

PREFACE

This book is about value, about the value of a car you want to buy, a workbench you decide to make, or a house you want to sell.

I had bought ships, designed machinery, and manufactured electronic equipment, enhancing value in each case, no better and no worse than anybody else. Then Larry Miles, whom you will meet in the book, opened my eyes: "Poor value," he told his followers, "is a people problem."

The method for solving this problem achieves such smooth interaction among the specialists who contribute value that it is a gold mine! The mining equipment is described in the book. It will be of interest to those industrial managers who must increase gross margins despite higher wages and material costs and to design engineers, buyers, cost accountants, quality specialists, industrial engineers, and those men in Marketing and Finance who have their fingers on the pulse of product value. For such employees the book is meant to provide the miner's pick and miner's lantern, low on fuel, for they will not need it long. Once they master the concept of value and learn how to work rapidly and effectively across departmental lines they usually move up, leaving the miner's tools in the hands of their successors.

The book is also meant as a guide to the value specialist who is ready to move from the evangelical, selling, and training phase to the less spectacular but more durable business of systematically improving the

To Maureen, whom I happily love, honor, and cherish;
and to Lawrence D. Miles, who has provided me with
the means to keep her, feed her, send the children
to college, travel, and support my creditors in style.

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Library of Congress Catalog Card Number: 76-165159

ISBN 0-471-25366-9

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

material resources. In the United States the word went out from Washington, "The best for our boys! The most of the best of everything for the war effort!"

The United States was embarked on a deliberate policy of lavish use of resources—a very sensible policy *at the time*. By 1947 we began feeling the backlash of that policy. To begin with, there were not so many material resources around as we thought. Shortages began to appear everywhere. Certain materials simply were not available; others had skyrocketed in costs.

At the GE Plant in Schenectady Larry Miles, the man who founded the discipline of value analysis, was faced with the technical problem of successful substitution and with the economic problem of high cost. Now when you attempt to substitute, you are looking for *something else*, and you are immediately freed from all the restrictions associated with the original product or service. All you have left is the function. You are now concerned only with what the product or service *does* and with *what else* will do the job.

By concentrating his efforts on fully understanding *the function* of a product or service Larry Miles laid the foundation stone for value analysis. He then went on to develop means of "providing the performance the customers want and for doing so at an appropriate cost."

In his efforts to improve the interaction between the people responsible for the physical and the economic aspects of a product Miles discovered that poor value is "a people problem." So he developed an arrangement of techniques—some old, some modified, some new—for the early and fruitful interchange of information among the diverse disciplines that contribute to product value.

The system worked surprisingly well. It revealed that just knowing what things cost could save 5%; improvements in the choice of materials and methods, another 10%, but finding a better way to do what the product was supposed to do in the first place could save 30% and more. From that moment on Miles concentrated on the function and his motto became *define the function; evaluate the function*.

An engineer interprets the word *function* in terms of performance. This approach put value analysis into preliminary design and specification writing.

In 1954 the U. S. Navy Bureau of Ships, under Rear Admiral Legget and his assistant Rear Admiral Mandelkorn, set up a formal Navy value program with guidance and training from Miles himself and his GE team. The Bureau of Ships, primarily concerned with engineering, adopted the discipline under a new name—*value engineering*. In this way it could assign engineers to analyze value without changing their engineering

titles. There were civil service slots for engineers but none for "value analysts." We will see later how the term *value analysis* itself originated.

By 1956 all 11 naval shipyards had active value-engineering organizations. Private industry, in the meantime, had been adopting the discipline. In 1952 the RCA Engineering Products Division appointed an administrator of value analysis, and the corporation has had an active value program ever since.

The Army Ordnance Corps Watervliet Arsenal, because of its proximity to General Electric, couldn't help hearing about the savings. They asked for a little neighborly guidance.

With the help of both BuShips and GE, Army Ordnance set up a value-analysis organization in which six arsenals, the Ordnance Ammunition Command, the Army Rocket and Guided Missile Agency, and the Army Ballistic Missile Agency participated. All these value-analysis activities are now part of the Department of Defense value-engineering effort.

Not only did the services unite in their efforts to get better defense for the dollar but defense contractors followed suit, freely sharing value-analysis information with one another. Though state governments have picked up the method to get better use out of their resources, the most significant growth has been in the private sector—from automobiles to motorcycles and from earth-moving equipment to sewing machines, not to mention hospitals, oil companies, and telephone companies. Private industry in Canada has kept right abreast of value-analysis progress in the United States.

Overseas, Sweden and Japan have been the most active in value analysis, with Norway, Denmark, England, Scotland, Ireland, and West Germany following closely. The growth of value analysis "Down Under" has been characteristic of the dynamism of Australia and New Zealand.

The Society of American Value Engineers (SAVE), currently chartered as a national society under the laws of the State of Georgia, was incorporated on October 22, 1959, in the District of Columbia.

Sister societies are the Scottish Association of Value Engineers (also SAVE), the Society of Japanese Value Engineers, the Canadian Society for Value Technology, the Scandinavian Society of Value Analysis (SCANVAVE), and the English Value Engineering Association.

ORIGIN OF THE TERM VALUE ANALYSIS

Accepting John Stuart Mill's solution of the paradox of value, most economists agree on the two essentials of exchange value: "The thing

must conduce to some purpose, satisfy some desire" (our function), and "there must be some difficulty in its attainment" (our cost).

The first of the two essentials, the one which would "conduce to some purpose, satisfy some desire," has been considered beyond the scope of measurement—unanalyzable! Russell Ackoff said in his extraordinarily useful book, *Scientific Method* (1962):

The analysis of the "unanalyzable" and the conception of the "inconceivable" have in the past constituted some of the most important spurts in the progress of science.

We owe such an advance to Larry Miles. He not only tackled the unanalyzable but he showed us how to analyze it, how to identify, classify, and evaluate the function, how to pinpoint its most important aspect in a verb and a noun, how to select measurable nouns, and how to combine physical measurements and business measurements to yield an economic specification.

To understand the insight that led to the development of value analysis we should note that Miles has degrees in education *and* in engineering. His own training encompasses the social as well as the physical sciences, hence his early efforts at emulsifying the oil and water of these two arbitrarily separated fields.

Buying and selling is a *social* activity and Miles was a purchasing agent working for Harry Erlicher, Vice President of Purchases at GE. Both naturally understood the "people problems" that led to poor value. Now, engineering deals with the *physical* sciences, but engineers are *people*, so Erlicher and Miles set up a meeting with Harry Winne, Vice President of Engineering. They found an engineer in the fullest sense of the word, a man who realized that in engineering manipulating the sources of power and the properties of matter has only one purpose—the service of man. He had tailored his professional development to accomplish this purpose.

Harry Winne saw the importance of the method at once. "What are you going to call it?" he asked.

Miles had not thought of a name for his new approach, but Winne was enthusiastic. "You are dealing with *value*," he said. "Value has a performance part and a cost part."

There was a pause. Then Harry Winne asked, "Why don't you call it *value analysis*?"

Miles, who had already taken the step from fact to value when he asked the question, "What *should* it cost," grinned in appreciation of Winne's support. "Value analysis it is!" he announced happily.

IMPLEMENTATION. Everybody urges implementation, and we all agree that plans and decisions are *Love's Labor Lost* until they are implemented. There is mighty little information available on implementation, yet I have to lecture on it. I tell the audience what I know about implementation; then, in the question period they tell me what *they* know. Since the lecture victims outnumber the lecturer, I get more out of it than they do. I try out their recommendations—using live projects; I present the results to other groups of thoroughly experienced industrial managers, and when it looks like we all have put together something that really works I try it out a few more times. Then I write it up as Chapter 9 of this book.

ABSTRACTING GENERAL PRINCIPLES

The thought that certain basic principles must underlie the successful performance of value-analysis tasks was farthest from my mind when I was called to the office of my supervisor's boss in 1960. Without preamble the big boss said, "It looks like there is something behind these value disciplines."

I nodded politely.

"They work," he continued.

"Yes, sir!"

"That's not enough," he snapped.

The expression on my face must have said, "What's not enough?"

The big boss explained, "Doing something right, without knowing why." A conspiratorial gleam brightened his eyes. Motioning me to a chair besides his desk, he directed, "Find out *why* these value disciplines work. Pick out your best examples, compare them, and abstract the general principles behind them."

A tall order.

It took me some 10 years to comply. The road signs which constitute the principles of value analysis originate in a variety of disciplines: economics, strategy, management, and psychology.

A principle is a rule of conduct or guide to action. The principles of value analysis are all implicit in the work of Larry Miles, particularly in his most recent work. All I have done is to identify them and describe their application in the light of my own experience.

Usefulness of the Principles

Had we, in value analysis, understood and applied certain principles from the beginning, our specialty would not have aroused the hostility ac-

corded a brash youth who bursts into the halls of his elders to teach them a new way of doing things.

To say that the good old-fashioned way is no longer good enough is beside the point. Seldom can you get people to improve by putting them on the defensive, by telling them that you know better, or by characterizing their objections as "road blocks in the path of progress."

Cold Hard Facts Can Hurt

The principles of usefulness, limited resources, economy, adequate information, and effective communication, because of their immediate impact on the cost-profit squeeze, rode rough-shod over many an objection. The triumphant value analyst, with his task group serving as a chorus, proved that money could be saved where others said it couldn't. He showed dramatically how wrong everybody was. Finally, he achieved complete unity of purpose among department heads; they all wanted to get rid of him. After the farewell luncheon members of his task groups were left stranded, wondering why nobody loved them, when they had done everything right. Larry Miles, who is at this writing more active and perceptive than ever, sums up the situation this way, "Embarrassment! They had embarrassed the people responsible."

Nothing Wrong With People Acting Like People

Additional principles had to be invoked: direction, responsibility, interacting skills, direct motivation, and objectivity. Application of these principles avoids disrupting the lines of command, avoids encroaching on the territory of others, engenders respect for the man responsible, and shows us how to offer solid information instead of exhortation. Moreover, understanding why people act like people shows us how to put the fuel of useful learning and personal accomplishment under the boiler of human aspirations, keeping out of value analysis the cultist who must remake people instead of learning to do the job with people as they are.

Then the overwhelming evidence of actual consumer behavior revealed that constant product improvement is at least as urgent an industrial necessity as cost reduction.

In the Free World People Buy What They Want

More principles! consumer sovereignty, balance and proportion, selectivity, and concentration all aimed at giving the customer a better product at a fair profit to the manufacturer.

directly to corresponding steps in the value-analysis job plan. Obviously, certain principles govern every phase of value work; others are narrower in application. The list that follows simply shows a convenient sequence of presentation.

Order in Which the Principles Are Applied

- | | |
|-------------------------|----------------------------|
| 1. Consumer sovereignty | 2. Concentration |
| 3. Direct motivation | 4. Interacting skills |
| 5. Objectivity | 6. Effective communication |
| 7. Adequate information | 8. Selectivity |
| 9. Direction | 10. Responsibility |
| 11. Usefulness | 12. Limited resources |
| 13. Economy | 14. Balance and proportion |

Results

Applying the principles of value analysis makes the draftsman think as well as draw the picture, makes the buyer contribute ideas as well as buy materials, lets the girl on the assembly line dream of a better product as she assembles the old product, and provides an opportunity for all of them to exchange ideas with engineers, stylists, and financial managers. Tapping and mingling employee imagination fosters innovation and increases the true productivity of the entire labor force, not by finding better ways to make yesterday's products but by making better products for tomorrow.

Some Good Books

In 1969 Warren J. Ridge, manager of value engineering for the Analog-Digital Systems Division of the Control Data Corporation, came out with an extremely useful book called *Value Analysis for Better Management*, published by the American Management Association, New York.

If the 1961 *Techniques of Value Engineering and Analysis* by Lawrence D. Miles is the value-analysis bible, then the revised edition—McGraw-Hill, New York, 1971—is the new testament.

Another McGraw-Hill 1971 book is Art Mudge's *Value Engineering*. I have worked with Mudge and learned much from him. As a value specialist he is down-to-earth, practical, realistic, and, above all, effective! He is the Director of Value Engineering Services for Joy Manufacturing Company.

Addison-Wesley, of Reading, Massachusetts, had the good fortune—also

in 1971—to capture Edward D. Heller as their author on value. His book is *Value Management, Value Engineering, and Cost Reduction*. Ed Heller has contributed consistently to the value disciplines by his creative thinking and sound common sense. Like the others listed in this section, he is a successful worker in the field, being Manager of Cost Reduction and Value Control for the Convair Division of General Dynamics in San Diego.

had done for the front office what Taylor, the Gilbreths, and Gantt had done for the factory floor. Finally, Lillian Gilbreth tied the whole thing together.

What else was there to be done?

Something for the function of the product as well as how to make it, and it was at this key-point in time, 1948, that Lawrence D. Miles joined the ranks of Taylor, Fayol, Gantt, Follett, and the Gilbreths to take us one more step forward along the road to better industrial management.

ANY DEPARTMENT MANAGER

For contrast let us first look at one of the few purchasing agents who do not use value analysis. It is one of those days when he feels like the traffic controller in a crowded airport. Unwanted, 'early shipments, preceded by their invoices, are circling overhead. Scheduled shipments, with all ground facilities waiting for them, are nowhere in sight. Departures of revenue-producing planes are delayed pending the arrival of the late shipments. Ugly weather is moving in and everybody is burning precious fuel.

How is such a situation usually handled?

Our harassed purchasing agent rushes around from expediting delayed shipments, preventing early shipments, and explaining factory shortages, back to expediting more late shipments which cause new factory shortages, etc. . . .

With a telephone receiver in each hand, he barks at one of his buyers, "Can't you see that I have no time now for vendor selection? Use the people we know, the people we can depend on."

And he goes back to undepending on his unselected or poorly informed vendors.

Is this primarily a purchasing problem? Hardly. It is a management problem—the fire-fighting syndrome. The department manager has been thrown off balance by an emergency and is now fighting a rearguard action; new emergencies have been created by the first emergency. Had he had time to fight the fire and still handle the job, he might now be in control of the situation. As it is, the Goddess of Chance is kicking him in the pants, retaliating for the overload.

What overload?

When we leave to chance something that should be our job, chance resents the imposition and clobbers us. A defensive posture leaves too much to chance. The only way out is to regain the initiative, but to regain the initiative one needs reserves. Of these reserves, the most important is time. Time cannot be stored but it *can* be reserved.

What have such accomplishments in common? What general principles govern their attainment? How can those principles be applied to improving product value? In seeking answers to such questions, the value specialist—whatever his title—has his work cut out for him.

Task of the Value Specialist.

Lawrence D. Miles was the first to identify those characteristics of intuitive value analysis that can be methodically applied in business. He started out with the methods of sensing, collecting, appraising, and using information. Not information on buildings, ships, or locomotives but information on the functions that such objects perform and information on what resources it would take to accomplish them. This and the other steps of the method are what this book is about.

Information. Once a project has been selected, getting the right information to the right specialists at the right time is the first service rendered by the value analyst. This rule applies, whether the analyst is working with a task group, whether he is part of an independent value analysis section, or whether he is working on his own. In the latter case he may have to collect and disseminate the information personally, though it is practical sometimes to identify the key specialists and put them in direct communication with one another.

Analysis. Identifying the product's function, breaking it down into the benefits it provides, comparing their relative importance, and relating the benefits to the cost of attaining them, is the second service performed. The experienced analyst can usually identify and define the functions of a product almost automatically. When working with a diversified task group, however, he must teach the participants how to do it. When the function is complex enough to be broken down into the benefits it provides, the relevant specialists must participate in the study, either in the task group or by individual contact with the analyst.

Innovation—Alone or in Groups? So much has been written about group creative sessions that many a value analyst feels at a disadvantage when working without a task group. There is no evidence, however, that a man alone is inherently less creative than he would be as part of a group. What happens in well-selected groups is that there is a great pool of relevant information that provides grist for the creative mills of the individual members. The groups also provide stimulating discussion and cross-pollination of ideas.

How does the analyst, when working as a loner, achieve cross-pollination? The same way that bees do. They flit from flower to flower, carrying

pollen from one flower to the other and engaging in stimulating discussion with each flower. In touching base with the specialists, the lone value analyst participates personally in the interchange of ideas instead of being only a catalyst. It may take more time, but often it is the best way to do it.

Not Either Or, but Both And

The various ways a value specialist can work are not mutually exclusive. In a small plant he may personally work on two projects, providing service for a five-person task group and, at the urgent request of the controller, planning a two-week, profit-oriented workshop to bolster next quarter's earnings.

Implementation. In all cases implementation of value-analysis proposals is the decisive service, for the value specialist is not measured on seminars held, persons trained, or brochures prepared but on results.

WHO ELSE USES VALUE ANALYSIS?

The reader will have noticed throughout this section that in the industrial applications of value analysis the buyer, the design engineer, the manufacturing engineer, and the department manager have each used a value task group to bring the benefits of other skills to their own operations. Participants in each group represent, at one time or another, nearly every industrial specialty in the plant and in the field.

Engineering, Manufacturing, Purchasing and Cost Estimating are the most frequent participants, but Finance, Quality Assurance, Marketing, Styling, key customers, and key vendors also participate, depending on the task at hand.

We know what each participant contributes—his own special skill and the readiness to provide up-to-the-minute information on a custom-made basis for the users of that information, but what does he get out of it? He gets information in return, not only about the present project but about other opportunities not suspected until the group got together; *and* he establishes a network of contacts among key activities in the plant, contacts that will prove useful to him for many months to come, not to mention specific techniques for working successfully across the barriers that often separate industrial disciplines.

We might say, therefore, that all participants in the value task groups apply value analysis to improve their own day-to-day operations.

line specialists instead of improving the effectiveness of their interaction. Too little time results in frustration and ineffectiveness. Workshop duration for the great majority of products ranges between a minimum of 32 hours, an optimum of 48 hours, and a maximum of 96 hours.

A Feasible Workshop Schedule

Meeting half-days, Tuesdays and Thursdays, for two weeks constitutes a 32-hour-plus workshop. The plus is the time "made" during the rest of the week for gathering additional information. In a small plant this may be the only way to get the people away from their regular duties.

The full-week, eight-hour-day workshop has excellent momentum, generates great enthusiasm, but allows little time for getting new information, making and testing prototypes, and receiving samples from vendors.

The same 40 hours can be spread over two weeks to provide the elapsed time needed, but as long as you are spreading it out a 48-hour workshop, meeting all day Tuesdays, Wednesdays, and Thursdays, is just about right for that period. Add one week and three more workshop days and you have a luxuriant 72-hour workshop for very special new products.

THE VALUE-ANALYSIS JOB PLAN

The task of analyzing value follows the general pattern of the scientific method, incorporating problem solving and innovation techniques with the teamwork characteristic of group dynamics.

We owe the original and very successful sequence to Larry Miles, who was using it in 1947. Anthony R. Tocco presents an excellent version of it in the *Encyclopedia of Management* (Heyel, page 1026).

The three phases, *information*, *analytic*, and *creative*, by whatever name is given them, are the core of the job plan; all the rest is prologue or aftermath (Table 4-1).

Table 4-1 The Job Plan

Preparation
Information phase
Analytic phase
Creative phase
Evaluation
Presentation
Implementation

Preparation

This task starts two months to two weeks before the workshop. It includes selling the workshop to local management, selecting projects and participants, scheduling the effort, requesting the facilities, and preparing a data package for each project. Such a package usually contains

- marketing requirements
- engineering specifications
- costed-out list of materials
- drawings and schematics
- manufacturing costs
- quantities to be produced per year
- manufacturing schedule
- manufacturing process
- contract information
- data on applicable . . .
 - new materials
 - new processes
 - new products
 - new suppliers
- company standards
- industry standards
- government standards

As soon as the participants have been selected, the plant training manager sends them preliminary written material. Ideally, the material should be sent to arrive at the person's *home* as follows:

A month in advance: *Function of Value Analysis* and *Nature of Value*, both condensed.

Three weeks in advance: *The Principle of Consumer Sovereignty* and *The Principle of Concentration*.

Two weeks in advance: *The Principle of Direct Motivation* and *The Principle of Interacting Skills*.

One week in advance: *The Principle of Objectivity* and *The Principle of Effective Communication*.

So much for preparation *before* the participants arrive. Once they arrive, a senior member of management welcomes them, and the training manager organizes the task groups, assigns the projects, and the workshop goes on to . . .

ting a few answers to the right question works out better than getting many answers to the wrong questions.

Turning Information into Gold

To improve value we have to provide greater benefits for a given cost or the same benefits for less cost, not *greater* benefits for *less* cost—unless we can find a mine that yields resources at no cost.

Such a gold mine does exist, and by systematically developing the right kind of information we can home in on it. This is a dynamic gold mine in which gold flows down the hidden crevices of waste. Very real wealth can be rescued from this fate.

Eliminating friction and heat and electrical losses releases all the power these baddies were using up. Eliminating needless parts releases materials for better use, cuts down weight, and adds to shipping space. It may also increase reliability—fewer things to go wrong. It often improves performance—better use of power.

STEPS IN THE SEARCH PATTERN

Verifying Requirements and Constraints

The audacity to question specifications, the tenacity to track them down, and the skill to survive the experience are essential value-analysis traits. Most requirements and constraints originate within the inner sanctum of one particular discipline: engineering, procurement, contracting, . . . whatever. The priests of that discipline prepare specifications in the pious hope that the profane world outside will comply without unreasonable waste of time and money.

The “profane world” is made up of the other disciplines that contribute directly to product value.

Management expects, and obtains, from value analysis a nonsectarian look at all “musts” and “no-no’s” that govern the value of a product. The profane world, either in a task group or one pagan at a time, can render a service to the spec writer by showing him how his specifications affect their tasks.

Many specifications, however, are “handed down from above”; some are “sacred” and others “untouchable.” But “Above” is not stupid. If they can get a better product for the same money or the same product for less money, they will listen. In any case, your own management expects you to uncover pitfalls in the specs.

I have been on the "Above" side of the specs, as this vendor's phone call will reveal. "I've been trying for weeks to talk to you," he complained. "How can I get to see you?"

I sputtered, "Out of town. Tight schedule. What's the problem?"

Patiently, he explained, "You know those gookuses that won't fit inside the supergookuses?"

I knew.

"Well, you are paying through the nose, just to have that problem."

"Your plant or mine?" I interrupted to arrange the meeting.

I had not questioned the specs. I had not followed the advice of Larry Miles to challenge everything!

A frequent cause of wasted resources is the requirement for greater benefits than can possibly be used. Every specification must be examined in the light of the customer's needs or desires in order to make sure that we are not providing more than he wants in one area and less than he wants in another. Every statement that "the customer will not let us do this" or "the customer—or our home office—will not accept that" must be verified, for the absent customer or the remote home office is the last resort of the man who does not want to do something and needs a good reason for not doing it.

Validating Tolerances and Allowances

Validating tolerances and allowances calls for investigation to determine the need *and* adequacy of all safety factors, derating factors, power reserves, tolerances, allowances, and time cushions. Meant to offset actual uncertainty, allowances and reserves are often increased to offset the additional uncertainty created when the pressure of work forces designers to guess because they have no time to calculate.

Sometimes it works the other way. Tight tolerances are opened up in the interest of economy only to wipe out all manufacturing savings through rework. By *validating* I mean making sure that tolerances and allowances are neither too tight nor too loose. They should be continuously readapted to changing conditions of supply, to changing technology, and to increasing experience with a given product.

Identifying Potential Pay Dirt

A book that has taught me much about the value of information is Grayson's *Decisions Under Uncertainty*. He explains the role of preliminary information in drilling for oil. Not until you actually drill do you know whether you are going to get oil, gas, salt water, or a dry hole.

trickier. Say that you are in a small canoe in a placid lake and you have lost the paddle. You apply "body English" to the canoe, leaning forward gently and leaning back with force. The canoe begins to move until you retrieve the paddle. Children do it to get sleds started. It works *as long as you have friction*. If there were no friction between the canoe and the water, the canoe would move back just as gently as you moved forward, both of you taking your time. Then, when you leaned back forcefully, the canoe would move forward just as forcefully, to return to the exact position you were in before.

Energy is not being conserved. You are panting from the effort, using up oxygen, and developing an appetite. The law involved is the law of conservation of momentum.

John Bernoulli's problem of the shortest route, Huygen's study of the least length, Fermat's principle of least time, and the principle of least action of Maupertuis, Euler, Lagrange, and Hamilton all declare the inherent economy of nature in its cold, puritanical physical aspect. On the other hand, when nature is having fun, such as in the reproduction of life, it is downright generous, even prodigal.

We will see in Chapter 7 how the parsimonious universe of inorganic matter is running down, cooling off, while the generous universe of organic matter moves from disordered atoms to ordered molecules, from the cold slime of the earth to the movement of warm living things, in absolute defiance of the threat of ultimate cold death.

This shift from gloomy to hopeful thinking brings us back to Edmund Burke's statement that true economy is not parsimony. Conserving isn't enough. We have to do something with what we conserve. But we *do* have to conserve.

WHAT DOES IT COST?

This is a question calling for a simple quantity. All it tells us is that the cost is large, middling, or small. These are matters of fact. If we were to say it is *too* large or *too* small, we would be entering the field of value because value relates what *is* to what *should be*.

The question, "What *should* it cost?" was the step which led Lawrence D. Miles from fact to value. The question was asked within the framework of change for the better—exchange value!

Exchange, or trade, to be sustained and profitable, must be good for both parties. By exchanging firewood for game the freezing hunter and hungry woodcutter described in Chapter 3 eat roast venison near a warm fire. The proportions of the exchange determine whether this commerce

will be profitable to both parties. This is one definition of a fair price.

Now suppose there are several freezing hunters and several hungry woodcutters. Each will offer different amounts of his product in exchange for what he needs, depending on his wants and resources. Before the end of the season some woodcutters will go hungry and some hunters will be mighty cold.

The name of the game is survival.

Comparing costs is as essential to survival in business as it is in the rest of the jungle.

Simple costs are matters of fact; comparing them with what they buy us, and with other costs, which provide the same utility, becomes a matter of value.

A Matter of Fact—Cost Visibility

To see product costs in perspective we must stand back and look at cost to the customer—that all-encompassing figure which includes the supplier's cost and profit, plus what the customer must pay others—such as repairmen—for use of the product, plus direct costs to him, such as price and the cost of investigation, appraisal, comparison, ordering, and financing.

This is a good time to review our own costs, as developed in Figure 5-2. Such manufacturing and administrative costs are carefully recorded, monitored, and compared in industry. Often whole departments and diverse programs exist for the purpose of controlling and reducing these costs.

Reducing cost to the customer is another story. As noted earlier, truly informative advertising, convenient displays, and good service under warranty constitute investments on the part of the marketing function which reduce those direct costs incurred by the customer over and above the sale price.

Certain other customer costs are particularly sensitive to the efforts of a value-analysis task group. Here are some examples:

COST OF OPERATION. Sensitive to reduced inputs for the same output. Examples are longer cruising range in an aircraft or longer battery life in portable equipment.

COST OF MAINTENANCE. Sensitive to improved lubrication, better gaskets, and better wearing surfaces in mechanical equipment, to longer periods between calibration of test equipment, and to more durable finishes.

COST OF REPAIR AND OVERHAUL. Sensitive to improved accessibility of replaceable parts and to ease of refinishing.

Look for Analogies

- In the life sciences
- In the physical sciences
- In your own industry
- In other industries

Look for "Way Out" Ideas

- List primitive or elementary methods
- Examine the absurd and paradoxical
- Forecast methods of the future

Examine and Screen the Choices Developed

- Simulate or forecast consequences
- Exercise critical judgment (deferred until now)

BLAST, THEN REFINE

Lawrence D. Miles originally used the expression *Blast, Create, Refine* to describe the assault made on the shroud of tradition, inertia, and sanctity that often obscures the function of a product. The technique is delightfully presented by Miles in his 1961 book. He describes a pioneer couple's three-room dwelling and outhouse, the various additions, and the final structure that can accommodate a large family, plus indoor plumbing. The *Blast, Create, Refine* technique blasts away all the patchwork aspects of such a house, determines what the new functions should be, and, finally, refines the design.

The reader will note that I have developed this concept in Chapter 6, where we blast away the structure to determine the function, and in this chapter, where we strive to create new ideas.

Perfecting and Simplifying New Ideas

One definition of the verb, *to perfect*, is to bring to *final form: to complete*. In order to complete our ideas, we must blast away the scaffolding of the creative process, leaving only the final idea in terms of dynamic satisfaction of wants: the function and its resulting benefits. Then we must refine the idea by achieving the right balance and proportion among the benefits. Finally, we must simplify the means of providing those benefits.

THE PRINCIPLE OF BALANCE AND PROPORTION

Then let us mingle our ingredients, with a prayer to the gods, Dionysus or Hephaestus or whichever god has been assigned this function of mingling.

Plato in the *Philebus*

The amount of resources, such as materials and direct labor, that can go into an industrial product is determined by what the customer will pay, less the indirect expense and profit of the suppliers.

Given this limitation of resources, we know that we cannot increase one element of product worth without reducing one or several of the others. What we have to work with, then, are the proportions among the elements of worth that will yield the best value.

Blindly striving for the most of the best of everything amounts to trying real hard instead of thinking. Achieving a balanced combination of benefits, on the other hand, calls for common sense, not brute effort. "A painter," said Aristotle, "would not give his creation an oversize foot, be this ever so magnificent a foot." Neither can we endow our creations with exaggerated portions of any one benefit, whether it be economy, reliability, performance, or what have you. Instead, we must determine the relative importance of the desired benefits and combine them in the measure and proportion that will satisfy the customer, for, as Plato said in the *Philebus*, "the qualities of measure and proportion constitute both beauty and excellence."

Had not the classical Greeks understood the principle of balance and proportion better than any other people, I would not be quoting them here, but understand this principle they did, leaving ample evidence of its application in their sculpture, architecture, science, and statecraft.

In Book II of his *Politics*, Aristotle repeats, ". . . it is the perfect balance between its different parts that keeps a state in being." With respect to an industrial product we can say that, for a given level of resources, the balance and proportion among desired benefits determines the worth of the product.

THE TASK OF SIMPLIFICATION

In a comprehensive study of more than 100 value-engineering implemented recommendations the American Ordnance Association found that