A System of Management for Organizational Improvement

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Faced with cutbacks in funding, escalating costs, global competition for limited resources, and a demand for higher-quality outcomes, organizations of all types have felt the pressure to operate more effectively. Organizational improvement is required. Based upon various management approaches, five guiding principles are being used to make outstanding improvements in organizational performance: measurements/benchmarking, leadership, employee involvement, process improvement, and customer focus. However, not every organization trying to apply these principles is successful. What is required for success is that these principles be understood and applied as an integrated system of management.

INTRODUCTION

During the past decade, rapid worldwide technological and sociopolitical changes have precipitated the "globalization" of the economy where ". . . in every industry and sector throughout the world, success, and in some cases survival, will depend upon the ability of organizations to compete globally."[1] Fueled by this change, organizations of all types, including business, government, education, health care, military, and research and development, have been rethinking their operations and management approaches.[2] Faced with many of the same demands, such as cutbacks in funding, escalating costs, competition for limited resources, and a demand for higher-quality outcomes, these organizations have all felt the pressure to operate more effectively. The old paradigms simply are not working anymore.[3] Transformation into a new style of management is required.[2]

When we examine the various management approaches that these organizations are taking toward managing improvement, we find five guiding principles that are working to make outstanding gains: measurements/benchmarking, leadership, employee involvement, process improvement, and customer focus. All of these principles seem familiar and make good common sense, yet not every organization that has tried to apply them has been successful.

The purpose of this article is to describe how this set of five principles constitutes the components of a *system* of management for organizational improvement. First, the failure of improvement initiatives will be examined to shed light on why quality improvement approaches are often unsuccessful. Next, systems concepts will be reviewed in order to establish "appreciation for a system."[2] Insights gained from the applications of systems thinking to this theory of organizational improvement will then be used to develop an understanding of how the individual components of the system reinforce each other. Finally, the validity of this proposed system of management will be examined through its different applications to organizational improvement.

REASONS FOR FAILURE OF IMPROVEMENT INITIATIVES

One of the key reasons cited for the failure of quality improvement initiatives is that "many quality

management plans are simply too amorphous to generate better products and services . . . . [Yet,] the only justification for the enormous sums of money invested in [quality improvement initiatives], is increased customer satisfaction and improved competitive position."[4] Simply reading lots of books, training lots of people, and forming lots of teams to implement thousands of new practices simultaneously have little effect on customer satisfaction. Neither do such acts have an effect on determining what competitive advantage an organization will have in the marketplace. If these activities do not add value to an organization or do not align with its strategic direction, they will fail to make a meaningful contribution to the bottom line and they will be discarded. Many companies have fallen into this "activity trap" in trying to implement quality improvement initiatives.[4]

Several recent studies have suggested that quality improvement, in its present form, may not be able to claim the kinds of successes that would justify current levels of investment.[5] According to a study by Matthews and Katel,[6] Douglas Aircraft was troubled by poor earnings and an inferior competitive position. In 1989 the company implemented an extensive quality improvement program; by 1990, continued losses forced them to abandon it. Matthews and Katel also reported that winning the Malcolm Baldrige National Quality Award did not help the Wallace Co., a Houston-based oil supplier, stay profitable. And they cited a survey of 500 companies conducted by Boston's Arthur D. Little that found that

> [A] slim 36 percent said the [quality improvement] process was having "a significant impact" on their ability to [be competitive]. Some companies complain that such management techniques cost more than they're worth . . . .[6]

In another study, MacFarland[7] cited that "federal managers are ambivalent about [quality improvement] because they do not fully understand the concept or the connection between improved quality and cost savings." She based her claim on a survey of 600 federal executives and managers conducted by the international consulting firm, Coopers & Lybrand. The study suggested that critical steps are being missed in the implementation of the quality improvement process.[7] Blewitt[8] reported that most quality improvement initiatives spend too much time focusing on the processes and mechanics of the improvement program instead of the end result, which is customer satisfaction. He also pointed out that "every company should strive for continuous improvement . . . . They need to be continuously refined to reflect changes in the business environment and in customer needs." To work, quality improvement initiatives should clearly define leadership and communicate a vision for organizational change.[8]

Wilkinson's research indicated that many failed quality improvement initiatives were "implemented in a partial manner" employing a confusing "set of tools and techniques," improvement teams, and training, with no visible connection to the real business of the organization or to its improved performance.[9] These efforts failed because the organizations failed to realize the interrelationships of the five previously cited guiding principles; little benefit was derived when the principles were segregated.[10]

On the other hand, studies have shown that successful organizations appreciate the importance of the interrelationships of these common-sense principles. When they employ the principles as a system of management, they exhibit greater profitability, increased customer satisfaction, more involved employees, lower costs, higher productivity and efficiency, and superior quality in their products and services.[10,11]

SYSTEMS CONCEPTS

The quality improvement approach is not a program or an organization intervention with a specific beginning, middle, and end. It is a system of management: strategic in nature, open to the environment, cyclical in operation (producing output and receiving feedback), striving for equilibrium (a state of balance or adjustment between opposing or divergent influences or elements), and seeking optimization (a process of arranging or combining the efforts of all components so as to achieve a required response).

By system, we mean "an integrated assembly of interacting elements [or components] designed to carry out cooperatively a predetermined function."[12] This definition is intentionally broad to cover a wide range of different systems. In an organizational context this implies a multiplicity of people, processes, technologies, and materials that together perform a significant function and contribute to a specific aim—a service or product development.

A simple three-function model of a system is shown in Fig. 1. The input to this three-function system comes from sensing the environment; the processing is done

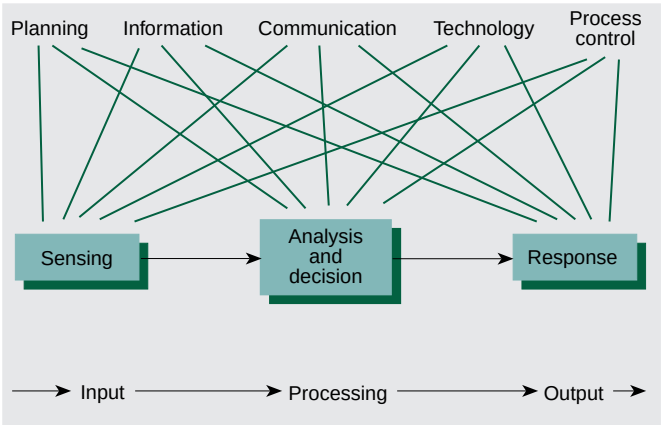

Figure 1. Three-function systems model.

by people using technology and methods to do analysis and make decisions; and the output constitutes the response of the system to the input. The infrastructure to make the system work is contained in subsystems such as planning, information, communication, technology, and process control.

Extending this three-function model in Fig. 1 to a system of management for organizational improvement, a relationship of management principles develops. The first element, sensing, provides the input to which the system will react. This input usually comes from the environment outside the system. In an organizational improvement context, it may come from measurement of customer or sponsor satisfaction about products and/or services or from benchmarking other organizations' best practices. The second element, analysis and decision, considers processes inside the system that result from acting upon the information from outside the system. In an organizational improvement context, analysis and decision includes the leadership, employee involvement, process improvements, and communications necessary to tailor a specific response. The third element, response, represents the output of the system. In an organizational improvement context, an output could be customer-focused improvements in product or performance. Thus, the system of management for organizational improvement has five interrelated components as shown in Fig. 2.

The first of these components, measurements/benchmarking, allows an organization to objectively evaluate whether changes are necessary and whether activities lead to better performance results. When used to assess feedback, measurements/benchmarking can help to identify gaps between the system's current state, "what is," and its desired future state, "what should be." The results of the assessment can serve as an input for planning system changes or process improvements. In addition, measurements/benchmarking can be used as a "feed forward" mechanism to predict trends, forecast future environments, and anticipate needed improvements. This allows organizations to change course and anticipate the needs of customers for new products or new services.

Leadership, the second component, is a system process that is strategic in nature. "A system must be managed"; this is the leader's function.[2] It requires the conception of an organizational vision—an ideal, preferred future with a grand purpose—and a strategic plan to realize that vision. This plan includes mission, goals, and objectives that "cascade down" each level of the organization. Leadership also serves to create and maintain an environment of information sharing, open communications, integrity, and trust. These elements constitute a basis for reacting to customer inputs and empowering employees.

The third component, employee involvement, is a system process that creates a spirit of cooperation within an organization and taps the creative contributions of each member. An organization's success in improving performance depends largely on the skills and motivation of its workforce. Employee involvement aligns human resource development with strategic plans and change processes. It focuses on empowering the workforce and forming worker–manager partnerships. It builds commitment to a common purpose, a set of performance goals, and an approach.

Process improvement, the fourth component, is a system process involving the incremental elimination of all barriers to good performance. This component deals with the efficiency and effectiveness of an organization's administrative and technical work processes that influence the customer's perception of the quality of the product or service. Process improvement works on the principle that an environment in which everyone has the opportunity to continually and incrementally improve the work of the organization is the basis for an improving organization.

The fifth component in the system of management for organizational improvement is customer focus. Customer focus centers on gaining a profound understanding of customer requirements and expectations and using that understanding to provide a product or service far exceeding satisfaction. When viewed as feedback, customer focus allows an organization to respond to customer reactions to the output of the system—products or services—and to identify improvements. This concept encompasses

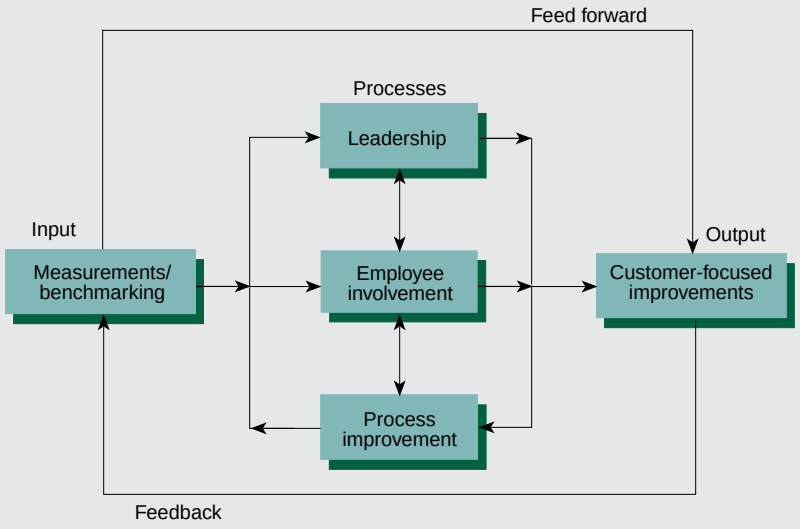

Figure 2. A system of management for organizational improvement.

the external sponsor who pays for the effort and the end user of the product or service. Customer focus also applies inside an organization to everyone who receives and builds upon another person's work (the internal customer).[13]

INSIGHTS FROM SYSTEMS THINKING

Management of a system . . . requires knowledge of the interrelationships between all the components within the system and of the people that work in it.[2]

W. Edwards Deming

Having presented the case that the five components in Fig. 2 constitute a system of management for organizational improvement, the following insights can be made by applying systems thinking:

1. All systems components must be present for a successful outcome.

Since each of the management principles in a system has an essential part to play, all must be present for a successful outcome. If a component is vital to the system output, it should be present to make a significant impact on the output. Many organizations embarking on improvement do not understand this concept. They often choose one or an isolated few of the systems management principles, expend a great amount of resources on introducing that principle, then expect the organization to improve. When the organization does not improve significantly, the management has no idea why.

Some of the strategies or methodologies that fit into this system of management framework that have been or are being applied on an individual basis are shown in Table 1.[14] Each of these strategies individually seems like a good idea. However, if the strategy is not a part of a system of management for organizational improvement, it could have little effect.

It is interesting that the systems management principles often are developed with different emphasis over time. A good example is the approach taken by IBM Rochester, Minnesota, a 1990 Malcolm Baldrige Quality Award Winner. Figure 3 shows a strategic view of its quality goals, initiatives, and vision.[15]

Notice how IBM Rochester leadership has introduced process improvement, measurements and benchmarking, customer satisfaction, and employee involvement. The quality objectives have been integrated into employee performance plans that have been linked to achieving IBM Rochester's business objectives. The presence of its systems management principles is summarized in its vision:

Customer—the final arbiter
Products and services—first with the best
Quality—excellence in execution
People—enabled, empowered, excited, and rewarded

Table 1. Strategies of organizational change and their relationship to the system of management principles.

Strategy	Measurement	Process improvement	Leadership	Employee involvement	Customer focus
Benchmarking	X	X			
Statistical process control	X	X			
Quality control tools	X				
ISO 9000*	X	X			
New corporate vision, mission, or strategy			X		
New products and/or new markets			X		
Management of diversity			X	X	
Culture change			X	X	
Skills development			X	X	
Quality circles				X	
Self-managed work teams				X	
Kaizen†		X		X	
Business process reengineering		X			
Concurrent engineering		X		X	
Work-flow analysis		X			
Quality function deployment		X			X
Customer assessment	X				X
Customer service and relationship-based sales					X

*International Organization for Standardization (ISO) guidance for quality management systems.
†Ongoing improvement involving everyone.

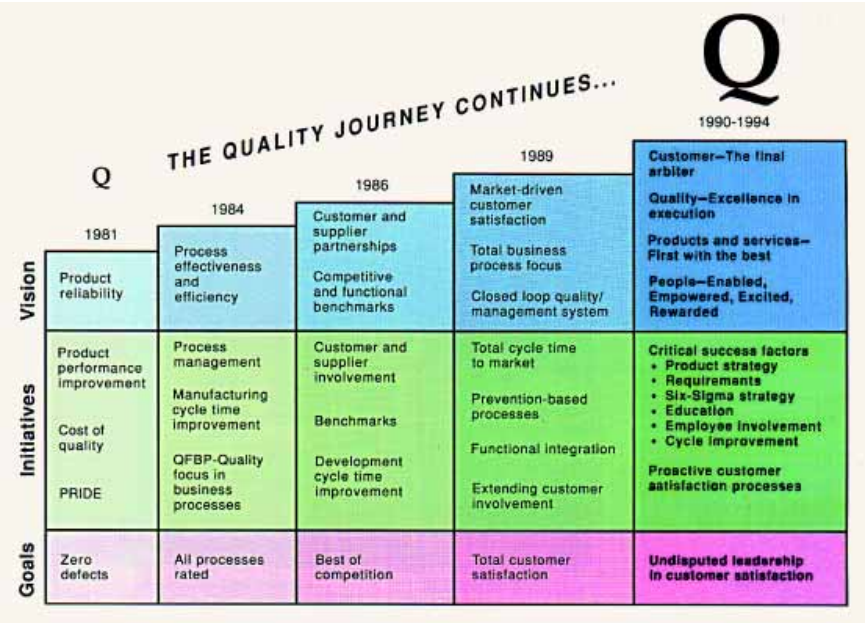

Figure 3. A strategic view of quality goals, initiatives, and vision at IBM Rochester since 1981 (from Ref. 15). © Copyright International Business Machines Corporation (IBM) 1990, 1991. All rights reserved. (Reproduced with permission of IBM.)

operational performance and improvement as well as to redirect the vision of the organization.

An interesting insight provided in the system of management model in Fig. 2 is that the system components work cooperatively toward organizational objectives that are customer-based. Peter Drucker states: "The customer defines the business . . . To satisfy the customer is the mission and purpose of every business."[17] What the customer thinks, believes, needs, and wants at any given time ought to be accepted by the leadership of an organization and treated as seriously as budget reports, engineering test results, or marketing endeavors. When gaps exist between what a customer wants and what an organization feels the customer needs, intense communications with the customer are required to ensure that differences are resolved and the real need is satisfied.

Customer-driven organizations stay close to customers and create a cooperative process for translating external customer requirements into internal organizational requirements. This commitment to being customer driven is often expressed in corporate policy statements:

- [Motorola's] Fundamental Objective: "(Everyone's Overriding Responsibility) Total Customer Satisfaction"

2. Proper interrelationships among systems components are vital.

The proper interrelationships among the management principles are vital to achievement of organizational objectives. In a system the interrelated components work together toward some aim or common purpose. The definition of system emphasizes the importance of objectives that the components of the system are to achieve. If these objectives are vague, it will be a flimsy system. However, if the objectives are clearly defined and communicated, the system will be adequately challenged and allowed to respond.

Considering the interrelationships of the components of the system, precise and timely information exchange is needed to achieve the system objectives. This places information and communications that link the various elements on the same level of importance as the elements themselves. The Malcolm Baldrige National Quality Award[16] criteria framework embodies seven categories, as shown in Fig. 4. These categories align well with the system of management principles. Information and analysis is a specific Baldrige category that assesses key information and communications necessary to drive organizational improvement. Information is communicated to link customer and market data to

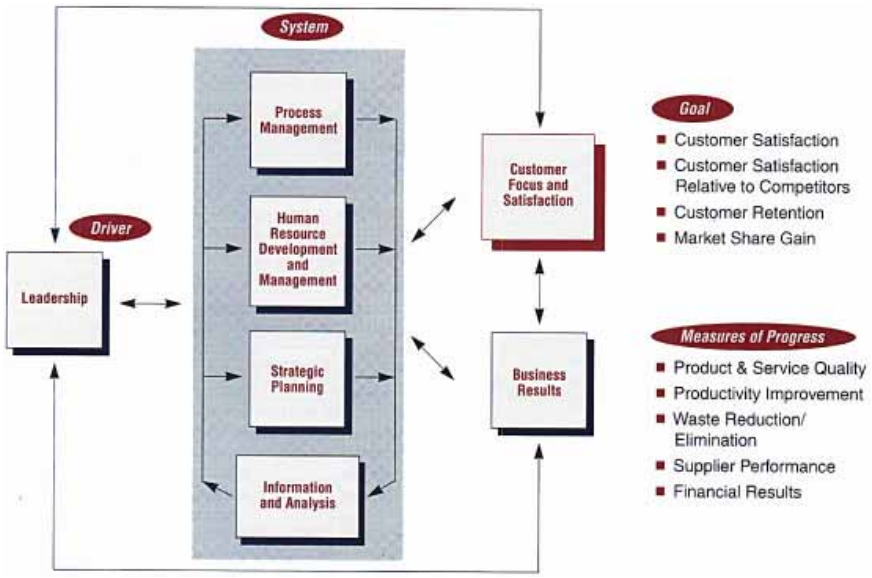

Figure 4. Dynamic interrelationships of Malcolm Baldrige National Quality Award criteria (from Ref. 16).

- AT&T Quality Policy:
  "Quality excellence is the foundation for the management of our business and the keystone of our goal of customer satisfaction."

The closer an organization gets to being customer driven, the clearer the interrelationships are among the system components and the more efficiently and effectively the system works. Companies that are accustomed to defining their activities by other criteria (departmental goals, financial targets, etc.) find that the shift in thinking to a total customer focus usually requires "deep-rooted cultural change."[18]

3. Leadership optimizes the system.

Optimization is a process of orchestrating the effects of all systems components toward achievement of the objectives. This is the job of the organization's leadership. Leadership is viewed in the Baldrige framework (Fig. 4) as the driver, that component which sets directions, creates goals and systems, and guides the pursuit of added customer value and organizational performance improvement. Without clear, consistent leadership and vision, the organization's management system will never be sound and efficient, and its improvement efforts will eventually be replaced by an intriguing new management fad.[2]

For effective optimization, the system's aim or purpose ought to be clearly defined and communicated to everyone. The system should be managed in order to accomplish this purpose. If any part or component of the system is changed, the whole system is affected. Optimization of a subsystem without regard for the whole system produces suboptimization, which may not improve organizational performance. To avoid suboptimization, the system of management ought to have a leadership infrastructure—which is the entire management infrastructure. Its most relevant measurement of success is improvement to the fundamentals of the business, not the details of the approach.[19]

A technique by which leadership optimizes the system is strategic planning. Strategic planning is the continuous process of making present entrepreneurial (risk-taking) decisions systematically and with the greatest knowledge of their futurity, organizing systematically the efforts needed to carry out those decisions, and measuring their results against the expectations through organized systematic feedback.[17] The distinction of a plan that can produce results is its ability to obtain the commitment of key people to work on specific tasks and be empowered to accomplish them. The test of a plan is whether management actually commits resources to activate the plan.

A crucial value in strategic planning is that it can be used to create organizational alignment. Organizational elements could often have different priorities. A program office may push for minimum cycle time and reduced cost, while engineering may push for maximum design flexibility and precision tolerances. The purpose of organizational alignment is to find equilibrium, the "proper balance among such contradictions."[20]

Organizational alignment is a prerequisite to employee empowerment. Alignment occurs when organizational executives, middle managers, and staff have clear direction, shared vision, and a clearly defined approach. Figure 5 shows the organizational leadership environments when various levels of alignment and empowerment exist.[21] It takes heroic leadership to reach organizational objectives when people are highly empowered, yet poorly aligned and working at times at cross-purposes. An autocratic environment of high alignment but little empowerment fails to produce motivated, enthusiastic responses. A leadership environment for optimizing the system for organizational improvement requires both organizational alignment and staff empowerment.

There is a clarifying note in the Baldrige criteria framework (Fig. 4) regarding strategic planning that is often overlooked. Strategic planning does not require highly formalized plans, planning systems, or planning departments. Nor must all organizational improvements be driven by strategic plans. Yet strategic planning is such an important leadership technique for optimizing the system that the Baldrige criteria make strategic planning a distinct element for evaluation.

MEASURES OF PROGRESS: USING A SYSTEM OF MANAGEMENT APPROACH

Many outstanding examples are given in the literature of the successful use of these principles as a system of management. The following sections describe how

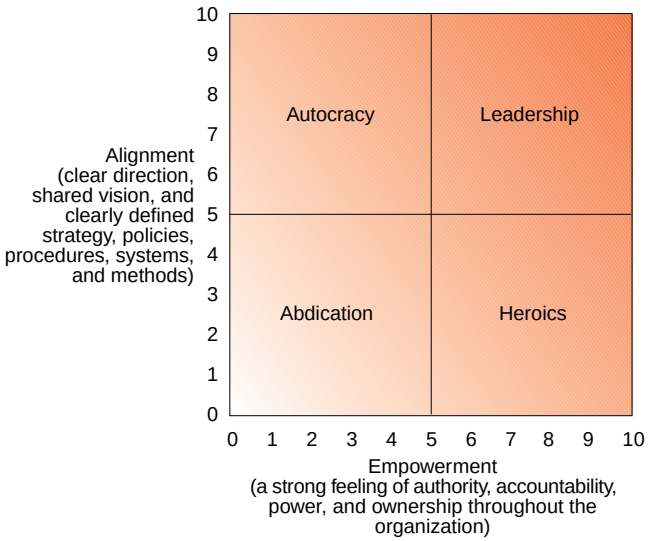

Figure 5. Organizational leadership environments (from Ref. 21).

proper application of this system of management increases organizational performance; provides innovative, process-oriented improvements; and affects customer satisfaction.

Increased Organizational Performance

Organizational performance is a true measure of how well a system of management is functioning. A functioning organization is one where everyone knows the most important variables to control in order to satisfy customers and guarantee effectiveness and efficiency.[20] The following examples from industry, the Navy, and research and development organizations illustrate such improved organizational performance.

The U.S. General Accounting Office (GAO) conducted a review in 1991 of the performance of 20 organizations (e.g., Digital Equipment Corp., Eastman Kodak Company, Ford Motor Company, IBM, Motorola, Inc., Westinghouse, and Xerox) that had strategically used the components of this proposed system of management.[11] These organizations were among the highest scoring applicants in 1988 and 1989 for the Malcolm Baldrige National Quality Award. The primary question on which the GAO study focused was: "Can significant improvements in business results be achieved through quality improvement initiatives?" To determine the impact of improving organizational performance through quality efforts, the GAO study analyzed empirical data in four areas: (1) employee relations, (2) operating procedures, (3) customer satisfaction, and (4) financial performance. In each of the four areas a number of indicators were identified that could be used to measure performance.

In general, the GAO study found that organizations that adopted quality improvement principles as a system of management experienced an overall gain in corporate performance. Organizations that used these principles achieved enhanced employee relations (less absenteeism and fewer grievances), better operating procedures (higher quality and lower costs), greater customer satisfaction (fewer complaints and more repeat business), and improved financial performance (increased market share, and improved market and profitability). Table 2 summarizes these findings. Furthermore, the GAO study found common features in the quality improvement systems of all the organizations surveyed that were major contributing factors to improved performance: customer focus, management leadership, employee involvement, open corporate culture, fact-based decision making, and partnership with suppliers. Finally, the study indicated that many different kinds of organizations benefitted from putting specific quality improvement practices into place. However, none of these organizations reaped those benefits immediately. The report concluded with a warning: organizations that are implementing a quality improvement initiative should allow sufficient time (at least 2.5 years on average for this study) for significant results to be achieved.[10,11]

In addition to the private sector, elements of the government, such as the Department of the Navy (DON), have grasped the importance of the interrelationships among the components of this management system for increasing organizational performance.[22] Afflicted by many of the same conditions as the private and public sectors, the DON in 1992 released its *Strategic Plan for Total Quality Leadership* (TQL), "the approach used to implement total quality efforts within the Department." The elements of TQL are illustrated in Fig. 6. A major intent of the DON was to use TQL as an integrated approach to optimizing the effectiveness of the Navy–Marine Corps team by leading people; managing systems; and translating their vision, mission, and guiding principles into goals, strategies, and actions for improvement within a quality-focused organization.[23]

Since implementing their TQL system of management, the DON has seen many organizational improvements with resultant savings. The Cherry Point Naval Aviation Depot has achieved over $50 million in total savings through a combination of approaches, one of which was gain sharing (a productivity-based incentive award) to increase employee involvement (Fig. 7) (personal communication, J. Adams, Cherry Point Naval Aviation Depot TQL Office, Cherry Point, North Carolina, 3 July 1995). The Jacksonville, Florida, Naval Aviation Depot "used work process tracking, a new management structure, and a proactive program to get [improvement] suggestions from workers and customers (the Navy's flying units)" to produce P-3 antisubmarine patrol aircraft "with 40% less labor than originally planned, and is still improving . . . . The results: millions of dollars saved for the Navy and taxpayers" (Ref. 22, p. 8). The Norfolk Naval Aviation Depot reduced F-14 rework costs by 44%. The Naval Shipyard Norfolk reduced relief valve rejection rate from 21% to 0% and reduced its electrical connector fabrication rework from 55% to 6%. Finally, the Lakehurst Naval Air Warfare Center Aircraft Division, New Jersey, estimated that

Table 2. GAO survey of organizational performance of 20 companies.[11]

Areas measured	Total observations	Improved	Declined	Unchanged
Employee relations	52	39	9	4
Operating procedures	65	59	2	4
Customer satisfaction	30	21	3	6
Financial performance	40	34	6	0

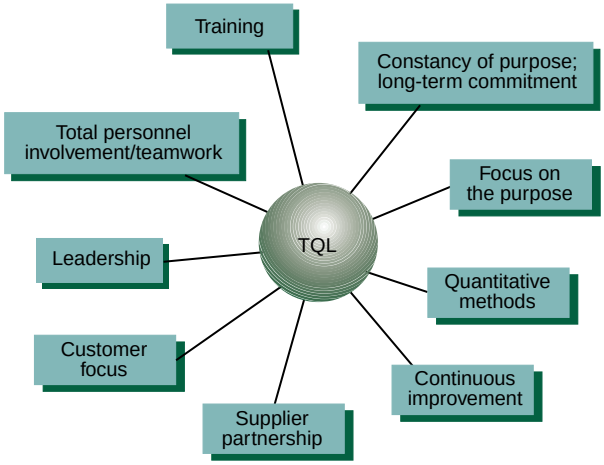

Figure 6. Elements of the Department of the Navy's Total Quality Leadership (TQL) plan.

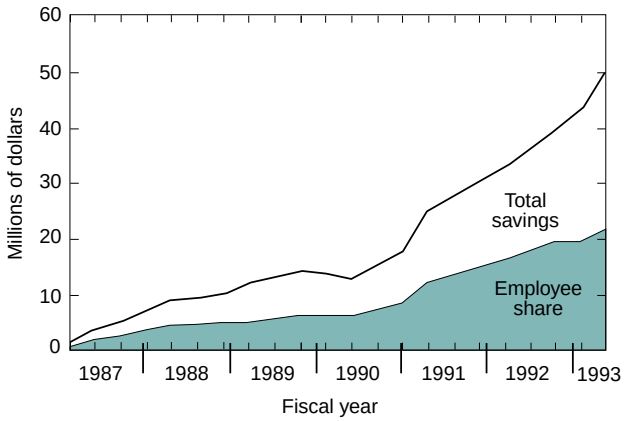

Figure 7. Savings associated with productivity gain sharing at the Naval Aviation Depot, Cherry Point, North Carolina.

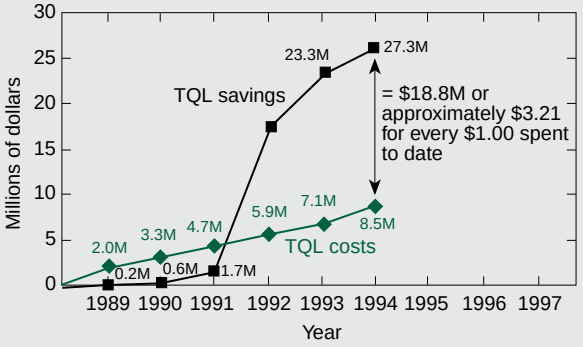

Figure 8. Return on TQL investment at Naval Air Warfare Center Aircraft Division, Lakehurst, New Jersey.

their total return on TQL investment as of the end of fiscal year 1994 was $27 million in total savings (Fig. 8) (personal communication, W. Lucas, Naval Air Warfare Center Aircraft Division TQL Office, Lakehurst, New Jersey, 5 July 1995).

Research and development (R&D) organizations such as the Applied Physics Laboratory often provide the first stages in the cycle of science and technology conceptualization, development, application, and deployment. To be competitive in today's global economy, that cycle must form an unbroken chain of continuous improvement.[24] As such, organizations have been making efforts to improve the cooperation between R&D and technology transfer efforts, to shorten the time from R&D to deployment, and to increase the customer focus of R&D so that results are meaningful to the sponsors and end users.[25]

R&D organizations are starting to reap the benefits of such efforts. Eastman Chemical Company (ECC) Research used the principles of customer focus, process focus, teamwork, management leadership, and continuous improvement in an innovative way to improve its output.[26] After 3 years of a company-led improvement initiative, Research's main output—new or improved product and process concepts—was not improving. In 1989, ECC Research focussed on this output, identified critical processes, instituted a few simple but credible measures, and linked the Research people into the plan. In 1990, ECC Research doubled its output without any substantial increase in resources. Since 1990, Eastman has used the Malcolm Baldrige National Quality Award criteria for annual internal assessment. These assessments have guided the company in quality improvement efforts by helping Eastman combine what it has learned into an integrated and linked quality system. In 1993, ECC won the Malcolm Baldrige National Quality Award.

AT&T has had the distinction of having three business units win the Malcolm Baldrige National Quality Award. In 1988, AT&T's R&D community at Bell Laboratories issued a document, *Implementation of AT&T Quality Policy at Bell Laboratories*, outlining the role of R&D in implementing the AT&T commitment to customers and to quality.[27] Key principles in the Quality Policy were: "all organizations and functions have customers; all organizations must continually improve the quality of the products and services they deliver to their customers; quality improvement comes from process improvement and is everyone's responsibility." Bell Laboratories then reengineered and redefined itself to become more responsive to its customers—the AT&T business units. Among its examples of successes is a 30-fold improvement in less than 2 years in field-quality performance for cellular software development.[27]

Applying this system of management for organizational improvement to R&D organizations presents particular challenges because of the nature of the people and the work. An initiative that focuses only on

today's customer loses sight of the role of R&D in creating new customers in the future. An initiative that values only facts and measures may lose the benefits from intuition, experience, and perspective. An initiative that builds teamwork and enhances innovation in teams still has to respect the creative contributions of individual scientists and engineers. An initiative that strives to continuously improve the organization today has to assist it in becoming something different tomorrow.

Process-Oriented Improvements

The following examples from The Johns Hopkins University Applied Physics Laboratory demonstrate innovative process-oriented improvements that result from the proper application of this system of management within the organization. The process improvement projects discussed manifest the concept of Kaizen, a Japanese word that means improvement. When applied to an organization, Kaizen means

> ongoing improvement involving everyone—top management, managers, and employees . . . . Where Kaizen is introduced for the first time management may easily see productivity increase by 30%, 50%, and even 100% and more, all without any major capital investments. . . . It helps management become more attentive to customer needs and builds a system that takes customer requirements into account.[28]

Waste Coolant Reduction System

A fine example of a technical process improvement is a project that was accomplished by an employee involvement quality team in the APL experimental machine shop. The manpower requirements and disposal costs for safely and efficiently disposing of machining waste coolant had become overly expensive as a result of the shop's newly adopted coolant management program. The team's solution, installation of a "waste coolant reduction system," won a corporate quality improvement award because of its impact on worker health, safety, and the environment and because it created an opportunity to cut costs and reduce processing time for waste coolant. The project was completed in about 11 months.

The quality team of six experimental machinists investigated the problem of disposing in a safe manner 55-gallon drums of waste coolant generated by metalworking machinery. Waste coolant is approximately 90% water and is contaminated by bacteria formed from the combination of metal fragments and hydraulic and way lube oils. A coolant reduction system was installed to more efficiently dispose of this environmentally sensitive waste. Using an ultrafiltration system to remove the water, the team was able to reduce the volume of waste to 10% of its original volume. The annual cost savings were twice the cost of the filtration system; therefore, the improved system paid for itself in 6 months and continues to pay for itself today.[29]

Subcontract Closeout Administration

The project of a process action team that focused on subcontract closeouts at APL is a good example of an administrative work process improvement. A management audit of the subcontracts process indicated that with timely closeouts millions of dollars could be made available. The department leadership chartered an eight-member, cross-functional team of professionals and support staff to respond to the challenge of implementing government-approved procedures to ensure the timely and responsible closeout of all subcontracts.

The team first identified and analyzed an enormous number of measurements in order to thoroughly understand the problem and determine root causes. On the basis of the process analysis, the team developed a manual that explained the different types of contracts. The manual included flow charts delineating the processes and showing the proper steps to close out each type of subcontract. Next, the team developed training and provided education and support to hundreds of staff members concerning the process. After completion of the project, the group was able to track the status of nearly 1000 subcontracts. The project provided a final but essential step in subcontract administration. It was estimated that millions of dollars were freed up as a result of this improvement.[30]

Heat-Sink Development

Streamlining an engineering process for developing heat sinks illustrates process improvement and significant cost savings in engineering design and fabrication at APL. Reacting to a customer's request that efforts be made to reduce program costs, a team representing design, fabrication, and quality assurance groups examined the process for developing heat sinks (metal plates attached to electronic circuit boards to dissipate heat). A diagram of the existing process is labeled "old process" in Fig. 9. A significant effort in design was involved in developing a fully dimensioned drawing of the heat sink so that these data could be entered by hand into a coordinate measuring machine used in inspection to measure the locations of the holes and slits in the metal plate and compare them to the dimensioned drawing. Real innovation occurred when this team challenged this method of inspection. Instead of using the machine for inspection, a full-sized Mylar drawing was created from the computer-aided design and used to overlay the heat sink. This innovative approach simplified the process to that labeled "new process" in Fig. 9. It decreased the heat-sink development time by 25%, reduced the development cost per

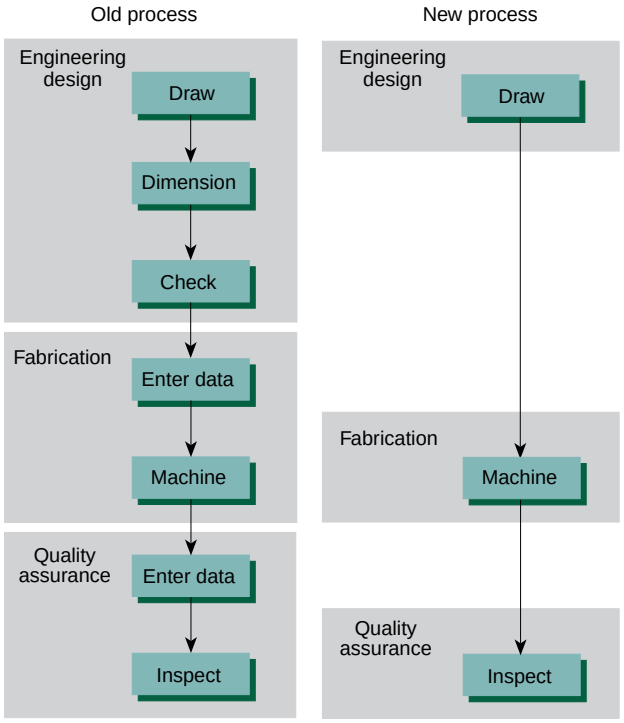

Figure 9. Comparison of old and new heat-sink development processes at APL.

heat sink by nearly $1300, and increased quality by eliminating unnecessary drawings and hand entry of data.[31]

Impact on Customer Satisfaction

To succeed, a system of management for organizational improvement needs to understand customer expectations and translate those expectations into actions in the workplace to better serve the customer. The APL projects described next delineate this axiom in practice.

Personal Computing Omnibus Contract

An award-winning project was conducted by a four-member computer user services center process improvement team at APL. The team's goal, set by department leadership in response to customer feedback, was to expedite purchases of personal computing equipment for major R&D programs.

After performing a customer requirement study, completing a process analysis, and gaining management approval, the team implemented a totally new streamlined procedure within 5 weeks from the start of the project. The Navy sponsor was able to realize a significant reduction in effort related to the processing of requests. Users and business administrators also recognized the simplicity of ordering computer equipment. Procurements that normally took 4–6 months were decreased to 2–8 weeks, with a 25–40% cost saving.[32]

Technical Reports

An APL cross-functional team of engineers was formed to improve the efficiency of the reporting of at-sea operations for use by crews, fleet commanders, the Navy sponsor, and other organizations. The major goals were to increase the utilization of the report findings without an increase in cost to the sponsor and to tailor deliverables (reports, data, etc.) to meet changing customer requirements. The team surveyed customer requirements for information, identified significant contributing processes to the existing report, proposed and implemented improvements, developed a new concise report, sent the report to the Fleet and to the sponsors, measured customer response, and evaluated the new process. Since these reports are repeated for different operations, the sponsor benefits from the cost savings on each report now and into the future, and the Fleet receives a superior product. The concise report reduced the development cost 15% and received glowing reviews from the Fleet.

FINAL THOUGHTS

> *The executive of the future will be rated by his [her] ability to anticipate his [her] problems rather than to meet them as they come.*[33]
>
> Howard Coonley

At the corporate level, improvement initiatives using a systems approach focus on producing an entire business enterprise that is optimized to deliver value to its customers. The system of management described in this article is an approach to achieving enhanced employee relations, better operating procedures, greater customer satisfaction, and improved financial performance. When applied correctly, it gives organizations a competitive edge.

A prerequisite guideline for applying this concept is to understand that the five guiding principles of measurements/benchmarking, leadership, employee involvement, process improvement, and customer satisfaction form a systematic approach to managing organizational improvement. All of the systems components must be present for a successful outcome. Piecemeal application of the principles does not optimize the system. These principles are interrelated and interactive. The system of management integrates them under a comprehensive disciplined approach focused on improving organizational performance. Organizations that have used these principles successfully to make significant improvements understand the interrelations and interactions of the five principles. Organizations that have failed in improvement initiatives often have implemented the principles in a partial manner, not recognizing the interrelations or that all the components must be present. This concept contends that

leadership ought to study and understand the system because knowledge is built on theory and theory is necessary to predict and improve the system. The components or processes of the system ought to be aligned and managed for optimization of the goals of the organization.

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