caution. Most of these limitations should be addressed in future research. Many of the following items came from constructive discussions with external reviewers including members of the researcher's Ph.D. committee. All of the following points look clearer in hindsight than they looked before and during this research project.

Lack of Statistics

This study was designed to be exploratory in nature. For this reason, the researcher chose a small number of semi-structured interviews over extensive surveys. Even though interview data provide rich information, they lack statistical analyses other than internal consistency calculations. The study lacks proposition testing and corresponding evidence that comes from statistical inferences.

Lack of Performance Measures

This study lacks correlations with company performance. Its purpose is exploratory in nature.

Bias from Self Reporting

Although the researcher carefully selected business units whose upper managers assured him of open and honest interviews, this research effort was not free of self-reporting bias. In spite of fact that the researcher collected data from multiple sources and created attributes using "data triangulation" (see Sections 2.1.4 and 3.2.1), he could not guarantee that managers were accurately describing their operations. Because managers knew that findings would be published, the researcher suspected that the interview and survey sources painted an overly positive picture of their business units.

Lack of Controls for Size, Product Life Cycles, and Technical Development

This study also lacked controls of factors which may have caused differences among the business units. Factors such as size, product life cycle times, and levels of technical development vary greatly across the four business units.

Multidimensional Constructs

This research fits the fifty success attributes into six constructs consistent with Baldrige Criteria. Fitting attributes for quality strategy into only six constructs created multidimensional and somewhat confusing constructs. For example, the construct of "Leadership" includes a wide range of attributes from empowerment to the firm's ability to take advantage of our cultural diversity.

Selection of Only TQM Firms

The limited number of interviews and companies brings up questions about generalizability. Can the findings be applied to companies in general, or are they situation-dependent? Do the results apply only to TQM firms? This research does not answer those questions. It does not try to generalize to populations, but to theory. (See Section 2.2.)

Inability to Demonstrate Cause and Effect

A major limitation in this study is how it addresses the effect of time on the data. Although the researcher always considered "sequence of time" and "causation" in conducting interview, he did not completely capture the time sequence of events to show causation. To establish causal relationships between potential causes and effects, the researcher must show that "causes" precede "effects" in time. The research design in this study is "cross-sectional."

7.3 Contributions of the Study

In general, this study contributes to the understanding of quality strategy in several ways. The study suggests attributes that contribute to the success of quality strategy. The examples in the study provide researchers with prevailing practices of successful strategy implementation. They also provide a rich understanding from the perspectives of managers from different functions and different backgrounds. The interview quotes give a window for others to uniquely view the forty-three managers in the context of their real situations. This qualitative methodology looks more deeply and more holistically at quality strategy than comparable quantitative studies. It captures many of the details and subtleties needed to give the reader an understanding of the concepts studied.

In particular, the cross-case comparisons in Chapter 5 indicate that the relative importance of the major constructs is nearly identical across the four business units. This demonstrates the importance of these constructs in the quest for quality. However, the cross-case analysis of individual attributes within the broad constructs shows that firms are different in the particular attributes that contribute the most to quality. Thus, the systems' principle of equifinalify (there are many "means" to achieve a particular "end") is demonstrated.

Although this study does not develop new theory or test existing theory, it provides unique propositions on innovation's moderating effect on quality strategy.

7.4 Implications for Managers

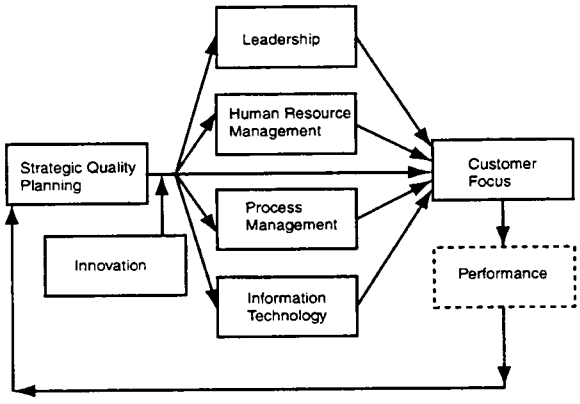
Because the data are grounded in the actual experiences of managers, they provide a useful framework to practicing managers. The framework starts with the Malcolm Baldrige Quality Award criteria, standards that many companies use to guide their quality strategy efforts. The research clarifies these criteria by developing success attributes describing these criteria. These attributes are not described in academic terms; they are in the words of practicing managers.

The researcher wrote the literature review in Chapter 6 using academic journals instead of applied literature sources. It should provide managers with an understanding of many of the concepts behind quality improvement strategy. These concepts should add to the ideas that are normally addressed in applied journals and books.

These success attributes are by no means an exhaustive "to do" list for companies striving to improve quality, but they can supplement the checklist of quality improvement activities that these companies are following. The constructs of leadership, human resource management, strategic quality planning, process management, customer focus, and information technology do not represent the only categories of grouping strategic quality activities. However, these categories are major guidelines that world-wide companies are following. The constructs and attributes should strengthen and clarify the methods and techniques companies are following to improve their quality efforts.

This research might provide one explanation why traditional quality improvement practices are not as effective in innovative high technology firms as in lower technology firms. Understanding of innovation's moderating effects on quality strategy might lessen the frustrations of high technology quality managers who have been disappointed with the effectiveness of traditional statistical process control tools.

7.5 Propositions for Future Research



Repeating Figure 5.4, the figure here shows the model that came from this research. It is a model of quality systems. Strategic quality planning drives the constructs of leadership, human resource management, process management, information technology, and customer focus. Customer focus is the performance result of quality improvement efforts. Other performance results are important, but only creating customer value was mentioned in this research. The assumption in all discussions was that if a

firm creates customer value better than competitors, financial and other performance results will follow.

This research found innovation to be a moderating variable. In high technology firms, the components of quality act together in a different ways than in low technology firms. The strength of the relationships in Figure 5.4 presents opportunities for future theory testing. Future research should include other industries and sample sizes sufficient for statistical tests. The propositions given in this section present opportunities for future research. The limitations of this research in Section 7.2 also point out research opportunities.

The moderating effect of innovation is the source of the following propositions:

> Proposition 1: In innovative business units pursuing a quality strategy, leadership often involves reinforcing experimentation and "learning from mistakes."

Experimentation and "learning from mistakes" was encouraged at HiTech/Medical and HiTech/Internet.

> Proposition 2: In innovative business units pursuing a quality strategy, leaders often exhibit resilience to withstand failures associated with exploration.

HiTech/Medical had undergone a major reorganization associated with previous exploration efforts. HiTech/Internet's history was painted with

one major product and process change after another. They were very adept at "changing on a dime." They were currently in the process of changing from a hardware to a software company. All of their hardware engineers were becoming software programmers.

> Proposition 3: In innovative business units pursuing a quality strategy, human resource activities are often involved in finding, recognizing, and rewarding entrepreneurial people.

" Finding and keeping creative, innovative people" was their "number one success attribute," according to the CEO of HiTech/Internet. HiTech/Medical was heavily staffed with creative, innovative, Ph.D.'s.

> Proposition 4: In innovative business units pursuing a quality strategy, process activities often focus on enhancing experimentation and learning from mistakes as well as on reducing process variation and eliminating process error rates.

Traditional process improvement and control procedures were not appropriate in either HiTech/Medical or HiTech/Internet because many processes were not stable. Often customers (and customers' needs) changed before processes had stabilized.

> Proposition 5: In innovative business units pursuing a quality strategy, creating customer value can involve testing the customers' needs or changing the customers' needs, in addition to satisfying the customers' needs.

The researcher saw several examples of "technology push" in HiTech/Medical and HiTech/Internet. HiTech/Medical worked very closely with research organizations. They were very successful in developing many innovations in their product lines. They were equally successful in stimulating their customers to want their innovations. The marketing efforts at HiTech/Internet were involved in creating customer need for their new technologies.

> Proposition 6: In innovative business units pursuing a quality strategy, relationships with customers can be stronger than customer relationships of low technology firms. Many of these relationships lead to joint ventures and partial ownership.

The researcher saw extremely close customer relationships at HiTech/Medical and HiTech/Internet. Both business units formed joint ventures with their customers. Both business units also co-developed products with their customers.

After thoroughly searching the literature for articles on innovation's moderating effect on quality strategy, the researcher found only the article on Total Quality Learning (Sitkin et al., 1994) outlined in Section 6.1.9. Many of the observations found in this research and proposed in this section are mentioned in that article. It appears that the above propositions have not been tested in other research.

7.6 Conclusion

Hopefully, this study reveals new insights into quality strategy. Although all of the success attributes were found in previous literature, the quotations by practicing managers should give a new understanding of how quality programs work in organizations.

The previous propositions on quality and innovation present some exciting attributes for other researchers to test. These propositions should provide relief to high technology firms that are frustrated that they look at customers, team work, processes, and human resources differently than lower technology firms.

Finally, this research provided tangible evidence (and relief) that many of the principles in the management literature *actually work* in organizations. Seeing quality practices in action is a learning experience that reading books and journal articles can not match!

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Appendices

Appendix A

Survey

Dear Manager:

I have interviewed 43 managers in 4 business units and have developed a set of "success attributes" for quality strategy. These attributes were reported by the managers as having a positive influence on their quality efforts. Some of the business units produce high technology products at low sales volumes while other business units produce lower technology products at high sales volumes. Some business units sell to developing markets; others sell to mature markets. With this in mind, answering "strongly disagree" to an attribute does not indicate a need for improvement; it simply indicates that the attribute does not contribute to the success of your organization. Please return your survey reply to me via E-mail, regular mail, or fax as soon as possible. The survey results will strengthen my findings from my face-to-face interviews. The results will also provide crucial information for my presentation to your management team.

This survey should take 10–15 minutes to complete. The definitions of most

management terms are enclosed.

Please tell me how strongly you agree that each of the following statements is true at your organization. (Remember, a "strongly disagree" response does **not** indicate a deficiency.)

I am not asking you whether the 50 items **are** success attributes. I am asking, "Given that the 50 statements are success attributes, how strongly do you feel that each attribute exists in your organization?"

1 We succeed because a combination of leadership of our managers and personal characteristics of all of our employees motivates us to seek innovation; that is, we thrive on change.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

2 We do well because our diverse mix of leadership styles helps us quickly adapt to changing environments.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Culture is an enduring shared set of values, core beliefs and philosophies that influence all business operations.

3 We succeed because our leaders help shape a quality culture.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

4 We do well because we have a strong culture that focuses on continually improving quality.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

5 Our company does well because the use of the Internet and E-mail has reduced the need for many management layers.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

6 A success attribute is that we emphasize "follow-up" in all of our human resource activities.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

7 We are successful because our human resource department is a strong advocate for the rights of employees to upper management.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Empowerment is giving employees ownership (trust, freedom, power, resources, responsibility, and risk) to succeed or make well-intentioned mistakes.

8 Our firm excels because our leaders empower employees to make decisions at lower levels.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

9 A success attribute is that empowerment has reduced time pressures on managers, allowing employees to have easier access to them.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

10 A success attribute is the fact that empowerment has helped minimize the disruptive effect of management changes.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

11 Our company does well because our leaders empower employees with the financial resources to do their jobs with a minimal need for management approval.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

12 Our organization excels because our leaders provide open access to information about the firm's performance.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Recognition systems are formal or informal ways employees are recognized for their efforts.

13 Our firm succeeds because our recognition system recognizes employees for contributing to customer value.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

14 A success attribute is that our leaders influence others to understand and commit to their long-term corporate visions.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

15 Our company excels because our human resource department relates well to the interests and concerns of our employees.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

16 We excel because the use of Internet and E-mail has improved communications with customers and suppliers.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Reward systems are formal or informal ways employees are rewarded for their efforts.

17 We are successful because our reward system rewards employees for contributing to customer value.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

18 A success attribute is that even though our products are customer-driven, we do a good job at motivating our customers to want our technological innovations.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

19 Our company excels because we create an environment where employees freely express ideas and opinions–that is, an environment to freely challenge the "status quo."
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

20 Our business unit does well because we have customer-driven versus a technology-driven products.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

21 Our firm does well because our business unit learns and continually improves quality.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

22 Our ability to use the Internet and E-mail to improve product and process design contributes to our success.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

23 Our business unit excels because our leaders possess flexible leadership styles that adapt to changing environments.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Corporate values are our highly-regarded sets of beliefs, assumptions,

and principles that provide standards for which we (and members of our corporate family) strive to achieve.

24 We succeed because quality improvement is a way of honestly creating good products that are consistent with our "corporate values."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Support for team or individual efforts includes assisting in defining processes, coaching others in accomplishing goals, providing resources, assisting in solving problems, and helping in resolving conflicts.

25 Our leaders' ability to provide support for team efforts contributes to our success.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

26 Our leaders' ability to provide support for individual entrepreneurial efforts contributes to our success.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

27 Our business unit succeeds because many innovations result from our firm's ability to take advantage of our cultural diversity.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

28 We excel because of our expertise at job analyses, selection of the best candidates, and performance appraisal.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

29 Our organization excels because we minimize human sources of process variation by training standardization.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

The **"means"** of planning includes meeting, discussing, arguing, communicating and coming to consensus in the planning process. The **"ends"** of planning are the plans.

30 Our business unit succeeds because we place more emphasis on the "means" of planning than on the "ends" of planning.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

31 We excel because we organize our processes around outcomes–versus tasks or departments.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

32 We do well because our main focus in creating customer value is also creating value for the end-consumer.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

33 Our firm excels because of our ability to understand and measure customer value.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Crisis management exists where a company encounters or anticipates exceptional external distress or business interruption. It can be accompanied by rapid decision-making, reduced slack resources, limited information, uncertainty, and tension.

34 A success attribute is that our firm has a healthy "sense of urgency" due to our condition of crisis management.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

35 Our organization does well because we have increased competencies, increased awareness, increased energy, and increased desire–simply put, increased productivity–due to our condition of crisis management.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

36 A success attribute is that our leaders plan and continually improve processes to promote customer value.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

37 We do well because of our excellence at how people get and give information–for example, how employees are informed and how employees give suggestions to their managers.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

38 A success attribute is that quality improvement is an important part of our overall business strategy.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

39 We succeed because we make all of our actions accountable to internal and external stakeholders, including our families, our communities, each other, and our religious beliefs.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

40 A success attribute is that we excel at integrating parallel process activities–for example "continuous flow manufacturing" or parallel programming.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

41 Our business unit succeeds because the use of the Internet and E-mail has reduced company functional barriers.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

42 A success attribute is that we create customer value better than our competitors.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

43 A success attribute is that we fit jobs into the overall lifestyles of our employees–for example, remote computer support for employees who need extended stays at home.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

44 Our company excels because we find the root causes of systems problems.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

To benchmark (or baseline) is to strive for excellence by setting minimum acceptable standards of performance.

45 Our ability to continually "benchmark" with the best quality practices in our industry contributes to our success.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

46 Our organization does well because our quality efforts are helped by training–especially ongoing training and on-the-job training.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

47 Our company does well because our leaders create incentives for change by changing others' perceptions of problems to create a willingness to change.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

48 Our company does well because we stay close to our customers and suppliers.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

49 We excel because we use "simple" (easy to use and understand) ways to monitor, control, and improve processes.
☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

50 Our company succeeds because we have objective job standards that focus on process improvement, teamwork, and customer satisfaction.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Thank you for your time.

Appendix B

Survey Results

Table B.1: Survey Results: Leadership

Business Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	BU Averages
Elec/Asia	4.2	4.6	3.9	4.3	3.9	3.3	4.0	3.9	4.4	3.8	4.6	4.3	3.7	3.6	4.3	3.8	4.4	4.1	3.0	3.3	4.0
Elec/USA	3.6	4.0	4.0	4.2	3.9	3.6	3.5	3.0	4.3	3.2	4.0	3.6	3.9	3.8	4.0	3.7	3.2	4.0	2.6	3.7	3.7
HiTech/Medical	4.1	3.4	3.6	3.3	3.8	3.6	4.1	2.8	3.6	3.5	4.2	3.6	3.8	3.7	3.6	3.5	2.8	3.0	2.4	2.6	3.4
HiTech/Internet	4.0	4.3	3.8	3.7	2.8	2.8	3.3	3.0	4.2	3.3	3.5	3.2	3.2	3.3	3.7	3.5	2.7	3.7	4.2	2.3	3.4
Averages	4.0	3.9	3.8	3.8	3.7	3.4	3.8	3.1	4.0	3.4	4.1	3.7	3.7	3.7	3.9	3.6	3.2	3.6	2.8	3.0	3.6

Table B.2: Survey Results: Human Resource Management

Business Unit	21	22	23	24	25	26	27	28	29	30	BU Averages
Elec/Asia	4.7	4.3	4.0	4.0	3.4	4.2	4.1	2.3	3.7	4.3	3.9
Elec/USA	4.3	4.2	3.3	3.1	3.1	2.9	3.8	2.2	3.8	3.7	3.4
HiTech/Medical	3.3	2.5	3.3	3.5	3.5	2.8	2.9	4.1	2.8	3.1	3.2
HiTech/Internet	3.5	4.0	3.7	3.2	2.5	3.2	2.8	2.5	3.3	3.7	3.2
Averages	3.9	3.5	3.5	3.4	3.3	3.2	3.4	3.0	3.3	3.6	3.4

Table B.3: Survey Results: Strategic Quality Planning

Business Unit	31	32	33	34	BU Averages
Elec/Asia	4.6	4.6	4.7	4.1	4.5
Elec/USA	4.5	4.5	4.5	4.3	4.4
HiTech/Medical	3.6	3.5	3.2	3.8	3.5
HiTech/Internet	4.2	3.7	4.0	3.8	3.9
Averages	4.1	4.0	4.0	4.0	4.0

Table B.4: Survey Results: Process Management

Business Unit	35	36	37	38	39	40	BU Averages
Elec/Asia	4.6	4.2	4.0	4.0	3.8	3.6	4.0
Elec/USA	4.0	3.5	3.6	3.7	4.3	3.4	3.7
HiTech/Medical	3.3	3.5	3.4	3.1	2.8	2.2	3.0
HiTech/Internet	3.3	3.8	3.7	3.7	2.7	2.3	3.3
Averages	3.7	3.7	3.6	3.5	3.4	2.8	3.5

Table B.5: Survey Results: Customer Focus

Business Unit	41	42	43	44	45	46	BU Averages
Elec/Asia	4.6	4.1	4.1	3.9	4.1	4.2	4.2
Elec/USA	4.0	3.3	4.1	3.7	3.6	3.8	3.8
HiTech/Medical	4.0	2.6	3.7	3.9	3.6	3.2	3.5
HiTech/Internet	3.5	2.8	4.0	3.3	3.2	3.8	3.4
Averages	4.0	3.1	3.9	3.8	3.7	3.7	3.7

Table B.6: Survey Results: Information Technology

Business Unit	47	48	49	50	BU Averages
Elec/Asia	3.8	2.8	2.9	2.6	3.0
Elec/USA	2.5	2.4	2.3	1.7	2.2
HiTech/Medical	3.5	3.3	2.9	2.8	3.1
HiTech/Internet	3.8	3.2	3.3	2.8	3.3
Averages	3.3	2.9	2.8	2.5	2.9

Appendix C

Reliability Analyses

RELIABILITY ANALYSES - SCALE (ALPHA)

Leadership--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
AT01	.6194	.6660	.8334
AT02	.4118	.6862	.8406
AT03	.5444	.6185	.8350
AT04	.5220	.6836	.8353
AT05	.5127	.6781	.8357
AT06	.2499	.4559	.8469
AT07	.2185	.6744	.8480
AT08	.4846	.5391	.8369
AT09	.5432	.6806	.8346
AT10	.5270	.5244	.8347
AT11	.3543	.6973	.8426
AT12	.3991	.4923	.8408

AT13	.4420	.4426	.8393
AT14	.3266	.5244	.8440
AT15	.3459	.4303	.8430
AT17	.6269	.5491	.8294
AT18	.5213	.7435	.8350
AT19	.2734	.3575	.8484
AT20	.4121	.6063	.8406

Reliability Coefficients 19 items

Alpha = .8465 Standardized item alpha = .8488

Human Resource Management--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
AT21	.6553	.5701	.7907
AT22	.5725	.5437	.8001
AT23	.5278	.5244	.8064
AT24	.5105	.6472	.8077
AT25	.3287	.6650	.8323
AT26	.6807	.6425	.7863
AT27	.5610	.5088	.8025
AT29	.4742	.5447	.8124
AT30	.4724	.5375	.8119

Reliability Coefficients 9 items

Alpha = .8237 Standardized item alpha = .8275

Strategic Quality Planning--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
AT31	.7632	.6025	.8356
AT32	.8116	.6870	.8141
AT33	.7342	.6415	.8513
AT34	.6634	.5282	.8717

Reliability Coefficients 4 items

Alpha = .8783 Standardized item alpha = .8811

Process Management--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
AT35	.6113	.4187	.7071
AT36	.2740	.2652	.7937
AT37	.5308	.3379	.7296
AT38	.3838	.3045	.7652
AT39	.6789	.5772	.6895
AT40	.6235	.5224	.7028

Reliability Coefficients 6 items

Alpha = .7681 Standardized item alpha = .7684

Customer Focus--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
AT41	.7653	.6499	.7733
AT42	.5213	.4885	.8319
AT43	.5925	.4861	.8155
AT44	.4376	.4310	.8397
AT45	.7014	.5946	.7873
AT46	.6969	.6163	.7906

Reliability Coefficients 6 items

Alpha = .8344 Standardized item alpha = .8407

Information Technology--Item-total Statistics

	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted

AT47	.6678	.4706	.7086
AT48	.6673	.4763	.7152
AT49	.6318	.5123	.7294
AT50	.4708	.2740	.8107

Reliability Coefficients 4 items

Alpha = .7936 Standardized item alpha = .7980

Appendix D

Sample Proposal Letter

Richard L. Neubert
186 W. Tennessee Avenue
Oak Ridge, TN 37830
(615) 482-1200
Fax: (615) 574-0680

February 5, 1995

John Doe
General Manager, Business Unit
Acme International
500 Main Street
Springdale, NY 00011

Dear John:

This letter is to give you some background on the types of information I will be gathering. This research is designed to develop a better understanding about quality improvement strategy. I want to develop this understanding by doing the following:

- developing new insights into quality improvement strategy;
- assessing the parts that contribute to the overall success of quality strategy; and

- understanding the overall system of quality strategy–that is, how all the parts fit together to make the entire system work.

Some of this research will create and verify academic theory, but much of this research will document the successful elements of your quality strategy. You should be able to repeat the success of your quality strategy if you better understand the whole process.

Collecting Data

To build credibility in my research, I will need data from several sources. For example, information from interviews showing a strong team-oriented approach to problem solving is more credible if this team-oriented approach is also mentioned in annual reports. **I will need all reports, archives, and letters you can provide to support my interview data.** I will also follow up later with a short questionnaire to strengthen the findings from the interviews.

In the interviews, I want to capture participants' answers "in their terms." In other words, I want to capture the following:

- sufficient detail in the interviews to allow me to understand the meaning behind the answers,
- direct quotes to capture the answers in the participants' own terms,
- reactions of participants to my questions, and
- my first impressions of *what I see* and and *what I hear.*

I would like to tape-record the interviews or have someone available to take notes. This will allow me to effectively capture the depth of the participants' experiences from their perspectives. I will bring my computer and printer and will provide each participant a typed copy of their interview for them to edit. If tape recording is a problem, then I can take notes. However, the notes will not capture as much detail and the interviews will take longer.

Remember, I am trying to create new ideas and an overall framework, so most questions will be open ended. The direction that the questions take

will be determined by the participant. Below are types of questions I might ask to start the interviews.

Initial Overall Quality Questions

- What are the goals of your quality program?
- What makes your quality program work?
- How is your quality program better than those of your competitors?
- How has your quality program changed over the last several years?
- How would you like to change your quality program ?

Baldrige Criteria Questions

I will use the Malcolm Baldrige award committee criteria and ask open-ended questions such as:

- How does your business unit create products and services that are valued by your customers?
- How do your leaders influence others to achieve your quality goals?
- How does your business unit use information to improve quality?
- What does your quality program fit into your overall business strategies?
- Tell me about the the importance of people development in continuously improving quality.
- How does your "people development" fit into your other systems to improve quality?
- Tell me about how you manage your processes?
- How do you measure, control, or reduce sources of process variation?
- How does your business unit measures performance?

I would like to watch as much of your operations as possible and talk to your plant workers and managers informally. Informal observations will help me understand your operations and your people. I want to include in my case writeups a great deal of descriptive details about the people, the activities, the interactions, and the settings.

Remember, I will maintain confidentially about any information I receive from my visit. No one will see any of the data I receive other than members of my Ph.D. committee.

People I Would Like to Interview

I would like to interview any business unit employee who can provide information about leadership, customer value, human resources, information systems, quality improvement, process management, reward systems, and measures of performance. Specifically, I will want to interview you and your management team.

Benefits

The benefits to the academic community would be great. They would include an opportunity to study a successful quality improvement operations and the factors that contributed to their success. There are very few studies available–this study would help move management theory forward.

The benefits to your business unit might include the following:

- validate your hard work to create and implement a successful continuous quality improvement program,
- validate your efforts to improve your business processes, and
- help you understand the reasons why your quality program and business process are successful–to allow you to improve future efforts.

I look forward to talking to you soon about further details of the study.

Best regards,
Rich Neubert

Vita

Richard L. Neubert was born on March 3, 1947 and raised in Oak Ridge, Tennessee. After graduating from Oak Ridge High School and working with the National Association of Manufacturing as a program director, he entered the University of Tennessee. He received a Bachelor of Science degree in Chemical Engineering in 1978 and a Master of Business Administration degree in 1980.

He worked for Exxon Chemical from 1980 to 1987 as a new product sales manager calling on the automotive industry. He became very interested in quality improvement strategy when calling on Ford Motor and Chrysler Corporation and seeing the results of their quality efforts. He left in 1987 to work for Urban Science Applications Inc., a quality-related consulting firm based in Detroit. He also worked for Apple Computer in 1988 as national accounts manager, helping Fortune 500 companies with computer-related solutions to quality-related problems.

Continuing to pursue his interest in quality strategy, he entered the University of Tennessee in 1989 to work on a Master of Science degree in Industrial Statistics and a Doctor of Philosophy degree in Business Administration. His recent work has consisted of quality-related consulting. As a graduate research assistant he has written cases for and presented seminars for U. T.'s Management Development Center and U.T.'s first year MBA students. He has also done computer and quality-related consulting for Goody's Family Clothing and the Oak Ridge National Laboratory.