

Targeting Value Studies

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ABSTRACT

The initial step in a value study is the identification of the product or process¹ to be studied. The essential next step is the identification of the functional areas of the product or process where value methodology (VM) will be focused or targeted.

This paper evaluates several of the systems presently being used to accomplish this targeting effort.

RATIONALE

A properly conducted value study involves the allocation of significant personnel resources. Since all resources are limited, it is important to identify the products that are most likely to benefit from the application of the VM process. It is even more important that the value team identify the specific product functions where value effort should be focused for maximum return.

This need to identify areas of high potential return is a recent one. Indeed, in his seminal book, *Techniques of Value Analysis and Engineering*, Lawrence D. Miles took no notice of this problem of function- or product-identification. You see, Miles was establishing philosophy and approach, not detailed procedure. As the VM process developed in the 1950s, 60s, and 70s, it became

increasingly more important to focus limited resources on areas with maximum potential return.

PRODUCT SELECTION

The products to be subjected to the VM process are commonly selected by executive or operating management. Criteria often include the following:

- (1) importance of the product or process to the future of the organization
- (2) known cost problems
- (3) known performance problems

PROJECT SELECTION

The identification of projects or specific target functions within the product under study is the responsibility of the value team. A number of methods for accomplishing this identification have been developed over the past forty years. They are usually referred to as *value targeting* methods. Most of the useful methods are based on rating the relationship of the cost of each product function to the worth of that function.

The wide variety of these targeting methods is deceiving, since some of the variations are minor. We therefore suggest the following five categories into which most of the methods will fall.

¹ In this paper the term *product* will be used to refer to a *product* or a *process*.

CATEGORY I: Cost Related

CATEGORY II: Basic Function Value

CATEGORY III: Value Index

a: Cost/Importance

b: Cost/Value

CATEGORY IV: User Mismatch

Each of these categories is described below with its associated advantages and disadvantages.

CATEGORY I — Cost Related

While this method has no place in a proper VM system, it is briefly described here for two reasons:

- (1) It provides a base reference for comparison of the value-related methods.
- (2) It is unfortunately used in the name of the VM process by far too many value practitioners.

Description of Process

This method makes use of the "sorting" feature of all modern computer programs. Sometimes called *ABC Listing*, it simply ranks the parts or assemblies of the product in order of their cost. It has been in use since the early years of the mercantile system and before, and has been historically used to great advantage by purchasing analysts.

Advantages

ABC Listing is easy to do; it is easy to explain to others. It focuses the effort on areas of high cost where the problem-solving effort will have maximum impact. It tends to legitimize itself by being referred to as "Pareto" listing, in reference to the *law of income distribution* as reported by an Italian engineer economist named Vilfredo Pareto in 1896.

Disadvantages

ABC Listing fails to relate to value. Without the evaluation of function it is impossible to tell whether a high cost area is a low value area. This method fails to take advantage of function analysis, the only truly unique element of the VM process.

CATEGORY II — Basic Function Value

Description of Process

This is the original targeting technique developed by Lawrence D. Miles and his group at the General Electric Company in the early 1950s. It is still used today in its unimproved form by a number of value practitioners.

NOTE: The first two steps in all of the following approaches, are identical. They will be referred to hereinafter as the *Costing and Function Definition steps*.

- Step 1: Cost the product under study.
- Step 2: Define the functions performed by each component of the product.
- Step 3: Allocate these costs to these functions.
- Step 4: Classify each of these functions as Basic or Second Degree². Second Degree functions are further classified as either Essential or Nonessential. Those which are Basic are regarded as necessary to the product. Those which are Second Degree are regarded as merely resulting from the method chosen to implement the Basic functions. By implication, all Second Degree functions, particularly those classified as Nonessential, are suspect as being removable without compromising the product
- Step 5: Establish the value (sometimes referred to as the Worth) of only the Basic function by determining the minimum cost required to provide only that Basic function.

This is essentially a creative exercise based upon the Miles-ian principles of *Evaluation by Comparison*, and the concept that the value of anything equals the minimum cost required to provide *only* its basic function. It is often exemplified by describing the basic function of a cigarette lighter as *Generate Heat*, and then asking, "What is the least expensive method of Generating Heat?" The answer is usually "A match, costing a penny or less." This exercise has

² Miles' term "second degree" was later changed to "secondary" by many practitioners outside the General Electric Company for unclear reasons.

established the Basic Function value of a lighter as "less than a penny."³

Step 6: This Basic Function value (worth) is then compared with the total cost of the product. If the cost is somewhat greater than the worth, the product is regarded as having low value and the value study on that product is continued.

Advantages

The Basic Function Value method focuses the attention of the team members on value (i.e. function divided by cost) rather than simply on cost. It is emotionally satisfying, since the experience of determining Basic Function Value exercises the creative juices of the team members and permits them to relate to functional equivalents from their own experience.

Disadvantages

The major disadvantage of the Basic Function Value approach is its unbelievability. Few value team members are truly convinced of the validity of the method as a repeatable means of evaluating functions. Their chief problem is the tenuous relationship between the product and the item used to establish the "minimum cost required to provide only the basic function." The use of a match costing less than one cent as an equivalent to a lighter costing \$1.29 strikes most team members as an unreasonable stretch which ignores the realities of the reaction of real users in a real market.

While a tyro seems ready to accept the process, an experienced manager, for instance, will often refer to the process as "a game," or a "dog-and-pony-show."

Without the emotional conviction of all of the team members, the remainder of the Value Job Plan

³ Lawrence D. Miles in *Techniques of Value Analysis and engineering* took a rather broader view of the definition of value. He said, "... 'value' means the lowest cost that would provide the function with the qualities and specifications with which the customer wants it to operate" (emphasis added). Further, in the same book, Miles emphasized that in Basic function Evaluation, the practitioner is to "temporarily (emphasis added) accept as satisfactory all other parts of the product." This delicate procedure has proven difficult for the average practitioner to handle. Most value specialists today, therefore, unfortunately establish value based solely upon the evaluation of Basic function, an unintended consequence of Miles' dramatic insight.

often degrades into simply "Playing the Game," or going through the motions. In effect, the professional or experienced person often gains the impression at this point in the process that VM is not a valid problem-solving process.

In another comment on the invalidity of the Basic Function Value system, Donald E. Parker, in *Management Application of Value Engineering*, points out that ignoring Second Degree functions tends to make a Value Index system meaningless.

CATEGORY III — Value Index

CATEGORY IIIa— Cost/Importance Ratio

Description of Process

This Cost/Importance Ratio targeting process was in wide use in the 1970s. It has since lost favor among value practitioners.

It is based on the presumption that, in a design, the cost of components should show a positive correlation with their importance.

First perform the *Costing and Function Definition steps*, then:

- Step 3: Define the relative importance of each of these functions by interrogating a group of users.
- Step 4: Establish the relative importance of each component of the product through use of criteria analysis.
- Step 5: This relative importance of each component is then compared with the cost of each component. These data are commonly plotted as percentages of their totals with the vertical axis representing importance. Those data points which are above a line with a slope of 1 are judged poor value and therefore targets for further effort.

Advantages

On its surface, this technique has a great "feel." The system is mathematical and rigorous. Participants using this system report being highly motivated to solve the problems identified as being value targets.

Disadvantages

The underlying presumption of this method is that, in a design, the cost of components should

show a positive correlation with their importance. This presumption is, quite simply, false. Those who realize this fact find that they are not motivated as described above. It has been suggested that the apparent effectiveness of the procedure is based upon a sort of "placebo" effect. If practitioners think that they have "scientifically" defined poor value, for their purposes they have.

CATEGORY IIIb — Cost/Value Ratio

Description of Process

This Value Index targeting process using the Cost/Value (sometimes referred to as Cost/Worth) parameter is essentially a refinement of the Basic Function Value targeting process. It was developed independently in several different variants by a number of value practitioners in the five years after the value analysis process was revealed to the world by its General Electric creators.

The reason for creation of this Value Index approach is the weakness of the Basic Function targeting process, particularly as seen by operating management: Basic Function targeting forces attention away from the very reasons why a product is attractive to users/customers. Through its requirement that each part of the product be defined in terms of one single function, it prevents effective consideration of the highly important functions which contribute to convenience, attractiveness and dependability, as well as those functions which add user-desired features to the product.

Description of Process

First perform the *Costing and Function Definition steps*, then:

- Step 3: Define the functions performed by each part.
- Step 4: Total the costs of all of the parts performing each function.
- Step 5: Establish the value (sometimes referred to as the Worth) of each function by determining the minimum cost required to provide the function. Total these to obtain a total value for the item under study.

This is essentially a creative exercise, accomplished as described in Step 5 of the procedure described above for establishing Basic Function Value.

Step 6: Divide the total product cost by the total value obtained in Step 5. This is the Value Index. It invariably exceeds unity. A high Value Index indicates that the item under study has low value and the value study on that product is continued.

Advantages

As in Basic Function Value, this method focuses the attention of the team members on value (i.e. function divided by cost) rather than simply on cost. Also, in contrast with the Basic Function Value method, this system admits that items may perform more than one function.

In addition, as in the Function/Importance Ratio method, this technique has a great "feel." It is mathematical and rigorous. Participants using this system report being highly motivated to solve the problems identified as being value targets.

Disadvantages

The Value Index approach retains the same weakness as the Basic Function Targeting process: Few value team members are truly convinced of the validity of the method as a means of evaluating functions. Most see the methods used for establishment of the worth of a function as imprecise, non-repeatable and highly unscientific.

CATEGORY IV — User Mismatch

This technique was developed at the Hotpoint Division of the General Electric Company by Engineering Manager Thomas J. Snodgrass in the early 1950s when he became dissatisfied with several key elements of the original Miles-ian form of value analysis (VA). He was particularly concerned with the lack of acceptance of the VA process by general management, marketing management and by experienced engineers. He saw their negative reactions in the following terms:

- (1) The use of the term "second degree" to describe some of the functions implied that these functions were somehow less important than those defined as basic. This was, he felt, a serious error which became immediately obvious to management whose responsibility was to deliver a product which was accepted in the marketplace.

Indeed, Snodgrass found that the functions which tended to be discarded from consideration as "second degree" were usually those which, in the eyes of the

user/customers, differentiated one product from another. They determined the winners and losers in the marketplace. These "second degree" functions also commonly accounted for 60% to 80% of total product cost. He felt strongly that these so-called "second degree" functions should not be ignored, but should be the prime focus of the VM process.

- (2) As a result, executive management saw the VM process with its emphasis on Basic Function Value as unsophisticated and amounting to little more than the renaming of the cost improvement program. It appeared to ignore the principle that every organization exists primarily to fulfill the needs and wants of its user/customers.

Description of Process

First perform the *Costing and Function Definition steps*, then:

- Step 3: Structure the functions in a purely hierarchical FAST Diagram format.
- Step 4: Measure user/customer needs and wants using a non-constrained questionnaire or focus panel and a group of 15 to 60 "lead users."
- Step 5: Micro-allocate the total product cost to the FAST Diagram
- Step 6: Micro-allocate the user/customer data to the same FAST Diagram

This results in a single large diagram containing three elements: (1) all of the functions performed by the product, (2) the cost of each function, and (3) the user attitude toward each function.

- Step 7: Identify areas of mismatch, i.e. Those areas where the cost of a function does not match what the user says it is worth. These targeted areas are then subjected to the remainder of the phases of the Value Job Plan.

Advantages

The User Mismatch targeting method focuses the heart of the VM process on only those functions where value *requires* improvement, that is: those areas where the product does not fulfill the objectively determined needs and wants of the user/customer.

An ancillary advantage is that the process loads the collective minds of the team members with an unprecedented quantity of valid data, expressed in the unconstraining language of function, ideally preparing them for the creative session to follow.

Disadvantages

The rigor of the User Mismatch process typically adds one to two days to the total length of the value study.

SUMMARY

The five classifications described above are often "mixed-and-matched" by value practitioners. Donald E. Parker, in *Management Application of Value Engineering* states that the worth of a function is usually determined in one of three ways: 1. By Function comparison, 2. Use of historical data, or 3. Personal experience. He goes on to describe a series of 6 questions which can lead to the evaluation of a function.

The users of every tailored *Value Targeting* method tend to strongly defend their form of the process. I have earlier suggested that this may be the result of a sort of "placebo" effect, but in fact it is more likely that the following pair of quotations combines to convince practitioners that their particular form of the VM process is superior to all others

" . . . unnecessary cost which can be so identified varies between 25 and 75 per cent of the product cost."

Lawrence D. Miles
Techniques of Value Analysis and Engineering
McGraw-Hill, NYC, 1972

" . . . any time you define and analyze function, you have magic in your hands, and no matter what the modifications, the system will work its wonders."

Theodore C. Fowler
Function Analysis, From Miles to Bytheway
Value World, Oct/Nov/Dec, 1992

In other words, those practitioners who feel that their own customized form of the VM process is more effective than other forms are often mistaken. The powerful magic of Function Analysis has them fooled. In the immortal words of Bill Murray from *Meatballs*, "It just doesn't matter" what method is used to target a value study. The only critical requirement is that functions are defined and analyzed.

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