

Value Improvement for the 21st Century

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Introduction

I first became aware of the value analysis/value engineering methodology in 1979 when I was employed by a value engineering consulting firm. My initial perception of the techniques was that they were used for the sole purpose of reducing costs. Unfortunately, that perception is held today by hundreds of thousands of people. But things have changed since VA/VE was originally developed, and cost reduction is but one of many benefits realized by applying the methodology.

When Larry Miles first developed value analysis, he was motivated by the need to obtain certain materials which were unavailable at the time. This prompted him to take a long, hard look at the "functions" these items were to perform, and speculate about what other materials might offer the same functions. As a result, the value analysis methodology was created.

As use of the methodology spread among major industrial concerns and U.S. government agencies, the primary focus was cost reduction. Even when the Society of American Value Engineers was originally formed in 1959, the name was chosen because the acronym "SAVE" implied "save money." It is interesting to note that Larry Miles, himself, questioned whether or not this was the appropriate image for the Society to project. He knew the VA/VE techniques were useful for accomplishing much more than just saving money.

In the past seventeen years, since my original introduction to VA/VE, I have learned that most people who have heard of the value methodology believe it is just another form of cost reduction. When talking to someone "new" to VA/VE and explaining what the methodology involves, it is not uncommon to hear "we do that all the time." This is because a description of VA/VE sounds, to someone unfamiliar with the *structured process*, like a logical way of doing business that each of us incorporates into our daily life, i.e., common sense. Further, the original emphasis on the cost reduction benefit of VA/VE has become widely accepted as the primary basis for using the value techniques. What I see now, as I visit different organizations and talk to people who use the value methodology, is a different, more creative attitude about how to use VA/VE. What I also see is the necessity for a cooperative effort at educating the public, and publicizing the benefits of this straightforward, pragmatic process.

Current Trends

When Total Quality Management (TQM) first became a "trend," I heard lively discussions between many value practitioners about which comes first: Quality or Value? As I learned more about the Quality movement, it became apparent to me that TQM, properly applied, is actually a culture, or attitude, within an organization. The very name, Total Quality Management, implies an attitude toward excellence in everything the organization does, both internally and externally. I quickly came to the conclusion that VA/VE is an excellent tool for *achieving* Total Quality Management. I believe it is also true that VA/VE is the appropriate methodology to use in a Reengineering effort. I suspect there are other programs to which the value techniques are equally applicable.

As a VE consultant, I have been involved in leading team studies on numerous projects, primarily in the construction arena. While many of these studies were initiated primarily to bring the project within budget, several of them were motivated by other, more abstract problems, including the avoidance of problems (not related to cost), and the need to improve quality of service. Two examples come to mind:

From December, 1992 through June, 1993 I led a team of individuals in the California Department of Transportation (Caltrans) in San Diego through a VA/VE study of the procedures they used in Construction Engineering/Administration. The department had a budget of \$25,000,000 to administer \$280,000,000 worth of construction, with a staff of approximately 230 people. Their personnel managed Caltrans' projects, as well as projects for other local government agencies. The VE team included various personnel from Caltrans – project managers, resident engineers (the people who actually managed on-site construction administration), project engineers, and an inter-agency coordinator – plus the Vice President-Operations from a construction contracting firm that did a lot of business with Caltrans. The team kicked off the study with, and regularly reported progress to, an “Advisory Panel” comprised of representatives from various city, county, state and federal agencies. Goals of the study, defined at the initial kick-off meeting, included:

- ◆ reduce/improve schedules
- ◆ streamline processes
- ◆ maintain quality
- ◆ reduce cost to public for construction and construction services.

The group identified nine major "subject areas" on which the VE team was to focus during the study:

1. Contract Change Order (CCO) Processing (especially approval procedures)
2. Inspections (which involved approximately 72% of the staff)
3. Resources (availability of experienced people; automation of processes)
4. Administrative Procedures (equipment acquisition; inventory control)
5. Communication
6. Organizational Issues
7. Contract Documents
8. Scheduling/Planning/Procedures
9. Incentives

Specific problems mentioned included delays; duplication of effort; inexperienced people; in-house versus consultant services; conflict resolution; and liability issues. The VE team applied the VE Job Plan to each of the nine areas individually, i.e., there were nine separate studies included in the overall effort.

The results of the study were outstanding. In summary, the VE team identified potential annual savings of more than \$5,000,000, or 20% of the department's annual budget. The true significance of the savings was that the dollars represented personnel time and effort spent on administrative activities – such as paperwork, public relations, and training classes – rather than time spent administering (or managing) construction. The “savings” was actually redirected effort.

One of the more remarkable proposals developed by the VE team dealt with automation of paperwork procedures. It would seem that this is such an obvious improvement it would have been in place already. However, the construction inspectors were filling out daily diaries – showing hours of work, equipment used, pertinent discussions, quantities of items placed with applicable materials testing and release information – manually, on paper forms. They were also conducting labor compliance interviews on other forms, which included overlapping information. At various times during the

monthly pay period, inspectors prepared quantity calculations and pay sheets used to pay the contractors. This involved diary review, materials acceptance and release confirmation, preparation of back-up calculation quantity sheets, preparation of pay sheets, and checking of each other's work. Inspectors also performed an inventory of, and established payment for, materials on hand.

The VE proposal was to automate the current multi-form method by combining all of the above information into one form that could be entered into a database. The database, then, could be used to recover data for labor and equipment on contract change orders, item adjustments, and claims analysis and resolution. After allowing for costs to purchase equipment, hire a programmer for a six month period, train personnel in the new methods, and employ a full time computer coordinator, this one proposal generated savings of more than \$1 million. Most of the savings was due to time – an average of 2-1/2 hours per day, per crew, per project spent on paperwork. This translates to more time available for actual construction management, as opposed to purely administrative work, and potentially shorter construction schedules.

This study may be compared to what is currently known as "Re-Engineering" of an organization. In fact, I am aware of one individual who teaches a Re-Engineering course at a U.S. university using the VE Job Plan as the basis for the process.

The second example is a VE study for the same client, on a highway designated as State Route 125 (SR 125). The construction of SR 125, a 6-lane freeway, was divided into three stages: stage 1 was to be constructed first, then stage 3, followed by stage 2.

This study was initiated by the Caltrans project manager as a means to solve certain problems he knew would occur during construction. The VE team was specifically directed to focus on the problem areas, and generate alternatives for solving those problems, rather than focusing on cost savings. Problems to be addressed included:

- ◆ establish a "haul route" for moving material from Stage 2 to Stage 1 of the project;
- ◆ identify potential for placing surplus material from an environmental mitigation site;
- ◆ identify where material will come from and/or go to for a landslide mitigation area;
- ◆ provide recommendations for preparing a Traffic Management Plan, including involvement of the public in the final plan; and
- ◆ coordinate construction of structures (bridges), particularly with regard to separation of SR 125 and another road to be constructed.

SR 125 will pass through a heavily populated, residential area, and very near a college campus. Caltrans was particularly concerned with minimizing the impact of construction on the residents of the area.

The VE team identified several alternative haul routes and traffic management plans, as well as a number of construction phasing ideas. The most significant proposal, however, dealt with the landslide mitigation. Two of the team members, an engineering geologist and a geotechnical engineer, developed a proposal to construct a shear key type buttress at the toe of the existing landslide in order to provide a stable roadway.

This slide area had been a recognized problem since the adoption of the proposed freeway alignment 20 years earlier. At least four different geotechnical studies had been conducted to determine the limits of the area, and recommendations for stabilizing it. The VE proposal was found to be superior to those four studies and, coincidentally, generated more than \$3,000,000 in savings on the project. This VE study was recognized by the United States Federal Highway Administration as "Value

Engineering Project of the Year" for fiscal year 1994.

These two projects are fine examples of an organization whose goals were to improve the way they do business, not just to reduce costs. In the case of the first study, Caltrans was interested in *streamlining processes*, making their personnel *more productive*, and reducing the cost to the public for construction and construction administration. In the second case, a new freeway which was being constructed to serve the public, Caltrans' primary goals were to *minimize disruption* to the public's daily activities, and *shorten construction schedules*.

In the industrial sector, a nylon business conducted a VE session on a design for a new manufacturing plant. During the Analysis Phase of the study, it was noted that their process included adding water at three separate steps, only to later remove the water in an evaporator. This resulted in an idea to make up the nylon salt at a different concentration, which dramatically reduced the salt storage system and eliminated a major process step. This change represented capital savings of \$1.5 million, plus energy, operations, and maintenance cost savings over the life of the project. Combined with other ideas presented by the VE team, the overall results of the VE study totaled \$4 million of capital cost avoidance, approximately 6% of the \$63 million project.

Another business conducted a VE analysis on a nonrevenue-producing Acetic Acid Volatility Control project to allow the plant to comply with the State's Air Permitting requirements for Acetic Acid emissions. The project consisted of design modifications to the waste treatment basins, that allow control of basin pH through neutralization with caustic addition.

The functions of the proposed process were identified, and it became apparent that a significant portion of the project related to providing redundant systems to ensure continuous, uninterrupted supply of caustic. This was to avoid even short term violations of the Air Permit requirements. Brainstorming other means to provide for the function "ensure supply," resulted in an idea that eliminated nearly all of the proposed backup systems, by just adding a spare installed pump on the existing caustic storage tank. This generated savings of more than \$300,000 – over 50% – on a \$519,000 project.

In the United States, we are seeing both in construction and in manufacturing, the application of the value techniques very early in the course of a project or product. VE is being used to actually develop the concept design of a construction project. A CVS facilitator works with the design team, guiding them through brainstorming and function analysis to generate alternatives, or VE proposals, for what will ultimately become the design of the facility. Manufacturers are using the VE methodology to determine what new products they might need, and then to develop the products themselves, as well as their marketing strategies for selling the products.

Increasingly, we see organizations using the value techniques for "re-engineering" their processes and procedures. These uses of VA/VE are all indicative of a trend toward applying the structured job plan to solve innumerable types of problems, and define countless opportunities. While cost reduction or cost avoidance is usually realized from application of VA/VE, the methodology is actually much more than a cost reduction tool.

A dispute avoidance approach used in the construction industry in the U.S. is "Partnering." This is a process whereby all the parties involved in a project – the owner, designer, the construction contractor and his subcontractors – develop a working relationship in a one or two day workshop environment, to avoid problems such as delays, change orders, claims, etc. during construction of the project. During the workshop the individuals agree to processes for preventing disputes and for resolving issues that may come up during construction. Ultimately they all sign a "Partnering Agreement" which spells out the relationship(s) and processes to which they have agreed. The Partnering process is intended to assure that

all parties have the same objectives, reduce or eliminate the risk of liability, and prevent possible claims and/or litigation. The agenda used in a Partnering workshop is somewhat similar to the VE job plan, but it misses two important pieces we use in VE: function analysis and FAST diagramming, and a structured approach to creativity. Recently I had the privilege, along with my husband and partner, to present a paper at a conference where we suggested that these elements of the VE job plan could strengthen the Partnering process. We called the concept Value in Partnering ("VIP"), and it was very well received.

Our emphasis in the VIP presentation, and my focus when I teach VA/VE, is the benefit of using function analysis and FAST. Developing a FAST diagram is a tremendous communications tool, and one which breaks through barriers of misunderstanding. For example, on a VE study of a highway project, the VE team included some of the engineers who designed the highway, and some of the maintenance people who worked on the highway. When a FAST diagram was developed, the engineers gained a new insight into what the maintenance people must deal with when working out on the roadway with traffic speeding past. At the same time, the maintenance people went away with a better understanding of what the engineers must consider when developing their design. FAST diagramming in a team environment causes all participants to openly express, and ultimately agree to, what they believe to be the functions of the project or process under study. The result is extraordinary communication, which frequently bridges wide gaps of misunderstanding.

The Future

To position ourselves for the 21st century, value practitioners worldwide need to be aware of roadblocks and work diligently to knock them down. If we use VE to build a better building or create a better product or improve a process, we must talk about what we've done. We must let people know how this straightforward, logical and structured process helped us be better managers, better marketers, more productive employees. We must emphasize how we used the methodology to avoid problems before they occurred...how we increased our market share by developing a strategy with a FAST diagram...how we added functions (or services) within our organization without adding people...how we shifted personnel focus to new areas, rather than shifting personnel out the door. VA/VE is a powerful tool for doing all of these things. It is a tool that, properly applied, adds to or improves the value of products, processes, facilities, organizations...a tool that can go a long way toward improving our world economy.

With all of these varied uses of the methodology, why is VA/VE not more readily recognized and accepted as a proven process? This is partially attributable to the fact that those organizations who use the value techniques publicize their successes, but not necessarily *how* they achieved their goals. It is due more, I believe, to the perception that VE is strictly a cost reduction method. And it is also because people hear the term value *engineering*, and believe it is too technical for their purposes.

This very terminology creates the need for a value practitioner to be a strong, positive communicator, and sensitive to the reactions of those with whom he or she is dealing. In the construction sector, design professionals are extremely sensitive to, and often antagonistic toward, the prospect of having their designs "value engineered." They perceive the process as a group of their peers coming in to criticize what they've done. Often they believe the VE team will "cheapen" their project in an attempt to save money (the "cost reduction" perception again). In industrial settings, product design teams and process engineers often resist value engineering out of fear that their innovative creation will be made less "state of the art" after being subjected to a VE analysis. These negative feelings are the result of not understanding the purpose, *the function* of VE.

A good CVS facilitating a VE study will dispel these misunderstandings with the proper communication *before* the VE effort ever begins, and by including the design team in the VE process. The CVS, and the

members of the VE team, must be in a "public relations" mode at all times: they must be positive about everything they say and write. This results in a much happier and more cooperative design team, as well as a higher probability for implementation of VE ideas. The same is true in all applications of VA/VE, whether in construction, manufacturing, or in administrative processes and procedures. The people on the VE team must "sell" themselves, the value process, and the VE ideas they develop. This may involve an outside customer, or an internal customer such as another department within the same company. For VA/VE to become widely recognized and accepted, it must continually be sold.

You may be aware that there is legislation pending in the United States Congress which would mandate the use of value engineering by all federal government agencies. As a result of a Circular (A-131) issued in 1988, and reissued in 1993, by the U. S. Office of Management and Budget (OMB), those agencies who use VE were required to report their VE activities to OMB. During a three year period (1988, 1989 and 1990), there were reported savings of more than \$5.5 billion as a result of using VE. In fiscal year 1994, approximately \$1.5 billion were saved by federal agencies. These numbers are very impressive and would, on the surface, appear to be sufficient to support legislation to require VE in all federal agencies. However, again because of a misconception about what VE is and what it is not, there is tremendous resistance to the legislation. Here, too, is the necessity to "sell" the VA/VE process.

These are images we, in SAVE, are striving to change. There have been attempts in the past to change the name of our society to something other than Society of American Value Engineers. There are thousands of people who believe that we are an organization of engineers, and we teach and use an engineering process. They turn away from us, and from the methodology, because they believe they must be an engineer to participate. The SAVE Board of Directors believes now is the right time to change our image, because we need to draw in the people who are practicing other value-adding methodologies such as Total Quality Management, Re-Engineering, Partnering, Design to Cost, Quality Function Deployment, and many others. Those people and value practitioners should be united in our efforts to add or improve value. And we need to dispel the images of engineering and cost reduction that are so prevalent among those who don't understand the value methodology, so that we don't turn away individuals who have a valuable contribution to make to the improvement of our economy. To prepare ourselves for the 21st century, we must bring together value practitioners worldwide, and we must join forces with those who offer other techniques to add or improve value!

Conclusion

I know that the value techniques created by Larry Miles are much, much more than cost tools. All of you know how valuable the methodology is, or you wouldn't be here today. We in SAVE have tremendous respect and admiration for the Society of Japanese Value Engineering, and for all of you here today, for the extent to which you use and spread the VA/VE techniques. I came here to Japan to express this to you, and to learn as much as I can from you about how you achieve your extraordinary successes. I thank you, Dr. Ueno, for offering me the opportunity to be here. I thank all of you, here at the SJVE conference, for your dedication and loyalty to the value methodology. Although he passed this life more than ten years ago, I know Larry Miles would beam with pride if he were standing here seeing you today.

At the time of original presentation, Ginger Adams was President of the Society of American Value Engineers (which has since become SAVE International), and Vice President of VEI, Inc., a VE consulting firm in Dallas, Texas. She is now Executive Vice President of Value Management Strategies, Inc., a VE consulting firm in southern California. As of 1999, Ms. Adams is a Fellow of SAVE, and since 2003 serves as Dean of the College of Fellows.