

Introduction



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Poor value is a people problem.

—Larry Miles

Lawrence Delos Miles was born in 1904 to Delos Miles, a public school superintendent, and Vinetta Miles, an elementary school teacher in Harvard, Nebraska. Miles was very bright, and he graduated from high school in three years rather than the usual four. He attended Nebraska Wesleyan University in Lincoln, Nebraska, with a degree in education. In 1925, he was a teacher and high school principal in Winnebago, Nebraska. In 1926, he made a career change and moved into banking. Dissatisfied with this, he returned to college to study engineering. In 1931, Miles graduated from the College of Engineering at the University of Nebraska with a degree in electrical engineering.

In 1932, Miles began a long and productive career at General Electric Co. in Schenectady, New York. His first assignment at GE was that of a design engineer in the Vacuum Tube Engineering Department. Over a six-year period in this position, he earned 12 patents for vacuum tubes and related circuitry. During this time, Miles developed awareness for unnecessary costs and began seeing the need for developing better ways of doing things.

This sensitivity to cost earned him a transfer to GE's purchasing department, and in 1938 he was promoted to the position of purchasing engineer. During this time, Miles worked closely with vendors to reduce costs associated with electronic components, eventually moving on to precision-machined parts. In 1944, Miles was

transferred to a subsidiary of GE called Locke Insulator. While at Locke, he began the development of the process that has now evolved into the function-oriented problem solving methodology known today as Value Methodology.

Miles was instrumental in the initial development and spread of Value Methodology. In 1959, he helped create the Society of American Value Engineers and served as its first president between 1960 and 1962. He was the author of the first book on the subject, *Techniques of Value Analysis and Engineering*, which was published in 1961. He taught seminars and lectured extensively throughout the United States and the rest of the world.

Larry Miles received many accolades and awards during his career, but none were greater than the honor bestowed on him by Japan. In 1984, he was posthumously awarded the Third Order of Merit with Cordon of Sacred Treasure by the emperor of Japan. The Japanese bestowed this honor on Miles due to the major impact that the use of Value Methodology had on making Japan an industrial and economic powerhouse. In addition, he received international recognition from Germany and South Africa for his contributions.

The story of Larry Miles is a fitting introduction to this book. Without him, the writing of this book would not have been possible.¹ Larry Miles also exemplified the role that Value Leadership can play in improving the value of products, services, and facilities. While other leaders in business improvement, like Dr. W. Edwards Deming and Phillip Crosby, have received greater notoriety, the work of Larry Miles has created a quiet legacy that endures today.

Today's Challenges

Most people today would agree that long-term profitability is the main objective of private enterprise, while the timely delivery of needed services would describe the goal of public bodies. They would also quickly point out that the products and services these entities produce should be competitively priced and/or efficiently provided while meeting or exceeding the performance expectations of their customers. In order to adapt to an ever-changing environment, organizations are challenged to make better use of their most important resource, their people.

This idea has been demonstrated through the innovations introduced by the quality movement and by the evolution of program and project management that has been experienced in recent years. Executive management has learned that through the emphasis of programs and projects and by ingraining a culture of quality improvement, the effectiveness of an organization can realize significant gains. Despite the benefits of these innovations, they will amount to little unless the organization possesses an active understanding of the value that its customers place on its products and services, and is capable of defining, measuring, and improving it.

In late 2008, the world was confronted with the sudden end to the unbridled growth that the global economy had experienced earlier in the decade. At the heart of our "irrational exuberance"² was the delusion that the market could only go up; that growth would be perpetual; that the uncertainty posed by risks could be completely avoided; and that value could be created from nothing. Looking back, it is remarkable to think that at least tacitly, the majority of us held these beliefs to be

true. Like the laws of physics, the laws of value cannot be circumvented. Value is grounded in reality. It demands honesty. It does not suffer fools or charlatans.

One need only look at the following recent phenomenon to see how easily we can be led astray when we lack a means to anchor value to reality:

- The overvaluations of Internet companies during the growth of the “dot-com” bubble were fueled by wildly optimistic speculation on fast-growing Internet businesses. One Internet company spent \$135 million in capital over its 18-month life span while never once generating a profit.³ Too great an emphasis was placed on rapid growth and not enough on the actual value of the service it provided.
- The development in the 1990s of the financial instruments known as collateral debt obligations (CDOs) and credit default swaps (CDSs) were touted by their creators as ways to essentially eliminate all investment-related risk. These instruments ran completely contrary to one of the basic tenants of the free market system, namely, the concept of “risk and reward.” What is all the more ironic is that the risk “experts” on Wall Street are the ones who concocted these schemes and drove the market into the ground, with many of them collecting huge bonuses for our pains. This proves the point that you cannot sweep uncertainty under the rug or hide it in the closet. It will most surely destroy value if it is not addressed in a rational, responsible manner.
- The proliferation of CDOs and CDSs in turn led banks to lower their lending requirements based on the false belief that the financial risks had been diluted to such an extent that they couldn’t possibly lose money on a bad loan. The availability of cheap adjustable-rate loans and the demand for housing led to the boom in house construction during this same period. Between 1997 and 2006, the price of the typical American house increased by 124 percent.⁴ During this same period, average U.S. incomes remained virtually flat. Inevitably, borrowers on the riskier loans began to default, which began increasing the supply of homes available and eventually burst the housing bubble. I can remember watching the value of homes in my neighborhood going up and up during this period while my income remained pretty constant. Chatting with my neighbors, we all agreed it couldn’t go on forever—and sure enough, it didn’t. Between 2006 and 2008, home prices fell an average of 20 percent nationwide and were still falling at the time of this writing.⁵ Despite the fact that many of us, at a gut level, felt that something was terribly wrong, we all just went along with it, thinking that the market must be right. Many of us even further leveraged our overvalued homes with home equity loans to buy other things we couldn’t afford. When we do not have a clear yardstick for measuring value, we lack the information needed to make critical decisions.

While these examples apply to the general economy at a macro level, they are a reflection of the inability of both individuals and organizations to understand and measure value.

Dan Ariely, in his brilliant book on behavioral economics, *Predictably Irrational*, discusses at length his thoughts on the subprime mortgage crisis. He argues that individuals, organizations, and indeed the global market behave in a manner that is completely irrational with respect to economic decision making. If even only a

few of the compelling points he makes are true, then it only further reinforces the importance of developing a rational framework that allows us to assess value.⁶

Lacking the compass of value, an organization is in danger of losing its way. Further, if it can find its compass, it must become fluent in its use in order to interpret its meaning. All of this first requires an acknowledgment that the organization lacks the tools, training, and necessary attitude by its leaders. Developing this insight is the first step, and the greatest hurdle, to overcome.

Managing the change that is necessary for an organization to stay competitive is a difficult challenge. However, the more successful it can become at managing change, the better it can become in meeting its customer's needs, reducing inefficiencies, improving the performance of functions, and managing costs and risks. These changes not only result in improved profits and better efficiency in the present, but continue to pay dividends for years to come. In today's economic environment, maintaining a focus on performance while controlling costs and managing risk are essential for long-term survival and sustainable growth.

In presenting the concept of value optimization, the author challenges the reader to look beyond the traditional indicators of value: price and customer satisfaction, and instead consider value from the perspective of functions and how they are performed relative to cost, time, and risk. This book presents a practical and proven approach, known as Value Methodology, which provides organizations with a cohesive theory, structured framework, and diverse toolset to identify, quantify, and optimize the real value they deliver by transforming the way it is perceived.

Value Methodology

This book is aimed at those new to the discipline with emphasis placed on the practical application of Value Methodology techniques to optimize the value of facilities, products, services, and processes. Value Methodology (VM) has existed under several different names over the years, such as Value Engineering (VE), Value Analysis (VA), and Value Management. There are no essential differences between these designations and they are, for all practical purposes, interchangeable. The term *value engineering* has been traditionally used whenever the Value Methodology is applied to industrial design or to the construction industry; the term *value analysis* for concept planning or process applications; and the term *value management* for administration or management applications. Value *Methodology* is the term most commonly used today and refers to the comprehensive body of knowledge related to improving value regardless of the area of application. Value Methodology is formally defined as:

*A systematic process used by a multidisciplinary team to improve the value of projects through the analysis of functions.*⁷

Value Methodology is an organized process that has been effectively used within a wide range of private enterprises and public entities to achieve their continuous improvement goals, and in government agencies to better manage their limited budgets. The success of the VM is due to its capacity to identify opportunities to remove unnecessary costs from projects, products, and services while

assuring that performance, and other critical factors, meet or exceed the customer's expectations.

The improvements are the result of recommendations made by multidiscipline teams under the guidance of a skilled facilitator, commonly referred to as a value specialist. The multidisciplined teams can comprise those that were involved in the design and development of the project, technical experts that were not involved with the project, or a combination of the two. There are two essential elements that set the Value Methodology apart from other techniques, methodologies, and processes:

1. The application of the unique method of function analysis and its relation to cost and performance
2. The organization of the concepts and techniques into a specific job plan

These factors differentiate Value Methodology from other analytical or problem-solving methodologies.

Value Methodology can be applied to products, manufacturing processes, administrative procedures, and the design and construction of facilities. The VM process is applied in basically the same way for each type of study; however, there are some differences in how preparations are made for the different types of studies and how some of the VM techniques are applied.

VM is often confused with cost reduction; however, cost reduction and VM are distinctly different. Cost reduction activities are component-oriented. This often involves the act of "cheapening" the item in other words, reducing cost at the expense of performance. Examples of typical cost reduction measures include eliminating components or elements, substituting less expensive systems, relaxing tolerances, and/or the thinning or changing of material. At best, such an approach creates a stripped-down, less expensive version of the original item. At worst, it results in the wholesale degradation of value by forsaking performance in the zeal to reduce cost.

Value Methodology, conversely, is concerned with how things function rather than what they are. This function-driven mind-set demands a radical transformation in our perception, in the way we approach challenges, both old and new. This functional way of thinking is, by its nature, predisposed to lead us to innovative solutions by opening our eyes and deepening our understanding of how things work. This concept of function is the very essence of Value Methodology.

Why Use Value Methodology?

The economic health of an organization relates to the efficient use that is made of available resources. As our society evolves we are confronted with increasing awareness that resources appear to be shrinking. We do not have unlimited choices in materials, types of energy, or sources of labor. The availability of capital is also limited, especially when we consider that the cost of borrowing capital is ever fluctuating and the purchasing power of the dollar seems to be steadily diminishing. Further, the quickening pace of technological advances may find us using designs or methods that are far behind the leading edge of progress. The owner,

whether an individual, a corporation, or a tax-supported public body, cannot afford the luxury of paying for design or performance features that contribute nothing to the basic function of the object being acquired. Such unneeded features are often introduced into designs either because there is inadequate communication between the owner, who controls the budget, the user, who identifies the requirements, and the project team, who transform these requirements into plans and specifications.

To achieve maximum benefits from our limited resources we must make full use of our only unlimited resource—our ability to think creatively. By taking advantage of technological advances in materials and methods of production, and by applying our creative ability to each project, we can in some measure offset the rapid rise in the cost of acquiring goods and services. These costs have risen sharply in the past decade, and in almost any year the rise in costs exceeds that of the preceding year. For example, within the construction industry, the cost of building materials has spiked sharply over the last decade for essentials such as steel, concrete, and lumber, as shown in Figure 1.1.⁸

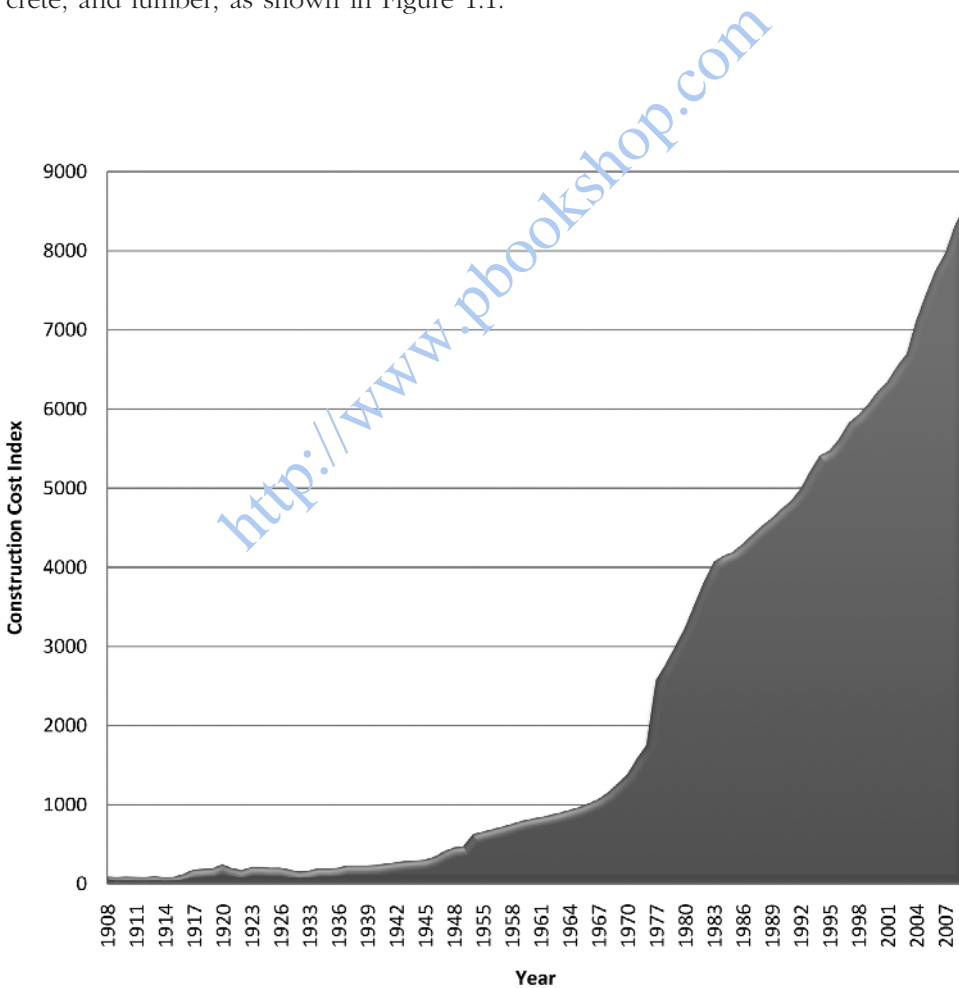


FIGURE 1.1 Construction Cost Index History

In order to acquire the desired projects, products, and processes with the limited funds available, we must use every possible means to attain the required functions at minimum cost. This is precisely what Value Methodology attempts to accomplish through a systematic, organized approach. It is also worth noting that Value Methodology is currently mandated in the United States by federal law. These laws generally apply to the design and construction of facilities, but are also applied for the procurement of some types of equipment and supplies. These laws and regulations include:

- The Defense Authorization Act (Public Law 104-106) states that each executive agency must establish and maintain cost-effective VM procedures and processes.
- The 1995 National Highway System Designation Act requires states to carry out a value study for all federal-aid highway projects with an estimated total cost of \$25 million or more.
- The 1986 Water Resources Development Act (Public Law 99-662) requires a review of costs (i.e., value study) on all federally funded water and wastewater treatment projects with a total cost in excess of \$10 million.
- The Office of Management and Budget's Circular A131 requires federal agencies to use Value Methodology as a management tool to reduce program and acquisition costs.

As a result, not only is VM required at a federal level, but also at the state and local levels due to the fact that federal funding is an integral part of most major capital improvement projects. In addition, many state and local governments have enacted legislative policy of their own that mandates the application of VM for a wide variety of projects at various budget thresholds.

Project Management and Value Methodology

Value Methodology, as a body of knowledge, is concerned with improving the value of things, whether it is a new facility, a manufactured item, or a management procedure. The application of Value Methodology typically occurs within the context of a program at an organizational level and within a value study, at a project level.

Experienced project managers, especially those with a thorough understanding of the Project Management Institute's *Project Management Body of Knowledge* (PMBOK), will appreciate the similarities between the management of a value study and the management of a project. In fact, a value study, in and of itself, is a project. It meets all of the criteria⁹ of a project:

- *Is it unique?* Yes, a value study is a unique endeavor having the goal of improving the value of a product, regardless of whether it is a new product or an existing one.
- *Is it temporary in nature and have a definite beginning and end?* Yes, a value study typically involves an intense expenditure of resources within a very short time, usually occurring over a few weeks or months.

- *Is there a way to determine when it is completed?* Yes, the value study is completed when the formal study process has been completed and oral and written reports have been submitted detailing the specific value improvements developed by the value team.
- *Is there a way to determine stakeholder satisfaction?* Yes, stakeholder satisfaction is determined by holding a formal implementation meeting. This allows the project team and vested stakeholders to determine the acceptability of the value improvements recommended by the value team.

Value studies can be conducted as a part of an ongoing project, or they may be completely free-standing projects in and of themselves. Project managers have a special role to play in the application of Value Methodology.

Project managers are generally positioned within an organization where they may take either a direct or indirect role in the performance of value studies. In projectized and matrix-based organizations, there may be a VM department where value specialists are assigned to facilitate value studies for specific projects. This involvement of a project manager in a value study may take on a variety of forms:

- The project manager may act as a value specialist in facilitating a value study for some projects and organizations. This approach may be preferable if the project is still in the initiation phase.
- The project manager may request and/or sponsor a value study to be performed for a project he or she is actively managing. In this case, the value study may be led by a value specialist from a different department within the organization, by a consultant value specialist, or by a value specialist from an external project stakeholder.
- The project manager may be the recipient of a value study on a project he or she is actively managing. Another entity within the organization, or perhaps an external stakeholder, will have requested that a value study be conducted for the project. In this case, the project manager may be an “unwilling” participant and will be required by the organization to cooperate with the value specialist in participating on the value team directly or in a supporting role.
- The project manager may be a primary decision maker with respect to the acceptance of value alternatives developed as part of a value study.

It is not uncommon for some project managers to take on more than one of the roles identified above. Regardless of which role they will play, it will be an important one in determining the success of the value study. Project managers in all organizations should have a fundamental understanding of VM and be aware of how it can improve the cost, performance, risk, and value of their projects.

It is important to understand that Value Methodology, unlike many management fads, is more than just a concept. VM provides an actual means of achieving improved value. The universality of its application to any project makes it an ideal project management tool. No project manager should be without it.

Value Methodology and Teamwork

The successful application of Value Methodology, as originally conceived by Larry Miles, has always focused on the importance of multidiscipline teams. In fact, VM

was one of the first disciplines to recognize the value of drawing upon the group synergism of individuals representing different technical backgrounds. VM is therefore a team process and, as such, requires that members of the value team work together harmoniously and in unison if its output is to exceed the sum of the individual efforts.

Genuine teamwork should always be value-based. In other words, it should be behaviorally rooted in mutually shared values. The value specialist will exert considerable influence over the values that will fundamentally affect teamwork. It must be further emphasized that the value specialist's sphere of influence must extend beyond the boundaries of the value team. The value specialist should think of the value team as an extension of the project team. Further expanding on this idea, the value specialist must seek to include the customer or user, the project team, and the project stakeholders as part of the total team effort, as illustrated in Figure 1.2.

A number of values and principles must be followed in creating successful teams. These include:

- Innovation requires an open discussion about things that are “wrong” about the current project. This is achieved by validating assumptions, strengthening the understanding of the problems that are trying to be solved, and improving communication among team members. Therefore, it is important to establish a basic level of trust among the team members that is based upon the understanding that the goal of the value effort is the overall improvement of the project. It is not about criticizing team members for perceived shortcomings.
- No one individual must ever intentionally be praised or rewarded for looking good at the expense of another. When team members sense that such behavior is rewarded, they will use information about the project in ways that will subvert the value effort and prevent teamwork. Team players are committed to the success of the project, which in turn will make everyone a success.
- Large organizations and bureaucracies tend to shield individuals from conflict through policies and procedures. Discomfort with conflict runs higher in these

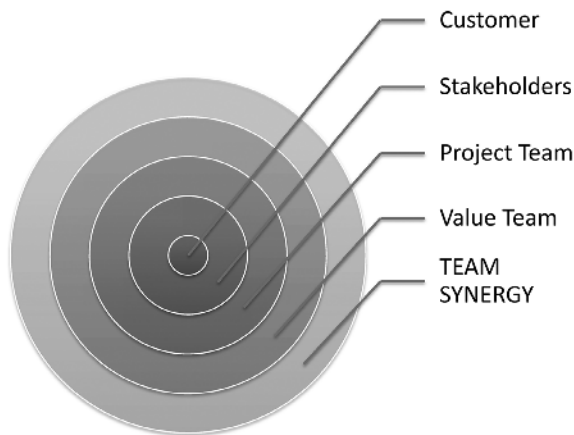


FIGURE 1.2 Teamwork and Value Methodology

environments for this reason. Therefore, the value specialist needs to develop strong facilitation skills in order to make people more comfortable with resolving conflicts in a team or group setting. The value effort by nature should be a process of consensus rather than an autocratic one.

- Managers within a bureaucracy generally understand that clarifying responsibility is necessary in order to prevent the paralysis that can develop when there is uncertainty within a team about who is responsible. Within the context of the value effort, teams, rather than individuals, must be empowered to solve problems.
- Individuals must have respect for data and objective analysis in order to foster teamwork. Members of a team are more willing to create interdependencies involving trust and vulnerability when they feel that facts and neutral data are valued.
- All members of the team that are part of the value effort must be valued equally, no matter how far down within an organization's hierarchy they are. The value specialist should seek to solicit information and ideas from everyone. Often, those within the lower echelons of an organization hold important information that is usually overlooked.
- It is not at all unusual for there to be both superiors and subordinates from the same organization participating simultaneously within the context of the value effort. The value specialist must emphasize the importance that team members demonstrate tolerance in the acceptance of constructive criticism of their own ideas. Teamwork improves when people feel that they have the freedom to constructively criticize and evaluate the group's efforts without fear of reprisal, and when superiors become more "hands on" and less authoritarian.

A "teamwork culture" must acknowledge interdependencies that exist in a complex organization. Values about fairness and equality must support the interdependencies within the total team comprising the value effort; otherwise, teamwork is undermined and the outcome will be compromised. Teambuilding is further discussed in Chapter 4, "Preparation."

History of Value Methodology

The genesis of the Value Engineering methodology was during the period of World War II, from 1938 to 1945. Lawrence Delos Miles, regarded as the father of Value Analysis/Engineering, was an engineer for General Electric Company.¹⁰ During this time, every facility was scheduled to the hilt and prioritized to AAA and higher. Steel of all types was totally scheduled. All vital products and materials were heavily controlled including copper, bronze, tin, nickel, ball bearings, roller bearings, electrical resistors, and capacitors. Miles was assigned the task of "finding, negotiating for and getting" a number of these vital materials, such as materials to expand production of turbo-superchargers from 50/week to 1,000/week for B-24s, capacitors and resistors for skyrocketing military electronic needs, armament parts for expanding production of B-29s, and so forth. In this environment, it was not possible to stop short of achieving the essential results.

Frequently, suppliers, already overextended, said no to increased schedules or new necessary products. In this desperate situation Miles was forced to basics. "If I can't get the product, I've got to get the function. How can you provide the function by using some machine or labor or material that you can get?" Time and again there was a way to do it. Engineering tests and approvals were rushed and schedules met. Thus "function" grew in vitality and was to later mature into the development of the VA techniques.

To assure materials for these and other vital programs, Miles usually worked two days in the vendors' plants, one to two days in GE plants, one day in the Pentagon keeping priorities suitable, and Saturdays and Sundays in his own office. One particular incident will illustrate the function emphasis that pressed itself upon him.

A production manager gave Miles a schedule calling for thousands of a few dozen types of resistors and capacitors to be delivered weekly starting in one week. Manufacturing schedules at the time were nine months out, with six months firm. He was told it was an absolute requirement. Miles asked, "Who agrees with you that this must be secured regardless?" The manager said, "Tom Garahan, overall production manager of GE." Miles asked, "Does Harry Erlicher [vice president of purchasing] agree?" The manager said yes.

The resistors and capacitors were secured. They were for Oak Ridge, Tennessee. Much later it was learned they were for atomic bomb research and development. Their priority overrode everything; still the others were vital too. Miles went to vendors and made schedule changes, but told each he would find some way to provide the essential functions of resistance and capacitance through a different shape or type or material or equipment, which would keep other vital electronic equipment on schedule for the military. The function approach proved to be so effective that he would never abandon it.

Critical years passed. In 1944, Erlicher asked Miles to become Purchasing Agent of a GE plant. Miles experienced more benefits from the functional approach in buying.

In March 1944, he was transferred to Locke Insulator in Baltimore, Maryland, a subsidiary of GE, as manager of purchasing. He took line responsibility for delivery and cost of millions of dollars worth of materials and products per year. During nearly the next four years, he developed patterns of engineering, laboratory, and purchasing teamwork that limited costs and improved products. He learned first-hand both the productive and the destructive force of human attitudes and practices, and their effect on appropriate designs and appropriate costs. His thinking was becoming more and more "What *function* am I buying?" rather than "What material am I buying?"

In 1947, Miles wrote a letter to Erlicher saying that he believed that much good could come to GE if he were relieved of line operation responsibilities and assigned full-time to cost reduction work in the central purchasing office. Mr. Erlicher bought the idea and moved him back to Schenectady in late 1947, where his activity was named the Purchasing Department Cost Reduction Section, PDCRS.

In late 1947, back in Purchasing on Mr. Erlicher's staff, his schedule was cleared so that he could research and develop workable techniques, which would secure more cost effective achievement by the decision-making employees in a plant or business.

Larry Miles described the early technique:

To an exceptional degree it focuses on what is important, develops knowledge about it, and then causes great creativity in that area. You select from the creative approaches, answers that may not have come in years with other thinking methods. When the system was put to work the first time, it resulted in replacing a bronze clip holding a cover on a refrigerator control (that could flex millions of times without breaking) with a lower cost brass clip (that would flex thousands of times). Quality was not sacrificed because the clip would be flexed only about six times in the lifetime of the refrigerator. The \$7,000 per year savings may seem like nothing, but when the same technique was applied to everything in the control box, the yearly savings jumped to \$1.25 million.

The new functional approach was introduced to Mr. Winne, vice president of engineering. Mr. Winne listened, understood, and said, "This is the best method I have seen to get competitive costs and retain quality. What are you going to call it? Proper quality at proper costs equals *value*. Why not call it *value analysis*?" Thus the new methodology was named. Then he said, "The vice president of manufacturing, Mr. DuChemin, will be most interested in this." Mr. DuChemin set up a 20-minute appointment with Miles. After two hours of listening and learning, he said, "Train 1,000 people per year." With the support of these people, Miles set up training programs that were available to GE's plants. He accepted people and products from different plants, applied the techniques, and showed them how they could increase earnings and maintain competitive positions. He learned that great benefits were derived when technical people used the VA system and geared training to them.

For the next three years, Larry continued training personnel and doing work for the plants. He did this using a revolving team of six to eight people. Training was moved into plant locations with a goal of 1,000 per year to be trained. Later, GE often exceeded that number. Larry and his training team learned that greatest benefits come when customers and vendors also know and use the VA functional and methodical thinking approaches. On his advice, GE agreed to provide VA training to other industries as well. During the four years from 1948 to 1952, \$10 million in benefits were reported.

In 1950, GE gave Larry Miles its highest award: the Coffin Award. This is given in honor of their first president, for benefits to the company resulting from the creation and use of the VA System.

This highest GE award, at that time, went to fewer than one in each 10,000 employees. Larry Miles was the first and only purchasing man to ever receive it. The citation was:

In recognition of his outstanding accomplishment through the establishment, organization, and development of a Value Analysis Program, which has resulted in substantial cost reductions.

In 1954, the U.S. Navy Bureau of Ships implemented the first federal government program with the assistance of Miles and his staff. There followed a period of gradual growth in federal agencies until 1963, when the Department of Defense

established specific requirements for a formal program within the three military services. This involved their design and construction activities as well as suppliers, and mandated incentive-sharing clauses in construction contracts. Contractors were permitted to propose Value Engineering changes and share in net savings. It also introduced full-time value engineers within agency staffs to promote and administer the program. The high level of success achieved by the Department of Defense led to further recognition in civil agencies. Great expansion followed in the next fifteen years. Today, every federal agency with a significant construction or purchasing program employs VE in some form. In addition to the Department of Defense, such agencies include the General Services Administration, the Environmental Protection Agency, the U.S. Forest Service, the U.S. State Department's Overseas Building Operations, Veteran's Administration, the Federal Highway Administration, and the Department of the Interior. This was further expanded during the 1980s by the executive branch, with the support of congress, to include requirements for the application of Value Engineering to all agencies within the federal government. In addition, many states and city governments have directed, through legislative action, that value methodology be applied to all capital expenditures. Thus the value technique, born of necessity in a single company, has become a widely used technical methodology for effective utilization of resources throughout the public and private sectors.

SAVE International

SAVE International, originally founded in 1959 as the Society of American Value Engineers, is the premier international society devoted to the advancement and promotion of the Value Methodology. Value Methodology benefits include decreasing costs, increasing profits, and improving performance.¹¹

Society members practice the Value Methodology in the public and private sectors for organizations in more than 35 countries. VM applications span a variety of fields, including management, construction, manufacturing, transportation, health care, government, and environmental engineering.

SAVE International offers member services such as education and training, publications, tools for promoting Value Methodology, certification, networking, and recognition within the value field. The SAVE International certification program is linked to a number of value societies in other countries. Additional information concerning professional certification is provided in Chapter 12, "Value Leadership."

Mission

SAVE International will promote, support, and advance the practice of value enhancing methods through global exchange, networking, certification, member services, professional growth, and recognition. Its strategic goals include:

- Promote the value methodology worldwide
- Collaborate with societies and organizations with common interests
- Identify new opportunities for application of the value methodology
- Embrace new tools and techniques

- Create more flexible and comprehensive value education
- Expand and diversify membership
- Enhance the image of the profession

Core Values and Beliefs

The following core values and beliefs give SAVE International boundaries in the pursuit of its vision:

- Foster an environment for personal and professional growth
- Embrace honesty and integrity
- Celebrate the accomplishments of members
- Advance the profession worldwide
- Concentrate on strengthening the knowledge of members

Projected Role for the Future

SAVE International has identified the role it will play in the future with regard to Value Methodology as summarized in the following points:

- SAVE International will continue to influence the development and dissemination of Value Methodology to chief executive financial officers of corporations and government agencies worldwide.
- SAVE International is known as the premier value organization, with highly skilled members providing value-based leadership in every facet of VM application.
- Opportunities abound for SAVE International members to enjoy top career advancement and business success. This is mainly due to the variety of educational and value-based research offered by the society at universities, symposia, on the Internet, and in collaboration with societies of similar interests.
- SAVE International is the repository of all methodologies related to value improvement, as well as information knowledge databases, for people everywhere.

Current VM Applications

Today, Value Methodology is widely used within the public and private sectors to improve the value of their outputs. Value programs have been instituted in order to ensure that value improvement occurs as a matter of choice. Profiles of three of the most prolific users of VM at the federal, state, and local levels are provided below. Each of these entities has found unique ways in which to apply the Value Methodology to improve the value of their facilities and services to the public.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers has one of the longest-running programs within the construction industry and has been a leader in applying the Value Engineering to construction projects since 1964, solidly demonstrating the Corps' cost effective-

TABLE 1.1 USACE VE Program Results

Fiscal Year	Military	Civil	Total
2004	\$59,771,000	\$84,630,000	\$144,400,000
2005	\$102,020,000	\$100,672,000	\$202,692,000
2006	\$386,124,000	\$111,285,000	\$497,409,000
2007	\$222,815,000	\$102,733,000	\$325,548,000
2008	\$186,684,000	\$114,764,000	\$301,448,000

ness. The program has resulted in construction of over \$5.5 billion in additional facilities, without additional funds requests.

The basic focus of the program is to increase project value by proactively searching for and resolving issues through very open, short-term workshops, and to maximize precious taxpayer resources to provide the required function(s), amenities, and the highest quality project(s), at the lowest life cycle cost.

The Corps has recently used Value Management/Value Engineering:

- Programmatically to create and implement transformation in how the Corps executes all Military Programs workload
- Shorten schedules significantly, and provide quality projects with reduced budgets
- Ensure full project coordination with all stakeholders
- Assist in preparing project scopes, negotiating environmental contracts, planning optimization, and project review
- Provide planning assistance to states and communities
- Assist in program review

The Corps regularly helps others initiate VM/VE programs by advising head-quarter offices, exporting or established training workshops, and by furnishing appropriate Certified Value Specialist leadership and/or teams (consultants and in-house) to perform Value Management Workshops.

In 2008, the Corps invested \$8.3 million in the program, performed 287 workshops, and had a return on investment of over 36:1. Table 1.1 summarizes the *net* USACE VM/VE savings and cost avoidance for the last five fiscal years as reported to the Departments of Army, Defense, and OMB.¹²

Over the past decade, there has been an increasing use of charrettes (intense design workshops focused on developing the conceptual design of a project) by U.S. Army Corps of Engineers (USACE) Districts to initiate the design process for military construction. Many districts within the Corps are now utilizing the Value Methodology in the form of a “Value-Based Design Charrette” to ensure that a project meets its scope, schedule, and cost targets at the earliest stage in the design concept.

California Department of Transportation

The California Department of Transportation (also known as Caltrans) uses Value Methodology, where it is referred to as Value Analysis. Caltrans uses VA for a variety of reasons, including:

- *Maintain federal funding.* Value analysis studies are now required on all projects greater than \$25 million (construction, right of way, and capital outlay costs) on the National Highway Systems (NHS). The project is defined by the environmental document and may include multiple contracts over many phases. The NHS Act of 1995, the subsequent Federal Rule (February 1997—Subpart 627), and the Federal Aid Policy Guide, which added a new Chapter 6—Value Engineering to define the application of this regulation.
- *Building consensus with its transportation partners.* Federal and state legislation over the last several years has given the local authorities a greater role in deciding local transportation issues. Value Analysis is an effective tool to break down the conflicts and build consensus with project stakeholders and partners.
- *Solving difficult transportation projects.* The steps and tools of Value Analysis provide an excellent tool to focus on and solve our most difficult transportation problems. The more complex a project in terms of geometry, staging, environmental impacts, and so on, the more opportunity it provides a skilled, well-led VA team to provide an in-depth analysis and subsequent innovative solutions for the project.
- *Cost reduction while maintaining or improving product quality.* The public is demanding more performance for less cost. Project costs should consider the total cost of ownership, which includes both the original (construction) cost and subsequent operation and maintenance costs. VA recommendations should not include cost reduction at the expense of project functions.
- *Elimination of detrimental design influences.* Many influences can negatively affect a project's design, ranging from a lack of information to the unwavering adherence to design standards. The VA review process can overcome the above influences by use of an objective, multidisciplinary team of individuals applying the VA methodology in a controlled environment.

Caltrans regularly conducts three types of value studies:

1. *Highway construction projects.* Performing value studies on highway projects is the primary focus of the Caltrans VA Program. Caltrans typically conducts more than 50 value studies per year on the design of highways, bridges, and other supporting facilities, resulting in implemented cost savings averaging over \$100 million per year.
2. *Product studies.* The VA process can be used to improve the quality of highway products. Typically, engineering products are items and systems as described in Caltrans' standard plans and specifications. Value Analysis can help identify products that need to be updated due to changing technology, outdated application, or any other changes that affect our standard engineering products.
3. *Process studies.* The VA process can be used to improve the quality of Caltrans' processes, such as policy and procedures and business practices.

Caltrans experienced a major boost to their Value Analysis program in 1995, when the FHWA began mandating that value studies be conducted on all projects involving the National Highway System. Between 1996 and 2008, the implemented savings have been considerable, over \$2.2 billion. Figure 1.3 summarizes the results of the Caltrans VA Program over the past two decades.¹³

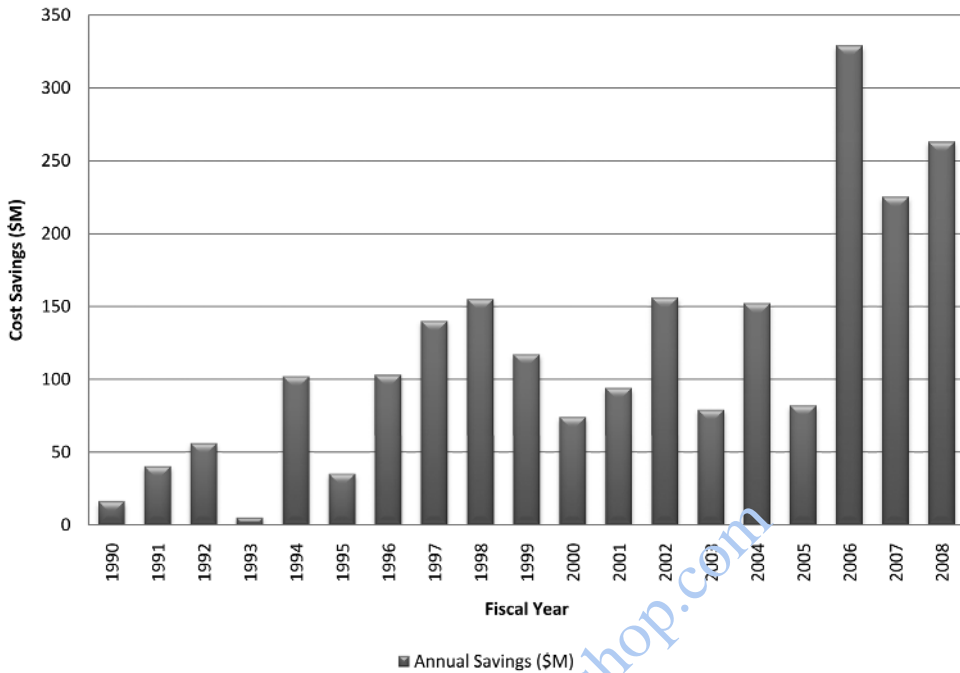


FIGURE 1.3 Caltrans VA Program Results

City of New York, Office of Management and Budget

The New York City Value Engineering/Value Analysis (VA/VE) Program began in 1983 as a response to a series of capital projects that had become very public embarrassments for the mayor. He asked the budget director for a capital project cost management tool to ensure that agencies would catch problems at an early stage, before costs escalated and construction schedules and public perception were affected.

The program has evolved and expanded over the past twenty years to focus on more than just cost management. OMB's objectives include getting a full reality check on a capital project's cost, program, and schedule, and on offering alternative proposals to improve the project's cost effectiveness, functionality, and schedule. The routine use of VM has become linked to OMB funding approval for large capital projects. Agencies use these reviews as an opportunity to get a second opinion from relevant experts to confirm or modify the technology choices and functional arrangements for their projects, and to identify ways to make them more cost effective, especially in times of fiscal constraints.

Additionally, Value Methodology has been used successfully to streamline or redesign agency operations or processes. Agency staff becomes the team of experts who suggest improvements and changes to upper management, using the structured VM job plan and professional VM facilitation. This tool is much in demand, as

agencies must do more with less and deal with changes in technology. Often, “business as usual” is no longer an option.

OMB has reviewed hundreds of capital projects of great complexity and diversity using VM. Subjects have included schools, hospitals, jails, water pollution control plants, bridges (movable and fixed, roadway and waterway), computer systems, parks, museums, zoos, garages, courts, health and social services facilities, police and fire facilities, vehicle maintenance facilities, corrections food services, combined sewer overflow facilities, water treatment plants, sludge and ferry boats and ferry terminals, landfill closures, lab buildings, data centers, and environmental projects.

The scale and variety of projects reviewed in the NYC program is unique, as almost all city agencies are administered by OMB. The wide range of projects demands that OMB undertake extensive outreach for appropriate and credible team expertise. In addition, OMB has used VM to recommend improvements to operational processes or delivery of services. Examples of subjects reviewed include the city’s procurement process for professional design services or human services contracts, leasing and space acquisition, daycare contracting, mail handling, the construction change order process, the emergency housing intake process, information technology services, social services payment and case documentation, and hospital revenue enhancement processes.

The VE/VA program reviews the largest, most complex or important capital projects from within the city’s capital. From 2001 to 2007, OMB reviewed 101 major projects resulting in cost savings of just under \$1.2 billion, with an average reduction of 4.7 percent per project and a return on investment of \$71 for every \$1 spent on value studies. The NYC VE/VA program has been a model for other government agencies, and it continues to evolve in response to the needs of its demanding stakeholders.¹⁴

Major Corporations

Numerous major corporations throughout the world representing all spheres of manufacturing, construction, and professional services maintain active VM programs. A representative list of these includes:

- Bechtel
- Bristol-Meyers Squibb Inc.
- Ford Motor Co.
- General Dynamics
- Ingersoll-Rand Company
- Kellogg Brown & Root
- Kraft Foods Inc.
- Navistar
- Pratt & Whitney
- Raytheon Systems
- Samsung Electro-Mechanics Co., Ltd.
- Teco-Westinghouse Motor
- URS Corporation
- Whirlpool

While the scope and focus of the application of Value Methodology within these organizations varies widely, all maintain formal VM programs.

Summary

In today's global economy, Value Methodology is being used to improve the value of construction projects, consumer and industrial products, manufacturing processes, and business practices around the world. Value Methodology achieves this by:

- Identifying areas of poor project value
- Developing innovative ways to better perform key project functions at less cost
- Maximizing the use of the most valuable resource—people!

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