

THE COST PROBLEM AND THE VALUE ENGINEERING APPROACH

by

L. D. Miles

What is back of the techniques of value analysis? What caused this organized approach to be developed in our economic system? What realities are responsible for creating the need for it?

The answer: "Costs" which are too high.

Costs are the direct product of people and depend on their knowledge or lack of it, creativity or lack of it, logic, attitudes, and feelings, and environment. To minimize cost, we must deal with the causes. To deal with the causes, the overall strategy which we call Value Analysis or Engineering was created. I shall set forth some situations and principles involved; then later, the overall strategy and selected technique of tactics will be shown.

COSTS ARISE BECAUSE OF THE APPROACH TO THE PROBLEM

The symptoms are so much clearer, and each individual symptom is so much more demanding than the real, partially obscured problem. Strategy and technique are required which better clear away the symptoms and get the problems exposed to open view.

What is lacking?

First, a better method for defining the problem in terms of exactly the knowledge needed.

Second, a system of search techniques that would bring up this knowledge when needed.

Techniques must be, and are provided, that will do both.

An example of the first is the extreme orientation to function, in customer's terms. What "function" does the customer want? Does he mean the terminal board, which he says he wants? No! Basically he wants only a suitable means for making connections. Already the knowledge needed has changed from "terminal boards" to "means of making electrical connections." Does the customer want the spring that he says he wants? No! Rather he is seeking a means for returning the shelf to a preferred position. Similarly, would he want the electronic gear he has specified? No! The need is for something that will accomplish the function specified. An efficient system must send the decision maker searching for the knowledge he needs, not the knowledge he thinks he needs.

The technique of naming functions in two words has often caused discussions of several hours' duration, ending in disagreement. Later men enthusiastically proclaim that although they still didn't agree on how to name it, they now "saw it in a different light," and their searches for knowledge and use of creativity assume an entirely different orientation.

Of such is the strategy and tactics of value analysis or value engineering.

COSTS ARISE BECAUSE OF KNOWLEDGE OR A LACK OF IT

It has been said that if the decision maker, be he engineering, manufacturing, or purchasing, were in a room surrounded by all knowledge in the world that might bear upon his decision, then he would make the optimum decision.

This is not in the slightest true. Factors shown throughout the paper would prevent his securing and using much of the needed knowledge.

Some are:

1. He wouldn't know precisely what knowledge he needed.
2. He wouldn't find information that was there.
3. He wouldn't get the needed combinations of knowledge from different sources usefully associated.
4. He wouldn't necessarily combine the needed knowledge and creativity in a usable manner to solve his problem.
5. He would be a little better off than the man usually is on the job because he is 1000 miles closer to the knowledge.

COSTS ARISE BECAUSE OF CREATIVITY OR LACK OF IT

Einstein said that when there is a problem to be solved, "Creativity is more important than knowledge."

To meet real life situations, the strategy of value engineering must:

1. Provide logic.
2. Communicate emotionally in credible terms.
3. Identify new types of knowledge needed.
4. Provide search techniques that will find that knowledge efficiently.
5. Cause creativity that will usefully combine the knowledge from diverse sources.

A chemical not yet compounded does not exist. A metal not yet developed does not exist. It's not because they couldn't be, but just because the required combination of creativity and knowledge have not yet been brought together. Similarly, an idea not "thought of" does not exist. The necessary combinations of creativity and knowledge have not yet been associated.

To accomplish the functions that the customer wants for half or a third of the historical or expected cost, a situation must be created in which the necessary creative ideation and essential knowledge are blended extensively and intensively.

Often creativity can no more combine divergent knowledge than sunshine can grow oranges at the North Pole. So, we turn to environment.

COSTS ARISE BECAUSE OF ENVIRONMENT

Of course few environments exist that would not accept a fully developed, fully debugged, fully tested, fully service-proved change which would keep all customer factors at half-cost. But, significant improvements, like people, are not born full grown. Resources, money, and men must be committed without assurance of results. Creative ideation, knowledge searches, exploration, and basic tests precede results. Of the creative ideation, 99% is worthless; 90% of the knowledge searches are useless; 75% of the basic tests fail. Meanwhile the designs and practices of the past are working perfectly.

Environment Unsafe - Hence there develops, to some extent in most environments, a "feeling" that men who press hard toward vastly better ways for accomplishing functions at lower cost are dreamers, and that they have in fact lost essential touch with reality and have their feet in the clouds and their heads out beyond thin air.

This takes the tangible form of occasional derision of the newest idea creations and especially of the continual stream of worthless ideas, useless knowledge, and failing tests.

The environment is often "unsafe" mentally and socially for activity that would produce large accomplishment. Only small, traditional-type cost reduction activities can comfortably live.

Environment Hazardous to the "New" - "Environment," as used here, includes the managers of a man, and his peers:

"Get out today's production; improve the process if you have time."

"Lick that engineering performance problem on the production line, develop a new approach later, if you have time."

"We made this change to save \$8000; it has already cost us \$25,000 in field failures." But the ten changes that worked out well in the field, saving \$300,000, don't become conversation.

These are the pronouncements heard from management of the business. All communicate to the feelings of men. What do they say?

"He who sticks hard to the proven past, causing no unexpected problems, is without guile and a benefactor to his company. He who deviates from that proven present brings all manner of unexpected tragedies to his associates and company, and is without virtue."

To the extent that the "environment" in which men work is unsafe for the creative and hazardous for the new, all work in decreasing costs is retarded or stopped. An efficient system for preventing or reducing cost must, then, deal effectively with this environment, and with the "feelings" of the individuals involved.

COSTS ARISE BECAUSE OF FEELINGS AND LOGIC

The decisions of each person are the result of a compromise between logic and feeling. Man's immediate environment influences the compromise.

1. He believes a decision is right if in harmony with his logic.
2. He feels a decision is right if in harmony with his feelings.
3. He is content in his work and decisions if the decisions of his logic are in harmony with his feelings. He feels frustrated to the extent that his decisions must, for reasons of logic, be made counter to his feelings.

Hence, he has a strong tendency to decide along lines of feeling without intense logical exploration, which might develop an opposite logic.

For example, consider the following sequence of events:

1. Product has failed in field repeatedly and the Company has been embarrassed. It needs a different switch.
2. Engineer creatively develops one, using a new principle.
3. Manufacturing works out the way of making it, and \$10,000 in temporary tools are approved by management to try it.
4. It works. All feel pride before peers for successful accomplishment. Managers and immediate superiors feel and act in a commending manner. All are very pleased with job and selves; both logic and feelings are in total harmony.
5. Later (perhaps a year, perhaps five), competitive pressures require switch functions for lower cost, and the engineer is assigned the task because of his "experience" in the area. He knows more about it.
6. He attacks with vigor. Keeping the main operating principles of his former approach, he can change a few parts, improve some tooling, eliminate a few obvious uncontributing costs. He gets 20% out.
7. His logic says the changes are good. His feelings say the changes are fair. He has even now made some slight inroads into his earlier model, which was a proven success in the eyes of himself and his peers. His feelings don't like it. He is uncomfortable about it. He wishes it could have been left alone.
8. Now it becomes necessary to remove much more cost from the total product. He is asked, "How much more can we, by pulling all the stops, get out?" His logic says, "a little". His feelings say, "None". He says, "Possibly a hard maximum of 5%."

If this engineer is to benefit the company's sales and earnings by a 50% reduction, he needs the help of a new strategy and some new tactics. Since the deterrent is his feelings, which have by now stopped aggressive search by his logic, the solution must come through an approach that deals with his feelings.

Dr. Graves, eminent psychologist at Union College, tells us that logic does not change feelings, that feelings, being emotions, can be communicated with only in emotional terms. Therefore the approach created must emotionally communicate in order to release the man from his past publicly proven work and allow his feelings to become reorganized in a new situation that may remove one-half to three-quarters of the cost. This emotional approach must be based upon logic drawn from the task at hand so that the new adjustment of feelings will be such that the cost objectives are reached.

A strategy of approaches and techniques must be created that will allow men to change their own feelings.

But it is not enough for the whole man to "want" to operate at lower costs. How can he do it?

How can a jetliner fly?

How can wire in a piano make such beautiful music?

How can a basket of parts provide voice from here to London?

Simple!

The overall system that is required must be provided.

Each part of the system must be correctly used.

The operator must use it correctly.

CONCLUSION

The strategy of value engineering must be based upon the reality that costs are controlled by decisions of people which in turn are controlled by:

- (a) Knowledge or lack of it.
- (b) Creativity or lack of it.
- (c) Logic.
- (d) Attitudes or "feelings".
- (e) "Environment".

A strategic system is needed that will:

- (a) Take its logic from the task.
- (b) Communicate emotionally in credible terms.
- (c) Identify areas of knowledge needed.

- (d) Provide efficient knowledge search.
- (e) Integrate creativity effectively.
- (f) Change environmental factors.

You will observe these elements in the overall strategy which is the value engineering system and the tactics illustrated.

Our program will then include answers to dozens of questions which should aid sharp clear understanding.