

VALUE ENGINEERING AND COST ESTIMATING

PARTNERS FOR PROJECT VALUE AND PROFIT IMPROVEMENT!

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Good morning, ladies and gentlemen. Thanks for allowing me to participate in what we anticipate will be an interesting and informative series of presentations. Hopefully I'll be able to add to that "Treasure Chest of Knowledge" while I take you on a brief tour through the World of Value Engineering. As the title for my presentation suggests, teaming Value Engineers and Cost Estimators should result in a WIN - WIN - WIN - WIN scenario for clients, contractors, Cost Estimators and Value Engineers.

First I'll introduce you to the Methodology of Value Engineering, point out some major differences between Value Engineering and cost reduction, and indicate the type and level of estimating support needed in performing Value Engineering Workshops. I'll cap that off with a few unique results to illustrate how VE is applied during the project design phase.

The second part of my presentation will focus on VE in the project construction phase, again indicating the type and level of estimating required to support VE in this phase. The potential for increased "hard dollar" profit improvement by using VE in construction could open new marketing areas for all of you.

Let me begin by establishing some sort of "Value" relationship between what we want or need in our products and services, and what we are willing to pay for those requirements.

Whether you are buying a car, a house, or any manufactured product, you want the best "buy" for the money you intend to spend. The same is true in interviewing a new hire, when we seek services, or in subcontracting work for any given project. If we make these "performance" requirements the numerator in the Value relationship, and the cost you are willing to pay the denominator, we have a "Value Equation". (Ex1) This makes it very clear that we can *increase* Value by 1) lowering cost (denominator) and keeping performance constant, or by 2) increasing performance (numerator) and keeping cost constant. In our VE Methodology, we convert the performance characteristics to "*functions*", and so we might have the following as our ultimate Value Equation: $\text{Value} = \text{function}/\text{cost}$

The first approach would be the equivalent of a cost reduction exercise, where you might substitute equivalent lower cost materials, or a less costly process to achieve whatever performance has been specified. The second approach might be a condition where some fixed dollar amount is available to buy as much performance as that budget will allow. I have seen RFPs and RFQs where the client asks the bidders to list all the line items that they will accomplish for a specific dollar contract.

The most rewarding experience for both client and contractor is obviously to maximize Value by BOTH increasing function AND reducing costs, and that is the goal of any Value Engineering Workshop.

One of the key elements in the VE Methodology is this conversion of performance characteristics to “*functions*”, and it is this process that distinguishes Value Engineering from a strictly cost reduction exercise. By defining requirements in these more abstract terms, the VE Teams generally can develop considerably more options to improve Value, and find more unique solutions “outside the box” to meet project requirements. (Ex2) We also identify which *functions* are “needs” (necessary requirements) and which are “wants” (nice, but not necessary). I will show you that process with a few examples a little later in my presentation.

The second element of the Value Methodology that differentiates it from “cost reduction” is the Value Engineering Job Plan. (Ex3). This Plan outlines a 5 phased approach that is the core of the Value Engineering process, and it must be meticulously followed to achieve optimized Value in any project. In the first (Information) Phase, data is accumulated so VE Team members become familiar with the project *through the eyes of the designers and users*. The only way for a VE effort to be successful is for Team members to understand the project requirements as defined by the users (owners), and interpreted by the designers. During this Phase the Team uses available data to identify project high cost areas, and a Pareto Analysis (80% of cost is in 20% of items) or other methods to focus in on areas that represent the highest probability for Value Improvements. A rigorous function analysis is used to determine what is “driving” those high costs.

Once the Team feels comfortable (and only then) with their understanding of the required project functions, they enter the second (Creative) Phase of the VE Job Plan. During this phase VE Workshop participants (including designers and users) list as many ideas as possible to accomplish the functions that were identified and discussed during the Information Phase, without ANY restrictions (limitations imposed on the project, real or perceived). This Phase is intended to get participants “out of the box”, and provide a completely “open” shopping list for potential alternative approaches to satisfy necessary functions, eliminate unnecessary functions, AND contribute to a better (value improved) project result.

The third (Evaluation) Phase of the VE Job Plan is dedicated to “boiling down” perhaps over 100 ideas into a smaller number (20-30) that would have the highest probability for incorporation by the designers and users. Ideas that cannot be used are of no Value to the project, so it is critical to have these groups involved in the Evaluation process. I use the SIRRS (Simplified Idea Ranking Rating System) (Ex4-4A) to assure these groups are *involved* in the process, which not only provides their “take” on what ideas are most appropriate for their project, but it begins the “buy in” process for ultimate incorporation of those ideas to benefit the project, which is the ultimate objective of any VE effort. Note that initial estimate of potential cost impact falls into very broad ranges at this stage of the process.

Now is a good time to talk about the involvement of cost estimators in the VE process, and what I am about to say may shock a few of you. Since most of the VE Workshops during design are conducted at or around the 30% design completion (or earlier)(Ex5), there is NO need for estimates at this time to be more accurate than (+ or -) \$10,000-\$20,000! Even on a small \$1 Million project that’s (+ or -) 1-2%, but I still have cost estimators on my Teams carrying their calculations out to the penny! Not only that, but they get upset when I take their numbers and “round” them off even to the closest \$1000. Even clients are shocked when I tell them we are NOT going to provide estimates for any ideas that have a potential cost impact of (+ or -) \$10,000 - \$20,000, or sometimes even higher! No one in their right mind should make decisions based on

that level of “costing” at 30% (or sooner) design completion; whether or not to include a VE idea at that time should be based strictly on the technical merit of the idea.

The VE Team Cost Estimator here needs to make quick cost “assessments”, and to work with other Team members in identifying where significant cost impacts (+ or -) could occur. This early design phase cost information should be used **ONLY** to indicate the potential cost impact as a tool in the decision-making process that will determine if an idea should be pursued further by the designers.

The fourth (Development) Phase of the VE Job Plan is where the most promising ideas are further documented to aid in the determination (by designers and users) of which should be incorporated to enhance the project under VE review. Your Seminar package includes the forms I use in this process, and they are typical for what most agencies require from the VE effort. (Ex 6-11). You are welcomed to these for your own use, and to modify them with your own company logo. I’ll walk you through each one quickly, with special attention to the Cost Sheet.

These sheets are drafted by VE Team members during the VE Workshop, and discussed with the users and designers in the fifth (Presentation) Phase of the VE Job Plan. They are modified based on input from those discussions, and then included in a final VE Report. A VE Report would contain some of the elements shown in this typical Table of Contents. (Ex12)

To illustrate some of the VE elements we’ve been discussing, I’ll liven up this presentation with a few examples from the many areas where this Methodology has been applied in the construction industry. Each of these stories is included in your package, but I’ll pop them on the screen and give you some additional background for each one, and answer any questions as we go along.

The first on our list (Ex13) illustrates the benefits of a “multi-disciplined” Team for any project, for you never know where the best solution may be found. When Basilone Bridge at Camp Pendleton collapsed due to heavy rains, it created a dam across the Santa Margarita River that eventually led to a breach in the dike protecting the airfield there, and much publicized damage on the base. The ultimate solution developed by USMC was to build a higher dam, but because of the ADS (flight path) requirement, the new bridge had to be relocated 600’ upstream.(Ex14-14A) This required totally new approach road alignments, a new EIR requirement, and considerable additional costs. When the Team identified the new alignment as a *prevent collision* function, a logic (HOW does a collision occur?) developed based on the simple fact that a collision only occurred when TWO elements were involved, a plane and a vehicle. By eliminating ONE of those elements, a collision could NOT occur, and thus evolved the concept of a controlled bridge gate to prevent any vehicles from crossing the bridge when a plane was on final approach. This was a \$30,000 solution to a multi-million dollar problem, and resulted because the VE Team addressed functions rather than trying to just “cost reduce” bridge and other construction cost elements.

My second example gets back to our ultimate VE objective, to get “more for less”(Ex15). In this case, the VE Team suspected the project scope for the National City Marine Terminal expansion was a matter of convenience, and not “need”. In defining the total (3 phases) functional project goal as *expand capacity*, it became obvious that a look at the capacity “drivers”(ship lengths) (Ex16) could lead to a more logical pier length for each phase, AND provide added capacity on a shorter construction schedule. In this case, the Team recommended the Port of San Diego INCREASE cost to add an extra 325’ feet of pier length in the present project (which cost would

be eliminated in the next phase), but also proposed a number of ideas that were accepted to actually pay for that increase!

The third example was an unusual project, in that the VE team was called in to help determine how best to spend a \$6.8 Million litigation award.(Ex17) The condo complex in Laguna Sur sued the builder for “sub-standard” construction that was allowing water to seep into the ground floor bedrooms in a split-level design which represented over 80% of the units in the complex. The design solution presented was to break through the upper level garage floors to access the lower bedroom walls for waterproofing treatment. The VE Team determined that the *prevent intrusion* of water could be better (and more permanently) resolved by finding ways to *eliminate water* (source), which was accumulating in the crushed rock courtyards because the roof drains all terminated in that area, with no further access to the sewer system. By revising the drainage system and eliminating other undesired sources of water (faulty sprinklers, etc), the problem was solved without ripping up all the garage floors, and over \$1.6 Million was saved. By placing these dollars into the Maintenance Reserve the condo Association solved another problem in the community, by having extra dollars available for maintenance on those (single level) units that did *not* have the water seepage problems. If we have time, I will come back to how the function list developed for this project (Ex17A) was developed into a FAST Diagram.

My fourth example had a rather interesting final result, and also illustrates the use of the VE forms in documenting each Developed option (idea). This was a Coast Guard Station along the Gulf of Mexico Florida coastline. These auxiliary stations were established approximately every 50 miles along that coastline, and manned with high speed outboard motorboats, primarily to interdict drug smuggling operations in that area, which were covered by many small rivers, inlets and swampy lagoons. Many of the stations were converted homes or other structures that did not provide adequate security for much of the confiscated contraband, so “locals” would break in and steal the evidence, jeopardizing Coast Guard efforts in the court system. The Coast Guard solution was to replace these stations with basic concrete buildings, and secure storage vaults. This particular station was on such a small plot of land that the builder was restricted to three sides of the site, with little or no room for materials staging. In addition, temporary housing facilities for the Coast Guard personnel was scheduled for demolition after the new building was completed. (Ex18) One of the Team ideas was to use a Coast Guard vessel for the *house personnel* function, since it was just a temporary requirement. (Ex19) This had so many benefits (Ex20-21) that the Coast Guard Regional representative was going to (at the VE Team’s suggestion) go back to his headquarters and recommend that a barge be built for this function, and towed to locations where these new facilities were being constructed.

Now for the interesting part...I left that project (in the St. Petersburg area) to visit my parents about 100 miles North of there, on the 4th of July. While at a picnic at a neighbor’s home, I was discussing this project, and one of the other guests told me she had a summer cottage in the Yankeetown area (about 20 miles from Inverness), on a river where a similar Coast Guard project was just completing. Her next statement really caught my attention...she said the original station was a barge! For the price of a lunch and a ride to her cottage, we took her outboard motorboat up river, and I got the following photos of the barge (Ex22), went aboard and was told that they planned to strip it of anything useful, then sink it off the coast as an artificial reef. Needless to say, I faxed this info and photos to my client for inclusion in the project, and to prevent the embarrassment of requesting a new barge be built, when one was available “ready to go” not more than 150 miles from the initial project!

Let me now move quickly through the second area of my presentation, the opportunity that exists for contractors and cost estimators in the submittal of VECPs (Value Engineering Change Proposals) in the project construction phase.

Understand that a VECP means a change to the contract documents.(Ex23-24) When we follow the VE Job Plan and get to the Evaluation Phase, the first thing to do is identify those items which will NOT require a contract change because the contractor keeps 100% of those savings.(Ex25). Those that will require a change can become VECPs, and various agencies will share NET savings on those ideas with the contractor, ranging from 55% (USN Ex26) to 40% (Turner Ex27). Federal projects over \$100,000 are required to provide an Incentive Clause for contractors (FAR 48.0, Ex28), but you have to know that, and request they be included in your contract. The same holds true for those agencies which do have these programs in place (i.e. CalTrans). A typical VIP would include some formal identification of the Program, and an internal infrastructure that supports speedy and accurate assessment of the VECP. (Ex 29)

This is an area where contractors can really increase their profits, because (at least on Federal contracts) the fee paid as the result of a VECP submittal does not go into the contract profit limit calculation. Since the fees paid are based on a NET saving to the contract, the cost estimating for this process is critical, and highly scrutinized by all concerned parties. Considerable attention must be paid to detailed change cost impacts, including evaluations, testing, redesign and other costs. This certainly could be a lucrative marketing area for Professional Cost Estimators.

I hope this quick trip through the “World of Value Engineering” has been interesting, and even more importantly, enlightening. Since this is an educational seminar, I further hope you now have a better appreciation of the differences between Value Engineering and Cost Reduction.(Ex30). For your information, SAVE, International has a published Value Methodology Standard, which is a 26 page document in PDF format. If any of you are interested in an emailed copy, or any further information about Value Engineering, please contact me at gbartolomei@sbcglobal.net. A key requirement identified on page 7 of that document is as follows:

*“The team facilitator shall be adequately trained in VM techniques and be competent to lead and facilitate the team members through the VM Job Plan. **This individual shall be a Certified Value Specialist (CVS) or a Value Methodology Practitioner (VMP) if the studies are to be referred to as value analysis, value engineering or value management studies. A certified VMP shall work under the supervision of a CVS. This requirement is to ensure a minimum standard of structure, process, performance, and outcome that would match the expectations of a fully qualified SAVE International CVS and this standard.**”*

As a Certified Value Specialist, I am required by SAVE International to adhere to these Standards, and must pass rigorous training and experience tests to qualify and be re-certified for that recognition, just as you must for your ASPE Certifications and CPE Recognitions. There are individuals, firms and agencies that do not understand and appreciate the difference between Value Engineering and cost reduction, and I know as professional Cost Estimators, you interface with many of them in the construction industry. It only takes a few “bad” apples to spoil the potential harvest for all of us, so please use the information from this brief presentation to become more alert to the proper relationships for “Value Engineering and Cost Estimating...Partners for Project Value and Profit Improvement”.