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ANALYZING THREE QUALITY MANAGEMENT SYSTEMS IN
RELATION TO THE MALCOLM BALDRIGE
NATIONAL QUALITY AWARD

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Business Administration

by
Jeremiah David Worthington

December 2005

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Approved by:



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ABSTRACT

This paper explores different quality management systems and correlates their value in achieving success as measured by the Malcolm Baldrige Award. The three major quality management systems that are reviewed in this paper are International Organization of Standards (ISO), Total Quality Management (TQM), and Six Sigma. Each system is defined and described, and the differences are thoroughly explored. This paper also explores the Malcolm Baldrige Award as a measure of success or excellence and the criteria that is used for that metric. Previous award winning applications from various companies are analyzed and the associated quality systems used for their success are documented. A look into the actual scoring guidelines used for assessing an organizations quality level will also be discussed. A clear link can be made from the winners of the Malcolm Baldrige Award and quality management systems. Managing quality is the underlined common denominator among the entire award winning companies. In analyzing these quality management systems, this paper will show that there is a strong relationship between quality management systems and MBQNA winners.

ACKNOWLEDGMENTS

I would like to acknowledge the California State University, San Bernardino faculty, especially the College of Business and Public Administration. I also like to thank my fellow MBA colleagues, and now friends, for their continual support and effortless loyalty.

DEDICATION

I would like to dedicate this paper to my wife Sara.
Thank you for your unwavering devotion and unyielding
encouragement of my education.

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CHAPTER ONE

BACKGROUND

Introduction

Over the past 15 years, there has been fact and fiction about the cause of success of various organizations within different industries. Shrinking profit margins, tough competition, expensive technology and economies of scale have been taking their toll on the global business environment. Organizations today, regardless of their size or location, need to find ways to increase productivity, efficiency, and customer satisfaction while decreasing or maintaining operating expenses. As stated in the book, *Total Quality Management*, "Responding to intense competition in a rapidly changing world, they [business leaders] have been forced to seek ways to become more competitive" (George & Weimerskirch, 1994, p. 1). These companies need to find better ways of operating their business in order to survive in this competitive marketplace.

The manufacturing industry has been known for its commitment to provide quality products for many years. Some manufacturers are perceived to produce a higher quality product than others. These top performing

manufacturing companies, such as Motorola, IBM, General Electric, 3M, ITT etc., all have one thing in common: they all institute a Quality Management System (QMS). These organizations have been saving millions of dollars once Quality Management Systems were implemented. Quality helps satisfy existing customers and keep their loyalty. It costs five to seven times as much to get a new customer as it does to satisfy and keep one existing customer (Levinson & Tumbelty, 1997; Struebing, 1996). Therefore spending \$1000 on quality is like spending \$5000 - \$7000 on advertising and promotion. Even service industry companies such as the Ritz Carlton, Fed Ex, and Bank of America implement and engrain quality management systems. These quality systems are the underlining common denominator in all top-performing organizations. Top performing organizations in this case is being measured by the Malcolm Baldrige Award.

The Malcolm Baldrige National Quality Award was created by Public Law 100-107, and signed into law on August 20, 1987 (National Institute of Standards and Technology, 2003). Principal support for the program comes from the Foundation for the Malcolm Baldrige National Quality Award that was established in 1988. The Award is named for Malcolm Baldrige, who served as Secretary of

Commerce from 1981 until his tragic death in a rodeo accident in 1987 (National Institute of Standards and Technology, 2003). His managerial excellence contributed to long-term improvement in efficiency and effectiveness of government.

Started in 1987, the Malcolm Baldrige National Quality Award is presented annually to recognize U.S. organizations for performance excellence (National Institute of Standards and Technology, 2003). This award was modeled after the Deming Award, which recognized performance excellence companies in Japan. To quote the President and CEO of Graniterock, "There is no better assessment of your organization's performance available than the Award. The Criteria for performance excellence is unique in addressing all the critical elements of your performance system" (National Institute of Standards and Technology, 2003). This award is meant to identify and recognize companies with enhanced performance focusing on customer value and overall organizational effectiveness and efficiencies. This type of performance is best met through some type of Quality Management System.

Any organization can benefit greatly by instituting a Quality Management System that has been most commonly associated with manufacturing. There are many different

quality management systems and programs that these manufacturers and other service organizations use. This research paper will discuss and analyze these programs. This project also seeks to discover the underlining common practices of these programs and from the results, illustrate what these programs are truly intending to do. This research paper will do this by answering the following questions regarding quality management systems:

1. What is the philosophy behind quality?
2. What are quality management systems?
3. What are the top three quality management systems that exist today?
4. What are the criteria used to judge a Malcolm Baldrige winner?
5. What do all Malcolm Baldrige winners have in common?

Along with conclusions and recommendations, answering these above questions will be the objective and the content of this research paper.

What is the Philosophy Behind Quality?

In order to define a Quality Management System (QMS), the word "Quality" must first be defined. According to the *Merriam - Webster's Dictionary*, quality is known as one of

the following: 1. peculiar and essential character 2. An inherent feature 3. A degree of excellence 4. Superiority in kind, and 5. A distinguishing attribute. Quality is often used when ranking one product, item or attribute over another. It is often viewed as immeasurable and subjective. After all, who is to say what quality is and what it is not? Some might say a Mercedes-Benz is a quality automobile and a Ford Pinto is not quality. This statement nevertheless assumes that everyone's definition of quality is the same. A philosophical debate over the definition of quality can easily be started, just as individuals can also argue over the definition of success. Both terms are sought after by organizations, but not easily obtainable. One common reason of this debate is because both terms are perceived to be difficult to measure.

However, if quality were defined in actual requirements or standards, then it would be less subjective. If defined by clear requirements, then quality can be measured. If both vehicles in the above example were built according to the exact standards and/or requirements specified for each, then they are both quality products. According to Philip B. Crosby in his book, *Quality is Free*, "quality is conforming to

requirements; it is precisely measurable" (Crosby, 1980, p. 8). Once requirements exist in any product, process, or service, a measurement has been established. If the product, process, or service matches exactly to the given requirements or standards, then that given product, process, or service is of quality. Once there is deviation or variation from the requirements or standards, then defects are produced. Both quality and defective processes can be measured, analyzed, monitored and improved. Likewise quality is also defined as fit for use as defined by the customer (Levinson & Tumbelty, 1997, p. 7). In other words, can this process or product be used and can a customer accept it. A product that merely meets its own specification requirements falls short of quality. Consumers must also accept the product as a quality product. In other words, do the specifications of the product or service meet the requirements of the customers who will use the product or service?

Quality is now further defined as "meeting or exceeding customer expectations" (George & Weimerskirch, 1994, p. 6). These expectations also need clear identification. According to the book *Total Quality Management*, "[p]roducts and services that exceed customer requirements are of greater value to customers than

competitors' products and services. Increasing numbers of customers are likely to purchase such quality, and that improves market share and grows revenues." In this definition of quality, the underlining thought leans towards a bigger picture of the organization. Quality can not be achieved by setting requirements alone. To achieve quality within an organization, one must molecularly change the entire business model one has currently known and trusted for many years. It must align the business processes to meet customer requirements. Standards, requirements, continuous improvement, statistical process control are just tools to help build quality in the organization. Those tools cannot change the business model of the organization. For example, a business that wants to increase quality and lower cost needs to address the type of management style and organizational structure it currently obtains. Adding standards and documentation of a process is only a small part of the overall vision. To implement quality, a business must collect data from their customers differently, reevaluate corporate goals, change directions to meet or exceed needs, and give both human and monetary resources towards the movement. Learning statistical process control or tools of continuous improvement alone will not instill quality into an

organization. The entire organization must rethink its current business model to implement a quality management system and become a Malcolm Baldrige Award winning company. All Malcolm Baldrige Award winning companies have implemented and engrained some type of quality management system in their organizations. They not only engrained QMS, but they have changed their business model. Quality or customer centric management is the biggest driver of winning the Baldrige Award (Russell, 2003). Below are a few of the award winning companies over the past years:

Table 1. Malcolm Baldrige Award Winning Companies

ADAC Laboratories	Ames Rubber Corporation	Armstrong World Industries	AT&T Consumer Communications	AT&T Network Systems Group
AT&T Universal Card Services	Cadillac Motor Car Company	Coming Telecommunications Products Division	Custom Research, Inc.	Dana commercial Credit Corporation
Eastman chemical company	Federal Express Corporation	Globe Metallurgical Inc.	Granite Rock Company	GTE Directories Corporation
IBM Rochester	Marlow Industries	Milliken & Company	Motorola Inc.	The Ritz-Carlton Hotel Company
Solectron Corporation	Texas Instrument Inc. - Defense Systems & Electronics Group	Trident Precision Manufacturing, Inc.	Wainwright Industries, Inc.	Wallace CO., Inc.
Westinghouse Electric Corporation - Commercial Nuclear Fuel Divisions	Xerox Corporation- Business Products & Systems	Zytec Corporations	Los Alamos National Bank	Clarke - American

Source: (Chase, R.B., & Aquilano, N.J., & Jacobs, F.R. 1998. Production and Operations Management-Manufacturing and Service. Boston: Irwin McGraw-Hill)

These companies have achieved performance excellence by focusing the entire company on the customer, then identifying and improving the processes that lead to customer satisfaction. The Quality Management System is driven by customer requirements, which is needed for measurements and directed toward customer satisfaction.

A true quality management system links the first definition of quality, conforming to requirements, and the second, meeting or exceeding customer's expectations. The requirements or standards used for defining quality in a product or services should reflect the requirements of the customer. For example, let us say that a financial institution was going to set requirements on how long it should take to open a new account. If the company's process takes 35 minutes to open a new account, then 35 minutes is the baseline standard or capability of the process. Yet, if the customer deems a new account should only take 25 minutes, then there is a gap between the customer's requirements for a quality new account process and the capability of the financial institution to deliver the new account within 25 minutes (see Appendix A). This capability analysis shows that 32% of all new account openings will not meet the customer's specification of 25 minutes. The company at this point can then use other

problem solving tools and techniques to find the root cause, provide a solution, and optimize the process. On the other hand, if the company never researched the customer or measured their process, then they would have continued to operate not meeting the specification of their customers. A company can measure how well their process reflects that of their customer's requirements or expectations.

As one can see, Quality is much more than a hollow word used to describe products or services. It has defined meaning and can be precisely measured. The organization must think about their customers, processes, systems, and infrastructure differently. Implementing Quality in an organization is both a philosophical and strategic change. It is as much about understanding the concept as it is about building the systems. The book, *Total Quality Management*, refers to as a religious experience. Here is a quote for the book, "Like those who experience a religious awakening, these leaders are eager to spread the gospel of quality. 'When you get into quality, you become intolerant of the lack of quality in business, education, government, and other organizations' says James B. Houghton, former chairman of Corning Incorporated and the Leader who initiated Corning's Total Quality Strategy in 1983 (George

& Weimerskirch, 1994, p. 13)." Once the leaders of an organization have awakened to the benefits of implementing a Quality Management System, then they can begin to build the infrastructure to support this new movement. As one will see from the next section, it takes more than just belief to build a quality management system.

What are Quality Management Systems?

A quality management system is also more than a philosophy of meeting or exceeding customer expectations. The American Society for Quality Control (ASQC) defines a Quality System as: "A system of planned actions to ensure that a product or service consistently achieves an established level of quality which satisfies the customer's specifications and expectations" (Field Experts LTD, 2003). A Quality System is, in effect, a network of control mechanisms and techniques that when adhered to, dramatically reduce the possibility of customers receiving anything other than what they wanted and what they ordered. Although Quality System implementation is the most effective management tool...it does not guarantee quality. Every employee of the organization has a mandate to uphold and maintain the integrity of the system and is responsible to consistently strive for quality (Field

Experts LTD, 2003). A quality management system therefore has many different attributes. From the above definition, a quality system must have control, assurance, customer specifications, and employee focus. In essence, a QMS must be engrained into the culture of the organization. Before moving forward on the different elements of the quality system, a look in to organizational behavior must take place.

There have been ongoing debates on how an organization must be structured when enduring a Quality Management System. It is organizational ignorance to believe that an organization can quickly change its culture based on quality. It further would be careless research not to take a brief look into organization psychology and behavior. A balance between a Fredrick Taylor, mechanistic organization and an organistic organization must be managed on a daily basis. According to the book *Images of Organization*, Fredrick Taylor advocated five simple principles, which can be summarized as follow:

1. *Shift all responsibility for the organization of work from the worker to the manager.* Managers should do all the thinking relating to the

planning and design of work, leaving the workers with the task or implementation.

2. *Use scientific methods* to determine the most efficient way of doing work. Design the worker's task accordingly, specifying the precise way in which the work is to be done.
3. *Select* the best person to perform the job thus designed.
4. *Train* the worker to do the work efficiently
5. *Monitor* worker performance to ensure that appropriate work procedures are followed and that appropriate results are achieved (Morgan, 1997, p. 23)

These principles were raw concepts that would later be refined into the quality system we know today. Current Quality Management Systems follow Fredrick Taylor's theories to some degree. His theory was to establish specific methodology and controls when designing and assuring for quality. He wanted the responsibility to fall on management to create an efficient process that will allow an employee only to produce quality work. He believed that, if the process or system was built correctly, there would be very little an employee could do to create variation or inconsistency. Once the efficient

process was design, he further recognized that an organization must then assure the process is followed and create control systems to measure the effectiveness of the new process. Fredrick Taylor started these scientific management theories a century ago. Although this concept is widely used today, there is an equally wide counter argument for these procedures.

Those anti-Taylor enthusiasts believe that these concepts can harm an organization and deteriorate success. Some elements of these oppositions are mentioned in the book *Images of Organization*. Here are a few examples of what some people believe might happen to an organization: "(a) can create organizational forms that have great difficulty in adapting to changing circumstances; (b) can result in the mindless and questioning bureaucracy; (c) can have unanticipated and undesirable consequences as the interests of those working in the organization take precedence over the goals the organization was designed to achieve; and (d) can have dehumanizing effects upon employees, especially those at the lower levels of the organization" (Morgan, 1997, p. 23). This would seem to contradict that of quality Management, but in fact, these oppositions make the concept of Quality management much more useful.

Quality Management in its very nature is a true blend between "constant change" and a "structure approach". Quality management takes the best of both ideas, and puts it into one system. Quality Management is about defining quality, setting standards to meet the definition, assuring that those standards are met, and measuring the effectiveness. It is also continuously changing to meet the needs of its customers. As customer's needs change, so must the processes to deliver those needs change. It is both precisely structured and ever changing.

There are clear standards, procedures and other control mechanism that must be followed in a quality management system. How a company chooses to implement, follow, insure, and control these procedures and standards has an effect on the organization. There are many different quality management systems, but there are just handfuls that are the most affluent in mainstream business today. The next chapter will discuss the top three most common Quality Management Systems. Each system was created for the same purpose, to create quality. AS one will see in the next chapter, each system takes a different approach at achieving it.

CHAPTER TWO

WHAT ARE THE TOP THREE QUALITY MANAGEMENT SYSTEMS THAT EXIST TODAY?

Arguably the most well known quality management systems are the International Organization for Standards (ISO) standards, Six Sigma, and Total Quality Management (TQM). These systems and management styles will be described and analyzed. Each system offers a different perspective on adapting a Quality System to one's organization. For instance, ISO is perceived as the basic foundation for TQM and Six Sigma and will be discussed first.

International Organization of Standards

ISO, by definition is concerned only with quality management procedures for contract review and for the design, development, production, installation, and servicing of products and services. Although generally considered to be a European standard, ISO was developed by an international team that includes The American National Standard Institute (ANSI), the U.S. member of ISO (Goetsch & Davis, 1998, p. 6). ANSI was represented by the American Society of Quality Control (ASQC), its affiliates responsible for quality management and related standards.

The first version of ISO was ISO 9000, which released in 1987 (Goetsch & Davis, 1998, p. 6). The reason for creating ISO 9000 was to replace dozens of national and international quality standards with one single family of standards, universally recognized and used world-wide. Companies may want to implement ISO 9000 for several reasons:

- To improve operations by satisfying the ISO 9000 requirements for documented processes and records maintenance.
- To create or improve quality management/quality assurance systems that will be recognized by customers worldwide.
- To improve product or service quality, or the consistency of quality.
- To conform to the requirements of one or more major customers (Goetsch & Davis, 1998, p. 7).

ISO 9000 is not meant to be an organizational burden. If an organization adopts ISO 9000 for the wrong reasons, it will become a burden. ISO 9000 is a great tool or system to stabilize the organizations process and systems before tackling on a larger quality movement. ISO 9000 compliance focuses on the following guidelines:

- Say what you do (document it)
- Do what you say (keep records, i.e. document)
- Record what you did (Document the facts)
- Check on the results (Analyze and record, i.e., document)
- Act on the differences (Document Corrective actions) (Goetsch & Davis, 1998, p. 42)

Documentation of processes and systems is the essence of ISO 9000 compliance. ISO also provides an internal organization structure to support the movement. Without a foundation of written standards and procedures, tracking and improving quality is near impossible. Remember, any process that deviates from the specified process can be considered a defect. One cannot measure deviation if one has no basis to measure and compare.

Still, the original ISO 9000 does have some drawbacks. It does not measure the financial results of an organization. Using the Baldrige criteria, high performing companies must prove their quality by financial results, customer satisfaction etc. This means that a company can be ISO certified and show weak financial earnings and losses, and but actually produce low quality products. Although ISO 9000 is a great way to document processes,

follow standards, and hold accountability, it lacks a complete system for quality.

The ISO standards have now evolved incorporating more specific standards depending on the type of business. The ISO 9000 standards have developed into ISO 9001, 9002, 9003, and ISO 9004. Furthermore, ISO has also created the ISO 14000 standards for environmental management. Each new 9000 version has a subversions, such as ISO 9000-2:1993. This particular section deals with Quality Management and Quality Assurance Standards - Part 2: Generic Guidelines for the Application of ISO 9001, ISO 9002, and ISO 9003 (Goetsch & Davis, 1998, p. 21). The ISO 9001, 1987 version was expanded to create four guidelines: 9000-1, 9000-2, 9000-3, and 9000-4. Like the original ISO 9000, ISO 9001-1 gives guidelines for selecting one of the three other standards: 9001, 9002, or 9003. ISO 9000-2 gives guidelines for implementing the standards and ISO 9000-3 provides guidelines for the application of ISO 9001 in a software development situation. ISO 9000-4 gives guidelines to the dependability of the program management (Goetsch & Davis, 1998, p. 19-20).

ISO 9004 also has a similar expansion to that of ISO 9000. ISO 9004-1:1994 provides guidelines on the mechanics of quality management systems. ISO 9004-2:1991 provides

guidelines for services or service industry and ISO 9004-3:1993 gives guidelines for processed materials. ISO 9004-4 is concerned with quality improvements (Goetsch & Davis, 1998, p. 19-20).

The type of business determines which standards one should adhere to. The matrix below illustrates the function employed by the organization and matches them to the proper ISO standard.

Table 2. International Organization of Standards 9000 Standard Selection

ISO 9000 Standard Selection Matrix			
Function	ISO 9001	ISO 9002	ISO 9003
Design	X		
Development	X		
Production	X	X	
Installation	X	X	
Service	X	X	
Final Inspection	X	X	X
Test	X	X	X

Source: (Goetsch, D. L., & Davis, S. B. 1998. Understanding and Implementing ISO 9000 and ISO Standards. New Jersey: Prentice Hall)

For companies that do everything from design to testing, the ISO 9001 would be the standard to follow.

ISO 9000:2000 is the latest version in the ISO series. It embraces a full commitment to quality. Clause 0.2 of ISO 9000:2000 is quoted as followed:

To lead and operate an organization successfully, it is necessary to direct and control it in a systematic and transparent manner. Success can result from implementing and maintaining a management system that is designed to continually improve performance while addressing the needs of all interested parties. Managing an organization encompasses quality management amongst other management disciplines (Cianfrani & West, 2003, p. 5-6).

The ISO 9000:2000 also identifies eight quality management principles in order to lead the organization towards improved performance. Below are the eight principles followed by ISO 9000: 2000. They are from *Cracking the Case of ISO 9001:2000 for service*:

- a) Customer Focus. Organizations depend on their customer and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.
- b) Leadership. Leaders established unity of purpose and direction of the organization. They should

create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

- c) Involvement of people. People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.
- d) Process approach. A desired result is achieved more efficiently when activities and related resources are managed as a process.
- e) System approach to management. Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.
- f) Continual improvement. Continual improvement of the organization's overall performance should be permanent objective of the organization.
- g) Factual approach to decision making. Effective decisions are based on the analysis of data and information.
- h) Mutually beneficial supplier relationships. An organization and its supplier are interdependent and a mutually beneficial relationship enhances

the ability of both to create value (Cianfrani & West, 2003, p. 6).

Any organization that adopts the new ISO standards and its quality management principles will have a structure that will create, monitor, and measure quality. ISO standards are well known throughout the world and are used as the standardization tool for the rest of the world to follow. Another system that is becoming as well known is Six Sigma.

Six Sigma

Six Sigma is another popular quality management system. However, Six Sigma loyalists will argue that it goes beyond the normal definition of quality. As stated in the book by Thomas Pyzdek (2003) in *The Six Sigma Handbook*, "Six Sigma is about helping the organization make more money by improving customer value and efficiency. To link this objective of Six Sigma with quality requires a new definition of quality... [q]uality comes in two flavors: potential quality and actual quality. Potential quality is the known maximum possible value added per unit of input. Actual quality is the current value added per unit of input. The difference between potential and actual is waste." Six Sigma takes a

new perspective on some already proven quality tools and techniques.

Six Sigma is a rigorous, focused and highly effective implementation of proven quality principles and techniques (Pyzdek, 2003, p. 3). Sigma, σ , is a letter of the Greek alphabet used to measure process variability or standard deviation. In the Six Sigma methodology, a company's performance is measured by the sigma level of their processes. Most companies operate at a three or four sigma level which creates between 6,200 and 67,000 defects or problems per million opportunities (Pyzdek, 2003, p. 3). At a Sigma level of six, only 3.4 defects or problems exist per million opportunities.

Six Sigma was first started by a Motorola engineer named Bill Smith. In the early and mid-1980s with Chairman Bob Galvin at the helm, Motorola engineers decided that the traditional quality levels -- measuring defects in thousands of opportunities - did not provide enough granularity (isixsigma, 2003). Instead, they wanted to measure the defects per million opportunities. Motorola developed this new standard and created the methodology and needed cultural change associated with it. Six Sigma helped Motorola realize powerful bottom-line results in their organization. In fact, they documented more than \$16

billion in savings as a result of their Six Sigma efforts (isixsigma, 2003). Since then, Motorola won the Malcolm Baldrige award in 1988.

Lying within the heart of Six sigma is DMAIC problem solving methodology. The DMAIC is an acronym, which stands for Define, Measure, Analyze, Improve, and Control. These are the five phases of the six sigma methodology. Below is a chart that illustrates and defines the five phases of Six Sigma.

Table 3. Define, Measure, Analyze, Improve, and Control Definitions

D	<u>Define</u> the goals of the improvement activity.
M	<u>Measure</u> the existing system.
A	<u>Analyze</u> the system to identify ways to eliminate the gap between the current performance of the system or process and the desired goal.
I	<u>Improve</u> the system.
C	<u>Control</u> the new system.

Source : (Pyzdek, & Thomas 2003. The Six Sigma Handbook. New York: McGraw-Hill)

Each phase of the six sigma process is defined by Greg Brue of *Six Sigma for Managers* below:

Six Sigma problem-solving Sequence: Define, Measure, Analyze, Improve, Control

Define Phase

1. Identify the important problems in your processes
2. Select a project to combat one or more of the problems and define the parameters of the project
3. Determine the vital few factors to be measured, analyzed, improved, and controlled (Brue 2002 p. 92).

In any business, it is very important to understand what it is one is trying to achieve with a process improvement change. This is why in Six Sigma any new process change must start with a definition of what the problem is. One cannot fix a problem until one has identified the problem. This is the main role of the Define phase. This phase is also good to eliminate "scope creep." It is important that the project be scoped down from a very large corporate concern to an actual problem that can be solved.

Measure Phase

4. Select critical to quality (CTQ) characteristic(s) in the product or process; e.g.,
5. Define performance standards for Y

6. Validate measurement system for Y
7. Establish process capability of creating Y (Brue 2002 p. 92).

The Measure phase is mainly comprised of what is known as "soft tools". These are tools that the results are based on people's experience, intuition, and ideas. There is no "hard" data that can support these results. Nevertheless, it is very important to assemble a team and flush through the soft tools. Six Sigma recognizes that the input from the employees and process owners are extremely important in process improvement. It is their experience and ideas that lead the analysis in one direction or another. Out of the measure phase should be a list of significant causes to the defined problem. These causes or what is known as Xs need to be supported now with "Hard" data. This is done in the analyze phase.

Analyze Phase

8. Define improvement objectives for Y
9. Identify variation sources in Y
10. Screen potential causes for change in Y and identify vital few X_i .* (Brue, 2002, p. 92)

The Analyze phase is mainly used to support or debunk what was found in the measure phase using actual data. There is no longer any intuition or experience used. There

are a number of tests and graphs that can be used to understand the data and give the appropriate results. If the data supports what was found in the measure phase, then in fact, those significant causes become critical root causes. Not only did the team believe it was a problem, but now there is statistical proof that it is a problem as well.

Improve Phase

11. Discover variable relationships among the vital few X_i . *
12. Establish operating tolerances on the vital few X_i .*
13. Validate measurement system for X_i .* (Brue, 2002, p. 92)

The Improve phase is mainly comprised of creating a Design of Experiment or DOE. It is a tool generally used for manufacturing purposes. It allows one to understand the nature of the relationship of the critical root cause to each other or as a group. It is similar to regression, except that regression only allows a linear relationship, where DOE does not have to be linear. For example, if there are five critical root causes, this phase can show which one or which two are the ones that impact the problem the most. The improve phase is actually to improve

the critical Xs and not necessarily to improve the process.

Control Phase

14. Determine ability to control vital few X_i .*
15. Implement process control system on vital few X_i .* (Brue, 2002, p. 92)

*Note: X_i = initial X's.

The control phase is one of the most important phases of the DMAIC methodology. It is the time in which solutions are considered and scored as well as the plan to sustain the control of the solution over time.

Technically, any solution can be implemented regardless if one follows the DMAIC methodology. But every solution, no matter how it was derived, must be sustained. The control phase provides a structure to follow to sustain those gains. Some of the aspects of the control phase are human resources, documentation plan, monitoring plan, response plan and aligning systems and structures (Six Sigma Qualtec, 2004, p. 113). By following these plans, the gains provided by the any solutions can be sustained.

Each project that is selected follows the above DMAIC process. These projects are often handed to a professional in the company who is highly trained in specific statistical and quality tools. Six Sigma provides a clear

structure to how the organization should support these projects and the culture. Six Sigma provides its own branded personnel with their system. Within Six Sigma one has Executive Sponsors or leaders, Champions, Master Black Belts, Black Belts, and Green Belts. These roles are defined below:

Executive Leaders

The role of the Executive Leaders is to decide to implement Six Sigma and to endorse it throughout the organization. They need to absolutely believe that Six Sigma is the best system for the company. The support of Executive leaders is one of the most critical elements for Six Sigma success. Jack Welch, the CEO who started Six Sigma at General Electric, called Six Sigma "part of the genetic code" of future leadership at that company (Brue, 2002, p. 81). The executive leaders must also instill confidence in those who are heading the Six Sigma initiative. They must show confidence in others by providing incentives and rewards to other company leaders. Again, Jack Welch and General Electric have encouraged its executives to promote Six Sigma by linking it to compensation: 40% of the bonuses for the top 7000 executives are tied to Six Sigma implementation. That incentive sends the message about the importance of Six

Sigma and ensures commitment from the top levels down (Brue, 2002, p. 82). Finally, the executive leaders must have patience. Six Sigma projects take time and often do not provide immediate results.

Champions

In Six Sigma, Champions are advocates who fight for the cause of Black Belts and to remove barriers-functional, financial, personal, or otherwise-so that black belts can do their work (Brue, 2002, p. 83). Champions oversee the projects and the critical elements and report back to senior management. They also are the ones who select the black belt candidates and are responsible for the project schedule. Champions must be part of the project and not coach from the sidelines. The champion must have unwavering support for the black belts. The champion does whatever it takes to support the black belt.

Master Black Belt

The Master Black Belts are seasoned veterans in the Six Sigma methodology. They have been previous black belts and have completed numerous of different Six Sigma projects. The main role of the Master Black belt is to serve as a trainer, mentor, and guide (Brue, 2002, p. 85). Often the Master Black Belt is an outside consultant who

helps facilitate the process. Once Six Sigma is ingrained into the organization, other Master Black Belts can emerge from the ranks of the Black Belts. This is helpful to instill the Six Sigma way throughout the organization.

Black Belt

The Black Belts are the change agents who take the projects through the DMAIC process. The Black Belts sort out the data, separate opinion from fact and present in quantifiable terms the vital few elements that are causing productivity and profitability problems (Brue, 2002, p. 86). Black Belts do nothing else, except devote 100% of their time to their project. They are the backbone to Six Sigma.

Green Belts

Green belts assist black belts in their functional area. They work on projects part-time, usually in a limited, specific area (Brue, 2002, p. 87). Green Belts can use the Six Sigma tools in smaller departmental projects. This also helps disseminate the information throughout the organization. They also assist Black Belts in collecting data or running experiments. They are known as the "worker bees" behind the bottom line results (Brue, 2002, p. 87)

Six Sigma does everything to ensure that the methodology is followed throughout the organization. The Six Sigma core is about identifying big problems, assigning the best people to handle the problems, provide the tools and resources to fix the problems, and grant total uninterrupted time to work on the problem (www.bmgi.com)

One of the fundamental pillars of Six sigma is based on the equation $Y = F(X)$ or Y equals a function of X. In Six Sigma work, results are known as "Ys" and root causes are known as "Xs". This equation simply means that the value identified by Y is determined as a function of some other value X (Pyzdek, 2002, p. 63). The Xs are the inputs while the Ys are the outputs of a process. Those crucial Xs need to be located and controlled if we are to control the Ys. Those Xs are often what is most important to the customers.

In Six Sigma, all measurements and metrics are created to answer the following two questions:

What things do customers consider when evaluating us?

How do we know?

Six Sigma is about improving customer satisfaction by understanding the customer. In every product or service, customers have has critical elements that they evaluate

quality on. These elements are also known as Critical to Quality (CTQ). These are the attributes of a product or service that are most important to the customer. These are the essential Xs that need to be sought after and controlled. This is done by creating dashboards or metrics.

Six Sigma is a very methodical and controlled system that uses empirical data to make decisions. These decisions are made with the customer's satisfaction at the top of the priority list. Six Sigma seeks out to control those elements that matter most to the customer. This system creates an internal support structure that allows devoting a team entirely to the project at hand. Six sigma is not a brand new concept because it uses some of the same quality tools of Total Quality Management (TQM) that have been around for decades.

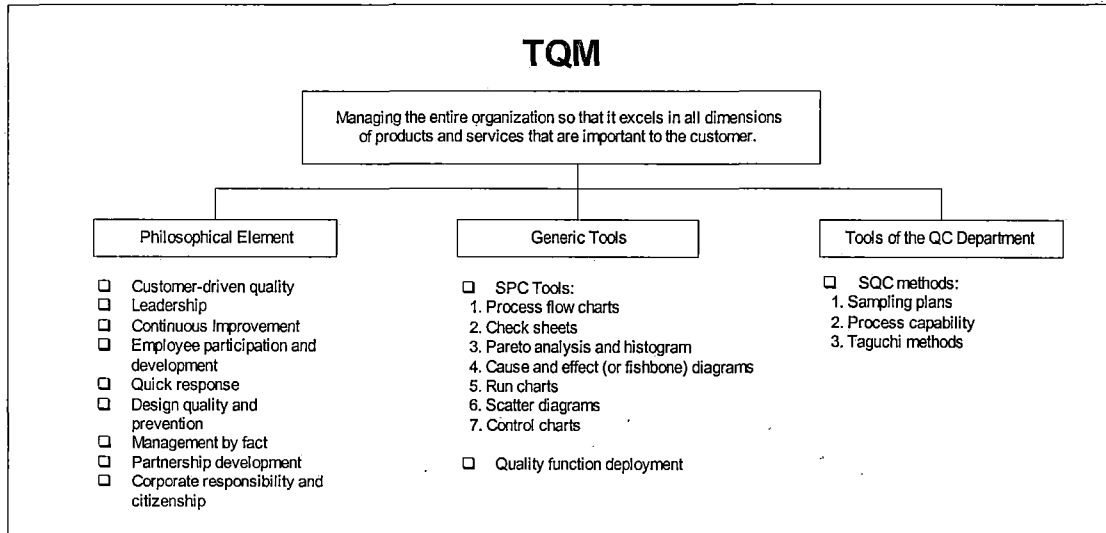
Total Quality Management

Total Quality Management is perhaps one of the first mainstream quality programs. This quality movement first started in Japan. Following World War II, Japan had to rebuild its industrial base completely. Starting in the 1970s, Japanese manufacturers, with the help of American consultants such as W. Edward Deming and Joseph M. Juran,

began making quality a competitive priority (Krajewski & Ritzman, 1999, p. 214). From the book, *Operations Management: Strategy and Analysis*, "Deming's philosophy was that quality is the responsibility of management, not the workers, and that management must foster an environment for detecting and solving quality problems. Juran believed that continuous improvement, hands-on management, and training are fundamental to achieving excellence in quality." Drs. Deming and Joseph Juran were the pioneers of the quality movement (Chase, Aquilano, & Jacobs, 1998, p. 200). The term total quality management (TQM) has been coined to describe a philosophy that makes quality values the driving force behind leadership, design, planning, and improvement initiatives (Chase, Aquilano, & Jacobs, 1998, p. 200). The following definition is taken from the book, *Production and Operations Management, Manufacturing and Service*, "We define TQM as 'managing the entire organization so that it excels on all dimensions of products and services that are important to the customer.'"

Total quality management stresses that the firm needs to integrate quality in all elements of the business. TQM is as much a philosophy as it is statistical controls. TQM uses standard Statistical Process Controls (SPC) to help

control their processes and systems. Below is a clear breakdown of the essential elements of total quality management:



Source: (Chase, R.B., Aquilano, N.J., & Jacobs, F.R. 1998. Production and Operations Management-Manufacturing and Service. Boston: Irwin McGraw-Hill)

Figure 1. Total Quality Management Diagram

Although there are other very important elements to TQM, such as Strategy, training, reward and recognition, process management etc., the core elements of totally quality management focus on customers-driven quality, continuous improvement, and employee participation (Krajewski & Ritzman, 1999, p. 214). The following is more detail on each element:

Customer-Driven Quality

Like the two other quality systems, TQM focuses entirely on the customer. This system is direct by

customer requirements and aims to achieve customer satisfaction. In the book, Total Quality Management by Stephen George and Arnold Weimerskirch (1994), it states, " [t]he benchmark companies in this book - Motorola, Corning, FedEx, Xerox, Solectron, the Ritz-Carlton Hotels, and others - make understanding and satisfying customer requirements their top priority. They have learned from experience that customer satisfaction determines financial success." Although most companies will acknowledge and recognize that their customers are the most important, they often do not follow their words with action. To quote Marty Russell (2003), California Award for Performance Excellence Judge and consultant, "organizations must seek customer design data and not marketing data." Many organizations will seek satisfaction surveys and other demographic data as data to determine their decisions. However, this data falls short of customer requirements. For example, if a company launches a new product and then collects data on the satisfaction of the customers who use the product, then the data is after the product launch. Changing an organization to require customer design data will lead the organization to obtain data on the customer requirements before the product was even created. Furthermore, data should have been collected to see if any

customers even wanted the product in the first place. These last statements are drastically different in their philosophy than just obtaining customer satisfaction. This is a core element of TQM; customer data drives organizational direction.

Employee Involvement

Any new change in direction or system would fail without the support of the employees. Employee involvement is a crucial pillar to the TQM process. A complete program in employee involvement includes changing organizational culture, fostering individual development through training, establishing awards and incentives, and encouraging teamwork (Krajewski & Ritzman, 1999, p. 216). The culture of the organization must change. The organization must adopt "system thinking". As defined by Peter Senge (1994) in his book *The Fifth Discipline Fieldbook*, system thinking is "a way of thinking about, and a language for describing and understanding, the forces and interrelationships that shape the behavior of systems. The discipline helps us see how to change systems more effectively, and act more in tune with the larger processes of the natural and economic world." This creates a shared vision for the entire organization from CEO to entry level employee. Every employee must be empowered to

make decisions and take ownership of the quality. In TQM, quality is everyone's responsibility.

Employees also must be developing proficiently. Training courses and on the job training is essential to build a capable and productive employee. Awards and incentives also play a key role in receiving employee involvement. Merit pay and bonuses can give employees some incentive for improving quality (Krajewski & Ritzman, 1999, p. 218). Other nonmonetary rewards, such as employee recognition in front of others, a private parking spot, or a plaque can also motivate quality improvements (Krajewski & Ritzman, 1999, p. 218). Nonetheless, without the employee involvement no organization can succeed in any endeavor the wish to pursue.

Continuous Improvement

Continuous Improvement, based on a Japanese concept called Kaizen, is the philosophy of continually seeking ways to improve operations (Krajewski & Ritzman, 1999, p. 218). The concept can be used to reduce time, waste, defects, cost, etc. The bases of the continuous improvement philosophy are the beliefs that virtually any aspect of an operation can be improved and that the people most closely associated with an operation are in the best position to identify the changes that should be made

(Krajewski & Ritzman, 1999, p. 218). According to the book, Operations Management, the below five steps are essential for success:

1. Train employees in the methods of statistical process control (SPC) and other tools for improving quality and performance.
2. Make SPC methods a normal aspect of daily operations.
3. Build work teams and employee involvement.
4. Utilize problem-solving tools within the work teams
5. Develop a sense of operator ownership in the process.

Two main elements to continuous improvement are statistical process control (SPC) and problem solving. SPC is the application of statistical techniques to determine whether the output of a process conforms to the product or service design (Krajewski & Ritzman, 1999, p. 247). Some examples of process changes that can be detected by SPC are:

- a sudden increase in the proportion of defective gear boxes
- a decrease in the average number of complaints per day at a hotel

- a consistently low measurement in the diameter of a crankshaft
- a decline in the number of scrapped units at a milling machine, and
- An increase in the number of claimants receiving late payments from an insurance company (Krajewski & Ritzman, 1999, p. 247).

Problem solving is another major component of continuous improvement. Many organizations use the Deming Wheel, after Dr. W. Edward Deming, otherwise known as the Plan-Do-Study-Act (PDSA) cycle. Like Six sigma using the DMAIC methodology, TQM uses the PDSA. According to the *Operations Management* book, the cycle comprises the following steps:

1. Plan. The team selects a process (activity, method, machine, or policy, for example) that needs improvement. The team then documents the selected process, usually by analyzing data (using the tools we discuss later in the chapter); sets qualitative goals from improvement; and discusses various ways to achieve the goals. After assessing the benefits and cost of the alternatives, the team develops

a plan with quantifiable measure for improvements.

2. Do. The team implements the plan and monitors progress. Data are collected continuously to measure the improvements in the process. Any changes in the process are documented, and further revisions are made as needed.
3. Check. The team analyzes the data collected during the do step to find out how closely the results correspond to the goals set in the plan step. If major shortcomings exist, the team may have to reevaluate the plan or stop the project.
4. Act. If the results are successful, the team documents the revised process so that it becomes the standard procedure for all who may use it. The team may then instruct other employees in use of the revised process (Krajewski & Ritzman, 1999, p. 219).

The Deming Wheel is a defined methodology for problem solving. It seeks to reduce the non value added steps in a process and confirms those necessary steps of the processes that still remain. It also uses data to drive decisions and illustrate the behavior of processes.

Total Quality Management assures that quality is explored from the customer perspective, involves all employees, and harnesses a systematic approach to continuous improvement and problem-solving. Total Quality management philosophy and measurements drove the creation of the Malcolm Baldrige Award.

CHAPTER THREE

WHAT IS THE CRITERIA USED TO JUDGE A MALCOLM BALDRIGE WINNER?

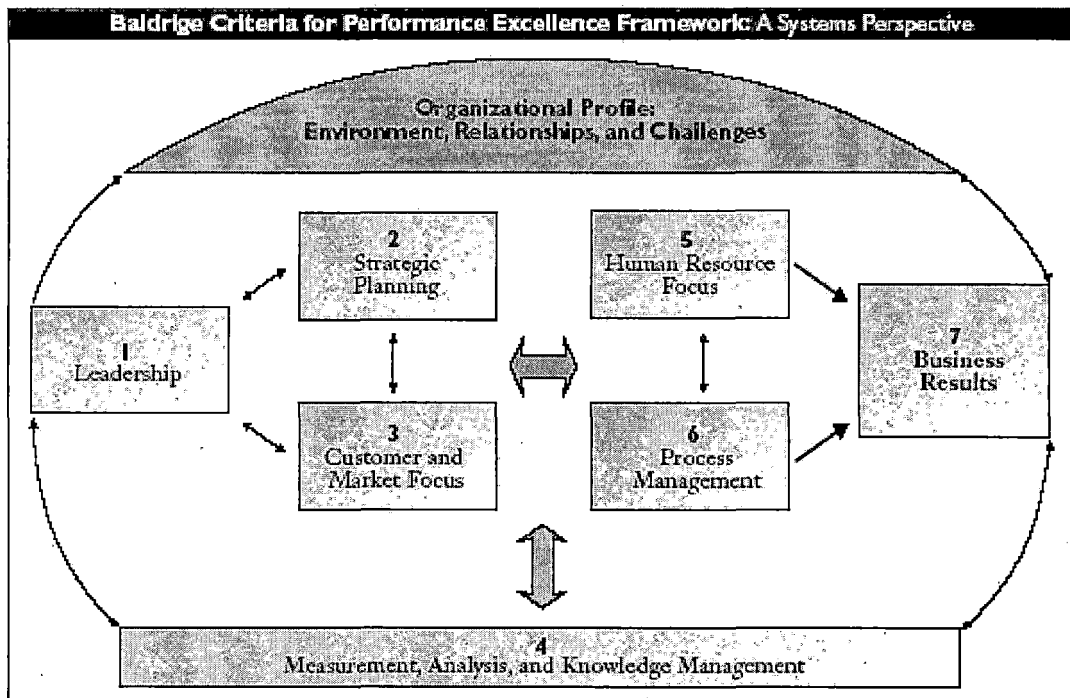
The Malcolm Baldrige is a world-renown award for performance excellence. Arguably, this award could be considered a benchmark for creating a successful organization. For this paper, the Malcolm Baldrige was used as the measurement for success. Before an organization can win the award, it must first be eligible to receive the award. The award is only for profit-driven business organizations. Non-profits or not-for-profit organizations cannot apply for the award. For an organization to win the Malcolm Baldrige Award, it must prove that it has surpassed the set Baldrige criteria. The Baldrige criterion is a listing of seven categories that are listed below. The following list is from the Baldrige official website, www.quality.nist.gov:

Categories	Points
1. Leadership	120
2. Strategic Planning	85
3. Customer and Market Focus	85
4. Measurement, Analysis, and Knowledge Management	90

5.	Human Resource Focus	85
6.	Process Management	85
7.	Business Results	450

(National Institute of Standards and Technology, 2003)

Each category is weighted with points. If the applicant receives a certain number or higher, the company has met the criteria to become a Malcolm Baldrige Award recipient. The below image is the Baldrige framework:



Source: (National Institute of Standards and Technology. 2003. Baldrige National Quality Program. February, 26 2003, from http://www.quality.nist.gov/PDF_files/2004_Business_Criteria.pdf)

Figure 2. Baldrige Award Criteria

Each category has sub categories with different points for weighting. The below category descriptions are

taken from the actual 2004 Business Criteria found at
[http://www.quality.nist.gov/PDF_files/
2004_Business_Criteria.pdf](http://www.quality.nist.gov/PDF_files/2004_Business_Criteria.pdf).

Leadership

The Leadership Category examines how the organization's senior leaders address values, directions, and performance expectations, as well as a focus on customers and other stakeholders, empowerment, innovation, and learning. Also examined are the organization's governance and how the organization addresses its public and community responsibilities.

Strategic Planning

The Strategic Planning Category examines how the organization develops strategic objectives and action plans. Also examined are how the chosen strategic objectives and action plans are deployed and how progress is measured.

Customer and Market Focus

The Customer and Market Focus Category examines how the organization determines requirements, expectations, and preferences of customers and markets. Also examined is how the organization builds relationships with customers and determines the key factors that lead to customer

acquisition, satisfaction, loyalty and retention, and to business expansion.

Measurement, Analysis, and Knowledge Management

The Measurement, Analysis, and Knowledge Management Category examines how the organization selects, gathers, analyzes, manages, and improves its data, information, and knowledge asset.

Human Resource Focus

The Human Resource Focus Category examines how the organization's work systems and employee learning and motivation enable employees to develop and utilize their full potential in alignment with the organization's overall objectives and action plans. Also examined are the organization's efforts to build and maintain a work environment and employee support climate conducive to performance excellence and to personal and organizational growth.

Process Management

The Process Management Category examines the key aspects of the organization's process management, including key product, service, and business PROCESSES for creating customer and organizational value and key support process. This Category encompasses all key processes and all work units.

The Business Results

The Business Results Category examines the organization's performance and improvement in key business areas—performance, financial and marketplace performance, human resource results, operational performance, and governance and social responsibility. Also examined are performance levels relative to those of competitors (National Institute of Standards and Technology, 2003).

The criterion for the Malcolm Baldrige does not mention how one performs the above criteria, only that the criterion is met. If the above criteria are a cookie cutter for success, then why do not more organizations simply follow the criteria? Each criterion was formed out of the quality movement. To excel at the criteria means one has excelled at achieving quality. To excel at achieving quality means one has established some sort of quality management system. Although the Malcolm Baldrige Award follows no set recipe and can be won by the use of many different quality systems, there is a common ground in which all winners share.

What do All Malcolm Baldrige Winners have in Common?

Every organization strives for success. They all strive to be the best in their business and become

financially profitable. With the Malcolm Baldrige Award being a world-renowned measurement for success, it is important to take a look at the common denominators of all winners. It is equally important to also look at the common denominators of these quality management systems and extract out what they all are trying to achieve.

According to the *Production and Operations Management* book, there are four common elements to an award winning organization:

1. The companies formulate a vision of what they thought quality was and how they would achieve it.
2. Senior management was actively involved
3. Companies carefully planned and organized their quality effort to be sure it would be effectively initiated.
4. They vigorously controlled the overall process (Chase, Aquilano, & Jacobs, 1998, p. 206).

The winners of the Malcolm Baldrige Award take commitment to the customer to the extremes and engrain this philosophy into the fabric of the organization (Chase, Aquilano, & Jacobs, 1998, p. 206). It is more than a program; it is a way of life. The Baldrige was set up to accept all philosophies of quality. It provides a clear

structure from the strategic plans and critical success factors to actual operational goals. To win the MBNQA, it takes more than passion and a commitment to quality; a company must also prove that they have their systems structured to meet the requirements of the MNQA criteria.

In researching the actual scoring system used by MBNQA examiners for auditing a company's application, I came across the scoring system used for the California Award for Performance Excellence (CAPE). This award criteria mirrors exactly to the MBNQA, however it is awarded by the State of California and not by the nation. The criteria and scoring however are the same as the MBNQA. See Appendix B for a chart that illustrates the Scoring Guidelines - Business Criteria for the California Award for Performance Excellence (CAPE).

In reviewing these scoring guidelines, I believe there are a few themes that must be addressed within an organization in order to win this quality award. In addition to the four previous mentioned in this paper, I believe that an organization must have an effective systematic approach to its processes. This will allow an organization to score high in the first 6 categories of the award. Appendix B shows criteria for categories 1- 6 and other criteria for category 7, which will be explained

later in this chapter. But to score well in 6 of the 7 categories, an organization must have a systematic approach. This approach must be data driven in all aspects of decision-making and it must be fully deployed throughout the organization. In my interpretation, these three main elements are the underlining keys to the scoring guide for the California Award for Performance Excellence. The organization will receive a higher score the more effective, systematic, and fully deployed this approach becomes within an organization (California Council for Excellence, 2005). When these scoring guidelines talk about systematic approach, they are referring to a defined, documented, and controlled process. They are talking about the reduction of variation of these processes. They are talking about employee involvement in a culture change to this new approach and they are talking about Executive leaders commitment to deploy this approach throughout the organization. How do organizations meet this systematic approach criterion and have it fully deployed throughout the organization? Award winning organizations fully deploy a quality management system to meet the criteria of systematic approach.

In further reviewing the scoring guidelines, there is another category that must see results. This is category

seven, Business Results. Category seven measures the performance of the systematic processes in various areas such as Marketing, Operations, Financials etc. An organization cannot win award on systematic approach alone, but must also show positive trends and results from its changes. In my analysis of category seven, an organization must show three major results from their changes. First, they must show the performance of their key processes. Many organizations do not know what their key processes are, let alone, have a clear measurement of performance. Second, they must show improvement trends of their key processes. A performance measure must show a positive trend. And third, all business results must address key customers, markets, as well as key processes. The business results category is not just about key process performance, but about positive results in new markets, in customer satisfaction or retention, as well as in the overall financial soundness of the organization. In order to win the MBNQA, an organization must meet the scoring criteria of category 1-6 and show positive result by meeting said criteria, which is illustrated in category seven.

It does not matter if an organization uses ISO, Six Sigma or TQM, CAPE and Malcolm Baldrige Awards promotes

emphasis on quality. The quality management systems in this paper addressed the criteria in categories 1-6 and all measured business results as addressed in category seven. If quality management systems are the answer to the actual scoring criteria to win the CAPE or Malcolm Baldrige Award, then we must look at the quality management systems of the past winners. The chart below shows the previous last Baldrige winners and the type of quality system those organizations used:

Table 4. 1999-2004 Malcolm Baldrige Quality Award Winners

1999 MBNQA Winners	Quality System (1)	Quality System (2)
STMicroelectronics, Inc. - Regions Americas	TQM	ISO 140001
BI	TQM	
The Ritz-Carlton Hotel Company, LLC	TQM	
Sunny Fresh Foods	Crosby philosophy	
2000 MBNQA Winners		
Dana Corporation - Picer Driveshaft Division	TQM	QS 9000
Operations Management International	CPI	Deming Wheel/PDCA
Karlee Company, Inc.	CPI	ISO 9000
Los Alamos National bank	Formal Quality Structure	
2001 MBNQA Winners		
Clarke American	Baldrige Model	Deming Wheel/PDCA
Pal's sudden service	Baldrige Model	Deming Wheel/PDCA
Chugach School district	N/A	
Peral River School District	CPI	Deming Wheel/PDCA
University of Wisconsin	Baldrige Model	

2002 MBNQA Winners		
Motorola Commercial, Government and Industrial Solutions	Six Sigma	M Gate
Branch-Smith Printing Division	CPI	ISO 9000
SSM HealthCare	Baldrige Model	
2003 MBNQA Winners		
Baptist Hospital, Inc.	FOCUS-PDCA	
Saint Lukes Hospital of Kansas City	PDMAI Model	
Community Consolidate School District 15	Baldrige Model	Deming Wheel/PDSA
Stoner, Inc.	CPI	Lean
Boeing Aerospace Support	Baldrige Model/ Six Sigma	ISO 9000/ Lean
Catapillar Financial Services Corporation	Six Sigma	Baldrige Model
Medrad Inc.	CPI	ISO 9000
2004 MBNQA Winners		
Bama Companies	Six Sigma	Internal Excellence Model
Monfort College of Business	CPI	Deming Wheel/PDCA ISO
Texas Nameplate Company	Baldrige Model	9000/14001
Robert Wood Johnson Unviersity Hospital	Deming Wheel/PDSA	

(Source: Personal analysis of the winning Malcolm Baldrige applications found on <http://www.nist.quality.gov>)

Over the past couple of years, I personally analyzed the applications of the MBNQA winners beginning with the winners of 1999 to present. In researching and analyzing these applications, I was looking for two major components within the application. Did they use a popular or recognizable Quality Management System? And, did they use more than one system to achieve their goal? The outcomes to these questions were based on my interpretation of the winner's applications.

In my research, illustrated in Table 4, 96.2% of the winners since 1999 used a formalized and well-known Quality Management System. Only one applicant, Chugach School District, used a system that was not easily recognizable or mainstream. This however, does not mean that Chugach School District did use their own internal Quality Management System. This only means that I could not associate the school district to a mainstream system. Many of these applicants use systems that are not covered in this paper, but have significant recognition throughout the business and quality community.

Furthermore, out of the 96.2% of the companies that use a formalized and recognizable quality management system, another 50% use an additional form of a quality management system. Nearly 26% of the applicants use the Malcolm Baldrige Model as their primary system. The criterion for the award often is used as a guide to help leaders change their business in a structured and systematic manner. As mention in this paper before, however, the award criterion does not specify how a company achieves the categories in the model, only that they do. It does not specify what approach to use, only that it is data drive and fully deployed. This is why that 100% of the applicants that uses the Malcolm Baldrige

Model as their primary QMS also specify an additional QMS that they use. According to my interpretation of the applications, the most common secondary QMS that is used is the Deming Wheel-PDCA, which was covered under the Total Quality Management (TQM) portion of this paper.

All of these companies used different quality management systems and all of them won the Baldrige Award. In fact half of the organizations blend and use multiple systems. Not only are quality management systems an underlining common denominator, but the blending of multiple quality management systems. Senior leaders at Ames Rubber Corporation view the Malcolm Baldrige Model, ISO 9000, and Six sigma as simply tools that all fit into a tool box for continuous improvement. According to President and CEO Tim Marvil, "Baldrige gives Ames an overarching set of criteria questions to determine where we are, ISO helps us document what we're doing, and Six Sigma helps us to implement the processes to correct the problems (i Six Sigma 2005)."

Ames is not the only MBNQA winner that believes a company must integrate multiple systems. ST Microelectronics, Inc. -Region Americas also believes that different quality systems help business achieve maximum results. According to the Baldrige National Quality

Program, Summer 2002 CEO Issue Sheet, " ST finds that even though ISO, Six Sigma, and Baldrige Criteria for Performance Excellence may overlap in some areas; they are not mutually exclusive. ' While each of these quality programs builds a foundation for continuous improvement, each is different in its scope and focus of its coverage,' explains Pieranunzi (National Institute of Standards and Technology, 2005)." He goes on to explain, "As we at ST see it, the Baldrige Criteria lay the foundation for the entire organizational process by encouraging review of its approach. ISO address systems that have a direct influence in product quality and customer satisfaction, without suggesting tools for analysis, prioritization, and evaluation. Finally, Six Sigma addresses the statistical strategy philosophy for continuous improvement. Regardless of which tools suit the organization's needs, best-in-class companies continue to use them in their pursuit of performance excellence and their commitment to never be satisfied. In fact, all are mutually complementary and have their place in Total Quality Management at ST" (National Institute of Standards and Technology, 2005).

As shown in this paper, every winning company has a structured and recognizable quality management system and

another 50% have more than one. Many organizations used classic TQM and others simply applied the Deming Wheel. Other organization used Six Sigma and yet others used a combination of ISO Standards with TQM. Regardless of what system they use, they are addressing the most important element of a quality organization, a systematic, data driven and fully deployed approach to its processes. Quality management systems, one or multiple, are the underlining common denominator to winning the MBNQA.

CHAPTER FOUR

CONCLUSION

Quality Management systems are the single most powerful tool that a company can establish to create a successful organization. Using the Malcolm Baldrige as a success metric, the underlining common denominator among all winners is a quality management system or multiple systems. Quality management systems regardless of the brand or style focus efforts on customer satisfaction, continuous improvement, employee involvement and leadership vision.

In my personal analysis of the quality management systems outlined in this paper, the MBNQA winning applications, and the scoring guideline for the CAPE Award, it has become clear that quality management systems have a strong correlation to award winning companies. Each quality management system analyzed in this paper, ISO, Six Sigma and TQM had a strong focus on customers, systematic processes, data driven decision-making, and required strong leadership involvement. In analyzing the winning applications, every company had a strong vision of the organization, measurable critical success factors, and strong leadership involvement along with strong employee

involvement. Every winning company had at least one quality management system. In analyzing the scoring guidelines for the CAPE Award, the scoring system emphasized on effective, systematic approaches, data-driven decisions, and this approach must be fully deployed. A well-deployed quality management system will address the effective, systematic approach and data-driven decisions and evaluations portion. A quality management system though is independent to deployment. A quality management system cannot deploy itself. The leaders of the organization must deploy the system and it must not waver. Every award winning application talked about their strong leadership and their commitment to quality and their customers. It is clear that there is one crucial element in becoming a world-class organization.

Leadership advocacy for the change is the most crucial element in a quality management system, regardless if it is ISO, Six Sigma or TQM. The deployment of any quality management system will fail if the leadership does not fully support the initiative. This support is not just verbal slogan that sounds great for the board of directors. It also means holding other leaders personally accountable to meeting milestones and providing the necessary capital to deploy the system properly. To quote

from the book, *Total Quality Management*, "The Institutes for Productivity Through Quality in the College of Business at the University of Tennessee in Knoxville have more than 15 years' experience in executive education and field research with a majority of Fortune 500 companies. In an article in *Quality Press*, associate dean Michael Stahl described two themes that are primary importance to American competitiveness and that have surfaced from the Institutes experience:

The first theme is that management should focus on creating and delivering the best value to the customer, not maximizing stock prices, return on investment, or shareholder equity-the typical measures of corporate performance. The second major theme is that managers must design and continuously improve organizational alliances and consensus thinking that will cut horizontal across vertical organizational structures; integrate corporate functions such as engineering, manufacturing, and finance; and foster teamwork" (George & Weimerskirch, 1994, p. 3).

In order for leaders to accomplish the above task, they must have a clear understanding of their systems. The

new business management model requires a dramatic shift in thinking among senior leaders who resist a systems view of their organizations. The model is not something one can fit into the way a company already operates, nor is it something that can be done in addition to normal operations (George & Weimerskirch, 1994, p. 26). More often, a quality initiative will fail not because of the employees, not because of the quality management system, but because the senior leaders failed to truly support the movement. It must not only be verbal support, but financial and structural as well.

Quality management is a simple concept. Establish systems to meet the needs of the customers consistently. After all, that is why organizations are in business, to serve their customers. An organization that puts a customer first and establishes controls and systems to consistently meet those needs of the customers, can reach the same success as a Malcolm Baldrige company. By following some of the quality management systems in this paper, ISO 9000, Six Sigma, or TQM, a company will be following a tested and proven system for success.

The structure of the Malcolm Baldrige was created from the quality movement. That structure was provided by the quality systems discussed in this paper. To implement

a quality management system is to implement a Malcolm Baldrige award winning strategy. It is up to the leaders and the employees to see that successful strategy realized.

The timing of this project's topic and my MBA for that matter could not have been more perfect. For many years, the financial institution I work for had dabbled into the concepts of continuous process improvement. This concept was viewed as some simple tools to help us understand our processes better. Implementing this structured approach of what was called CPI (continuous process improvement), was met with great resistance. Senior leaders, understood the value of such structure, but didn't want to change the way in which they currently operated. It was left up to a few middle managers to advocate this change. I was one of those personally involved in leading this grass roots effort. It turns out that Senior Vice Presidents do not like to listen to contrary points of view. And with no or little support from the CEO and other senior leaders, the CPI effort was in dismay. To advocate CPI internally at our organization soon became political suicide. Those that continued to support such efforts were perceived by some to be an annoying barrier and considered to be anti-production. As

one of those advocates of CPI, I needed a much broader understanding of what this effort was trying to achieve. Coincidentally I was in the middle of my MBA program and about to study further in Production Management and Management Science. The perfect blend of real life struggles and academic knowledge would soon combine.

It was through specific courses in my MBA program, such as Management Science and Industrial Psychology, which propelled my vision of what my current employer was trying accomplishing. It was then I realized that this CPI effort was a mere puzzle piece to an overall big picture of Quality. In hindsight, our original CPI effort was destined to fail. In studying quality management systems from many great authors for this paper, it was clear that my organization was trying to add a new tool to the current business with no support from the top leaders. This is clearly a recipe for disaster. It was this project paper that allowed me to focus specifically on a topic that would not only relate, but could change the direction of my organization.

With this new understanding of the big picture of quality, it was much easier to identify the gaps in our original infrastructure. The, at the time, Assistant Vice President of Strategic Planning and me planned and

refocused the companies efforts. We, among a few others, were the original CPI committee, and advocates, in charge of reviving the company's efforts into Continuous Process Improvement. It was through this planning in which I was able to use and share my knowledge of quality management systems from this project. In my research of different quality systems and our combined efforts in analyzing our past CPI failures, we were able to come up with a quality system that would best fit the needs our organization. This system would be Six Sigma.

In February of 2004, our organization began the journey of implementing Six Sigma and Business Process Management, mainly from the efforts of the AVP of Strategic Planning and me. We hired outside consultants to help with the culture change so that it was no longer internal lower ranked internal employees trying to change higher ranked management. This helped tremendously as they gave more weight to consultant's views then internal employees. Even though the organization still viewed these new efforts as tools to help the current organization, we were actually planning a bigger quality deployment initiative. In May 2004, I was hired, among two others, to become Process Improvement Managers in a newly formed Quality Department. We went through a month of training

over four months to become trained Six Sigma Black Belts. The AVP of Strategic Planning was promoted to Vice President of Quality and would now be our supervisor. Everyday, within our department, we get to apply many different ideas and concepts that were learned through this project paper.

Our department has further created a bigger picture for the rest of the organization. This is the picture of Quality Management. Over the past year, we have begun to understand that Six Sigma, or any other tool, are ways for us to achieve quality. And quality needed to be managed, measured, and improved. We have since launched an 880 day plan on how our organization will become a quality driven organization. We have more support from the CEO and other top leaders and we are starting to understand that our business must change to become a world-class organization.

From these efforts, and with a new heartbeat of quality, our organization has decided to apply for various quality awards, including the Malcolm Baldrige Award. It is estimated that we will begin the application process for this award sometime in 2007. As a Six Sigma Black Belt, a member of the quality team, an original member of the CPI committee, and all time advocate of quality, I can find nothing more rewarding than to see our organization

want and attempt to win one of the most prestigious quality awards, the Malcolm Baldrige. This project has become the backbone to many quality efforts throughout my organization.

It is my hope that this paper can also become useful for others in their journey to achieve quality within their organization. I wrote this paper to not only highlight and understand a few well-known quality management systems, but to reinforce how powerful and vital these systems are to becoming a successful organization. I wrote this paper to give the reader an understanding of what the Malcolm Baldrige Award is and clearly illustrate the one major change an organization can make to achieve this award. I hope the reader finds value in the research of quality management systems, the Malcolm Baldrige award, and the scoring system of the California Award for Performance Excellence. More importantly, the reader should find value in the strong correlation between these systems and winning the MBNQA. This paper has shown successful organizations measured by the MBNQA, and what they did to achieve this status. There is clear evidence that in order for an organization to win the MBNQA, an organization must plan, implement, and control a quality management system.

APPENDIX A

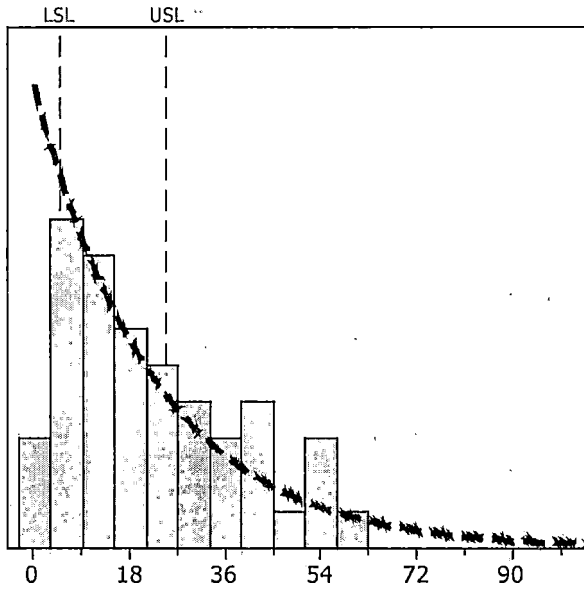
EXAMPLE OF A NEW ACCOUNT PROCESS CAPABILITY

Process Capability of New Account

Calculations Based on Exponential Distribution Model

Process Data	
LSL	5
Target	*
USL	25
Sample Mean	22.27
Sample N	47
Mean	22.27

Observed Performance	
PPM < LSL	148936
PPM > USL	404255
PPM Total	553191



Overall Capability	
Pp	0.14
PPL	0.68
PPU	0.07
Ppk	0.07

Exp. Overall Performance	
PPM < LSL	201098
PPM > USL	325436
PPM Total	526535

(Source: Personal creation of a Capability Analysis using fictitious data with MiniTab Statistical Software)

APPENDIX B
SCORING GUIDELINES -BUSINESS CRITERIA

SCORE	PROCESS (For Use With Categories 1 – 6)	RESULTS (For Use With Category 7)
0% or 5%	<ul style="list-style-type: none"> • No systematic approach is evident; information is anecdotal. (A) • Little or no deployment of an approach is evident. (D) • No evidence of an improvement orientation; improvement is achieved through reacting to problems. (L) • No organizational alignment is evident; individual areas or work units operate independently. (I) 	<ul style="list-style-type: none"> • There are no business results or poor results in areas reported. • Trend data are either not reported or show mainly adverse trends. • Comparative information is not reported. • Results are not reported for any areas of importance to your organization's key business requirements.
10%, 15%, 20%, or 25%	<ul style="list-style-type: none"> • The beginning of a systematic approach to the basic requirements of the Item is evident. (A) • The approach is in the early stages of deployment in most areas or work units, inhibiting progress in achieving the basic requirements of the Item. (D) • Early stages of a transition from reacting to problems to a general improvement orientation are evident. (L) • The approach is aligned with other areas or work units largely through joint problem solving. (I) 	<ul style="list-style-type: none"> • A few business results are reported; there are some improvements and/or early good performance levels in a few areas. • Little or no trend data are reported. • Little or no comparative information is reported. • Results are reported for a few areas of importance to your organization's key business requirements.
30%, 35%, 40%, or 45%	<ul style="list-style-type: none"> • An effective, systematic approach, responsive to the basic requirements of the Item, is evident. (A) • The approach is deployed, although some areas or work units are in early stages of deployment. (D) • The beginning of a systematic approach to evaluation and improvement of key processes is evident. (L) • The approach is in early stages of alignment with your basic organizational needs identified in response to the other Criteria Categories. (I) 	<ul style="list-style-type: none"> • Improvements and/or good performance levels are reported in many areas addressed in the Item requirements. • Early stages of developing trends are evident. • Early stages of obtaining comparative information are evident. • Results are reported for many areas of importance to your organization's key business requirements.
50%, 55%, 60%, or 65%	<ul style="list-style-type: none"> • An effective, systematic approach, responsive to the overall requirements of the Item, is evident. (A) • The approach is well deployed, although deployment may vary in some areas or work units. (D) • A fact-based, systematic evaluation and improvement process and some organizational learning are in place for improving the efficiency and effectiveness of key processes. (L) • The approach is aligned with your organizational needs identified in response to the other Criteria Categories. (I) 	<ul style="list-style-type: none"> • Improvement trends and/or good performance levels are reported for most areas addressed in the Item requirements. • No pattern of adverse trends and no poor performance levels are evident in areas of importance to your organization's key business requirements. • Some trends and/or current performance levels—evaluated against relevant comparisons and/or benchmarks—show areas of good to very good relative performance. • Business results address most key customer, market, and process requirements.
70%, 75%, 80%, or 85%	<ul style="list-style-type: none"> • An effective, systematic approach, responsive to the multiple requirements of the Item, is evident. (A) • The approach is well deployed, with no significant gaps. (D) • Fact-based, systematic evaluation and improvement and organizational learning are key management tools; there is clear evidence of refinement and innovation as a result of organizational-level analysis and sharing. (L) • The approach is integrated with your organizational needs identified in response to the other Criteria Items. (I) 	<ul style="list-style-type: none"> • Current performance is good to excellent in most areas of importance to the Item requirements. • Most improvement trends and/or current performance levels are sustained. • Many to most reported trends and/or current performance levels—evaluated against relevant comparisons and/or benchmarks—show areas of leadership and very good relative performance. • Business results address most key customer, market, process, and action plan requirements.

SCORE	PROCESS (For Use With Categories 1 – 6)	RESULTS (For Use With Category 7)
90%, 95%, or 100%	<ul style="list-style-type: none"> • An effective, systematic approach, fully responsive to the multiple requirements of the Item, is evident. (A) • The approach is fully deployed without significant weaknesses or gaps in any areas or work units. (D) • Fact-based, systematic evaluation and improvement and organizational learning are key organization-wide tools; refinement and innovation, backed by analysis and sharing, are evident throughout the organization. (L) • The approach is well integrated with your organizational needs identified in response to the other Criteria Items. (I) 	<ul style="list-style-type: none"> • Current performance is excellent in most areas of importance to the Item requirements. • Excellent improvement trends and/or sustained excellent performance levels are reported in most areas. • Evidence of industry and benchmark leadership is demonstrated in many areas. • Business results fully address key customer, market, process, and action plan requirements.

(Source: California council for Excellence website found on <http://www.caexcellence.org/newsite/downloads/scorebook.pdf>)

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