

## THE VALUE ENGINEERING OPPORTUNITY ASSESSMENT TECHNIQUE

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### ABSTRACT

This paper explains a structured query approach developed by the EG&G Idaho, Inc. Value Engineering Team (EGGVET)<sup>†</sup> to aid the Value Engineering (VE) Practitioner in identifying potential projects for the application of VE.

### BACKGROUND

The origins of the VE Opportunity Assessment (VEOA) lie in a tool developed by John Poole and refined by Sharon Collins of EG&G, Idaho in the late eighties called Opportunity Assessment and Planning (OAP)<sup>1</sup>. This tool is used as a way to study and document activities performed within any organizational unit to identify quality/ productivity improvements; prioritize these improvements based on value, control, and timeliness; and develop an action plan to bring about beneficial change to the more troublesome areas. The technique uses a group of four to eight people, including their supervisor, and takes between two and six hours to perform. This is typically longer than a manager is willing to allow just to determine problems; usually within this time frame the outcome is some solutions or at least some form of progress towards solution such as an action plan.

In the spring of 1988, the EGGVET used the VE philosophy to evaluate what functions the Opportunity Assessment Program (OAP) performs, identify its merits and drawbacks, and determine what could be added to enhance the product. In this paper, the word product means any goods or services that are for sale. The result was the VEOA which met the basic functions of the OAP and served as a powerful marketing tool for several reasons.

The VEOA can be used in conjunction with a 30 minute overview of VE to find fertile areas within an organization to which VE can be applied, show an example of something that has been VE'd, and provide the team participating in the VEOA with an opportunity to experience first hand a mini-VE session. VEOA takes approximately 90 minutes and is applicable to all levels of an organization from top management to the first line supervisor.

### THE STRUCTURED VEOA QUESTIONS

Just like the questions that are asked in the VE Job Plan, there is a structured query approach to the VEOA, including brainstorming and consensus decision making. The questions that are asked are

- I. What is the group's mission?
- II. What functions are being performed to support this mission?
- III. What is the group doing to satisfy those functions? (What projects, programs, activities, processes, standard practices, etc. do you use to satisfy those functions?)

- IV. In your perspective, which of these support the mission the most?
- V. Which are the most risky, troublesome, hassle, or serious to perform?
- VI. Which of these are within your control, or at least your influence to change?
- VII. Which of these have the most potential for cost or time savings, reduction of delay time, or reduce scope changes?

In these VEOA questions, any place that the word "group" appears, it can be replaced by a more appropriate title such as "unit", "department", or "company". The first question, the one related to mission, as well as the follow up questions are related upward in that any lower level organization mission should feed into and reflect the umbrella (higher) organization's mission and goal.

The result of these questions is a list of areas where value can be improved by various problem solving techniques. The most commonly used techniques are: Kepner-Tregoe's Problem Analysis, Decision Analysis, Situation Analysis, or Potential Problem Analysis<sup>2</sup>; Cause and Effect Diagramming<sup>3</sup>; Forced Field Analysis<sup>4,5</sup>; Nominal Group Technique<sup>6</sup>; Process Analysis diagram<sup>7</sup>; Paperwork Simplification<sup>8</sup>; various other Industrial Engineering tools<sup>9</sup> like Work Simplification, space layout, Project Management, and work sampling; and VE<sup>10,11,12</sup>.

### THE TOOL SELECTION QUESTIONS

Among this tool kit of techniques, VE is like a sledge hammer. If our problem is a fly, why use a sledge hammer when a fly swatter will do? VE may always be an effective tool for solving a problem but it is not always necessarily the most efficient. To select the appropriate tool, another set of questions are asked. These are:

1. Are there more than two organizations involved in or influenced by the decision?
2. Is the potential Return on Investment greater than 10:1?
3. Do we have greater than two days available to solve the problem?
4. Are the customer and management receptive to change?
5. Is buy-in to a decision necessary?
6. Is management willing and does it have the authority to implement changes?
7. Is there a misunderstanding between all or most affected parties as to the problem?

The more "yes" answers, the more likely that VE is the tech-

nique of choice and particularly, if questions 4 and 6 are answered "yes". If it does not seem like a candidate for VE then study and recommend use of another one of the problem solving tools listed above.

The VEOA approach uses a manager and three or four representative people from his/her organization.

**PERFORMING A VALUE ENGINEERING OPPORTUNITY ASSESSMENT**

Team Size and Composition

If there are more than three or four people under a supervisor, it is very important that the persons selected for the VEOA are perceived as the most influential and knowledgeable among their peers. This sometimes can be difficult to determine, but don't let this be an excuse for not limiting the number of candidates to the maximum of four. If this is not done, it will be nearly impossible to finish the VEOA in 90 minutes because consensus decision-making will take too long.

For a VEOA team, it is better not to have an outsider on the team. The presence of an outsider usually stifles team communication more than any perceived benefit such as a fresh viewpoint.

Another factor that will enhance the ability to achieve timely consensus is if at least one person on the team is very supportive and nurturing. These people are usually caretakers and process maintenance people; this aids in building consensus and maintaining good human relations and thus improves team building.

In addition to the team, there is a need for one or two facilitators. If you are predisposed to using a single facilitator to conduct a VE workshop use one for the VEOA. If you typically use two facilitators two here as well. This aids in the experiential aspects of the VEOA simulating a VE workshop and develops better understanding of the value of utilizing two facilitators.

Room Size and Layout

The room capacity should be such that the group of five to seven people will be comfortable. This means that the room should not be so large that it overwhelms the team nor so small that the people have to be crunched together and violate their "distance of comfortability" except under certain conditions. Normally, a room of 12' by 15' should be adequate.

Within this room (See Figure 1), use a semi-circle or an 'U'-shaped arrangement for seating of the five person team with the focal point being the facilitator(s) and the flip chart. Have chairs that support the user but are NOT too comfortable to reduce efficiency in completing the VEOA.

The team members should all sit on the outside of the semicircular or 'U'-shaped table ensuring that the highest level manager or sponsoring manager is not in the middle. This is so the lower level managers are not quite as intimidated and communicate freely in the questions that require free thinking such as VEOA question III.

Pre-VEOA Staging

For the most effective VEOA, before the session discuss with the higher level manager (sponsoring manager) what is going to happen and the advantages/disadvantages of the VEOA. This manager should understand the process well enough that s/he will 1) sponsor it, 2) help the facilitator in selecting who the three or four other people should be, and 3) understand some of the scenarios that might occur (e.g. the people under him/her misunderstanding or not even knowing the organization's mission).

The advantages are that an action plan results, the team gets to buy-in to and understands the decisions made, and they are also have heightened VE awareness. The disadvantages are that it takes time and closure does not occur in the meeting but later after the facilitator(s) have analyzed the VEOA results.

There are two different scenarios that can be followed here. In the first scenario the team is given the mission statement and in the second they develop the mission statement in a participative fashion.

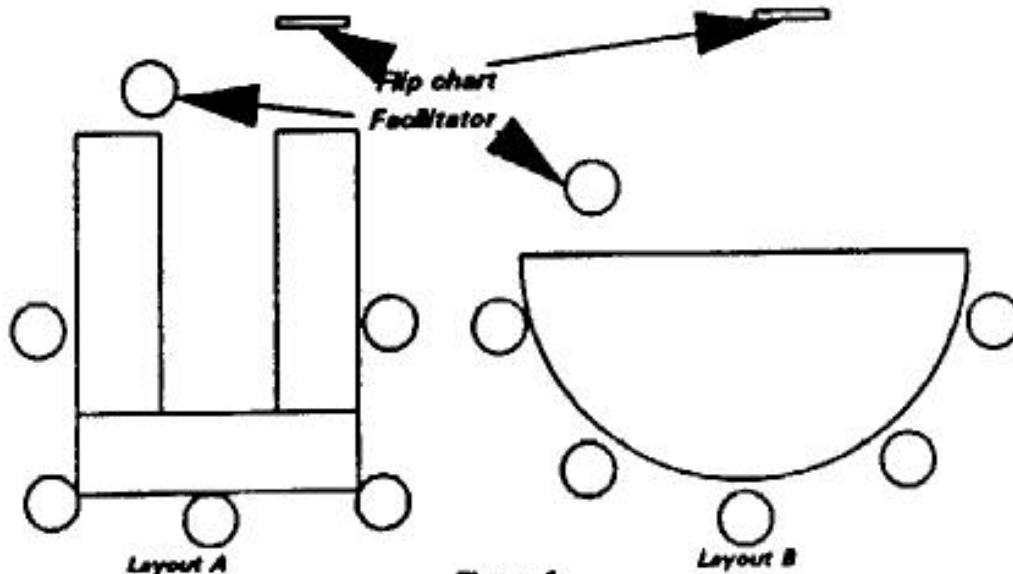
In the latter case, once the team members are identified, there should be a formal announcement issued stating why they were selected, where and when the meeting will take place, what the objectives of the VEOA are, and asking them to be prepared to answer the first question, "What is the organization's mission?"

In the former scenario the mission statement is just stated in the formal announcement instead of being put as a question. It is important to recognize that it is the responsibility of the sponsoring manager to establish the mission. Therefore, if the mission statement is established, this might be the preferred way to go.

Conducting the Session

If the team has had little or no exposure to VE, provide the managers with a 30 minute VE overview.

The VEOA is a Diverging-Converging thought process (similar to the VE technique) with most of the time being spent in the diverging process through question III. Be prepared to overcome the feeling of frustration that the group/team might get, particularly if they are analytical types such as scientists, accountants, or engineers either by training or practice.



**Figure 1  
Room Layout**

When conducting a VEOA follow the same good human behavior that you would use when conducting a VE session. Address the first question either by asking, "What is the group's mission?", or by reviewing the group's mission based upon what was decided during the Pre-staging meeting. In either scenario, use a calm voice when talking to the team, having already set the stage by asking that the high level manager not answer it and not be judgmental as to how well his subordinates can answer it or understand it. Allow about 10 minutes for discussion and record all comments on flip charts so that the ideas are visible to the whole team. Record their comments verbatim being careful that neither your body language nor voice projects an approving or disapproving quality. From that discussion, paraphrase the key points and come to an understanding of the mission statement or develop a mission statement that a team member recommends with buy-in by the whole team.

Next, review the definition of a function (active verb-measurable noun) and the ground rules for limited brainstorming. The objective is to identify ideas rather than fully develop team understanding of the concept of functions and correct function terminology.

Now, ask the second question, "What functions are being performed to support this mission?" Be prepared to receive a lot of input, so record verbatim and quickly. Again, remember to record the ideas on the flip chart so that all ideas are visible to the whole team. (For the remainder of the team session, continue using the flip chart even though not specifically stated in this paper.) (Here is where a second facilitator would be helpful; if there is not one available, ask the sponsoring manager to record. This will get the team brainstorming!) Allow 10 to 15 minutes for this question.

Next, ask the third question, "What is the group doing to satisfy those functions?" Use the most appropriate of the words project, program, activities, processes, standard practices, and/or desk procedures for the organization under study. For example, in the financial industry activities, work processes, and/or desk procedures might be the most appropriate terms to use and for an Architect-Engineering firm projects, programs, and/or activities may be more appropriate. Record all of the responses and allow 15 to 20 minutes for this question.

Now, ask the fourth question, "In your perspective, which of these support the mission the most?" Circle the areas that support the group's mission the most. As the team starts selecting these areas, listen to the level of agreement among the team and state what you think is the agreement. Ask if the whole team can accept it. Using this approach the fourth question should take approximately 10 minutes or about 15 seconds per item listed from question II. (This number is based on EGGVET experience that, when using limited brainstorming, 5-7 ideas are actually generated per team member.)

Focusing on the areas that are circled, ask VEOA questions V, "Which are the most risky, troublesome, hassle, or serious to perform?"; VI, "Which of these are within your control, or at least your influence to change?"; and VII, "Which of these have the most potential for cost savings?" using a three point rating scale of High, Medium, or Low. A note about the wording of questions V, VI, and VII; these questions can be reworded, refined, or added to so as to be more meaningful or selective to the group. Some examples are: adding a question VIA such as "Which of these areas is the most urgent?" or "Which of these areas are likely to grow if a solution is not found?". Another example would be to break out VEOA question V into four questions, one each for the criteria: risky, troublesome, hassle, or serious.

Of the circled areas, those that are rated high for all three questions are the ones that should be considered as candidates for value improvement. Highlight these so the team can see what conclusions they reached. This should give the team plenty of ideas on where to improve value. Based upon the answers to the evaluation questions, an action plan can be developed between the facilitator and the team as to the order in which that these opportunities will be solved.

Next, take this prioritized list and, after the VEOA, apply the Tool Selection Questions to each opportunity on the list and

determine the most appropriate tool for solving the problem. Then document the VEOA, distribute the document to the whole team, make recommendations, and set up a time with the sponsoring manager to discuss the recommendations. At this meeting, develop an action plan setting a time and cost for solving each opportunity and get commitment to address the opportunities.

Implementation is extremely important because nothing changes if no action is taken. If no action is taken nothing can improve. If there is no improvement then the team's time was all in vain and the team members are not likely to want to participate in any further team activities. The bottom line is improvement and/or cost savings and these can only occur if recommendations are implemented.

#### SIMILARITIES AND DIFFERENCES BETWEEN A VEOA AND VE

Like the VE job plan, the structured VEOA questions follow the sequence of Information Gathering (VEOA questions I, II, and III), Function Analysis (VEOA Questions II and III), Brainstorming (VEOA question III), Evaluation (VEOA questions IV, V, VI, and VII), Planning (the facilitator and manager developing the action plan), Implementation (the closure by you and the sponsoring manager to address the opportunities).

Another similarity is the use of a facilitator to direct the process. If you are introducing VE and the VEOA to companies that have not used facilitated teams, the VEOA gives those companies a way to try a new approach for a relatively small investment.

Both VE and VEOA make heavy use of group memory, recording on flip chart paper allowing the whole team to see. This advantage is best seen by doing: the team focuses their attention on the flip chart, looking up and tending to be more involved interactive instead of buried in their note pad and possibly withdrawn.

Differences between VE and VEOA are: 1) In the use of brainstorming, VE uses true brainstorming which seeks quantity of ideas but not necessarily quality, including freewheeling, whereas the VEOA has limited brainstorming. 2) In the use of functions and the Function Analysis System Technique (FAST), VE's emphasis is on true detailed function development and FAST diagramming whereas there is little attention given to it in the VEOA. 3) The time involved to reach any conclusions is orders of magnitude different. For most VE studies, it may take between three and five days where a VE overview and a VEOA can be done within two hours. This is particularly important to managers. Because of time pressures on a manager the more rapidly problems can be identified, quantified, and agreed on the more quickly the action plan to resolve them can be made. Time to solve a specific problem is easier to accept than with an unknown amount of time to identify unknown problems from an undefined heap. 4) Team make-up and size, for a VE study the team is usually composed of five to nine people whereas a VEOA team would have no more than four or five people. The team makeup of the VE team is heterogeneous and interdisciplinary while a VEOA team is more homogenous.

#### Advantages

The advantages associated with doing a VEOA are:

- VEOA can be performed at a low cost to the customer
- VEOA allows for quick identification of problem areas followed by a recommended solution approach. Often VE will be the best solution.
- VE is highly versatile. It can be applied to a variety of product and service industries.
- Using VEOA, the team begins to think in terms of function.

- VEOA serves as a good marketing tool because:
- It provides an example of a VE application and an immediate benefit from VE.
- It gives the team an insight into what occurs in a VE study
- VEOA is easy for a VE practitioner to learn.
- VEOA gives the VE practitioner details as to what the customer expects as well as insight into details of the customer's business and an introduction to customer specific jargon.

#### CONCLUSIONS

VEOA is an easy to learn and use, fast, versatile tool that can be an aid in finding the ripe areas for value improvement. Therefore, it is excellent for marketing VE and improving the implementation rate of VE studies.

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