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A MANAGEMENT SERVICES TECHNICAL STUDY

2

COST ANALYSIS FOR PRICING AND DISTRIBUTION POLICIES

Staff Study Published by the
American Institute of Certified Public Accountants

COST ANALYSIS FOR PRICING AND DISTRIBUTION POLICIES

MANAGEMENT SERVICES
TECHNICAL
STUDY NO. 2

COST ANALYSIS FOR PRICING AND DISTRIBUTION POLICIES

Staff Study Published by the
American Institute of Certified Public Accountants
666 Fifth Avenue, New York, New York 10019

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This technical study is a publication of the staff of the American Institute of Certified Public Accountants and is not to be regarded as an official pronouncement of the Institute. It was prepared under the supervision of Professor Richard F. Vancil, D.B.A., CPA, Harvard Business School, and Henry De Vos, manager, management services. The members of the committee on management services by CPAs assisted in an advisory capacity.

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Preface

Cost accounting furnishes management with much of the input required in order that management may make proper decisions. Perhaps one of the prime reasons that a business entity maintains a cost system is to provide some guidance for determining the adequacy of pricing and distribution policies.

The intelligent analysis of relevant cost data will go a long way toward determining the essence of profit planning—what to produce and what price to charge.

Cost analysis for pricing and distribution policies is the second effort in this series of technical studies in management services.

The contents of this technical study are divided into two sections: (1) textual material concerning the type of analysis covered by the study, and (2) four case studies describing engagements performed by CPAs in that area. All of the case studies are based on actual situations, although the names, locations, and, in some cases, minor details have been changed. In a few instances the figures also have been changed. Where this has been done, every effort has been made to avoid distorting significant relationships.

Each case study consists of two parts: (1) a description of the client situation as it unfolded to the practitioner, and (2) a description of how the practitioner dealt with the situation. The cases are presented in this format to enable readers to use them as a self-teaching device.

Several questions are asked at the end of part one: questions requiring quantitative analysis of the data in the case; questions about how the job should be approached; questions about fee estimates or man-day requirements; and so forth. It is suggested that the reader should plan to read part one carefully and prepare answers to the questions presented before proceeding to part two. Part two then provides an opportunity for the reader to compare his analysis with that prepared by the practitioner.

Most management decisions do not have just one obviously right answer. Therefore, the reader's solution to a case may frequently, and perhaps appropriately, differ from the approach taken by the practitioner. Working through the series of cases over a period of several weeks the management services student should find increasing confidence in his ability to size up a situation and devise an approach for dealing with the particular problem area discussed in this bulletin.

This is the second in a series of five technical studies prepared under the general supervision of Professor Richard F. Vancil, D.B.A., CPA, Harvard Business School. Assistance in the field research and case writing was provided by Dr. James S. Hekimian, Dr. Charles J. Christenson, Dr. David F. Hawkins, Dr. Robert C. Deming, Dr. Robert C. Hill, and L. Paul Berman.

Cost Analysis for Pricing and Distribution Policies

As CPAs continue to increase the scope of management services offered to their clients, the practitioner's ability to render competent advice on pricing policies and distribution costs becomes increasingly essential. Determining intelligent and profitable pricing policies is one of management's more important responsibilities. As an advisor to management, the CPA is in a position to make a unique contribution to management's analysis of pricing problems. This is a unique position because the CPA (1) can frequently analyze the company and its environment in a more objective and dispassionate manner than management itself, (2) is intimately familiar with the cost structure and other characteristics of his client's organization that relate to pricing problems, and (3) approaches the problem in a professional and analytical manner rather than relying on intuition as management frequently does in its pricing actions.

The purpose of this bulletin is to describe and illustrate the types of analyses that CPAs may be called upon to perform in the pricing area. First, this text will discuss some of the useful theoretical concepts that are applicable in dealing with pricing problems; then, the series of case studies will illustrate the application of these concepts and some of the problems of applying them in actual situations.

The first bulletin in this series, *Cost Analysis for Product Line Decisions,* provides a useful introduction to pricing decisions. The first bulletin deals with the subject of cost behavior and prediction, and examines some of the problems that arise in determining a useful measure of product costs. The cost concepts developed in Bulletin No. 1 are helpful in an analysis of pricing problems. In particular, the

concept of contribution to overhead, derived from an analysis of fixed and variable costs, is frequently useful in making pricing decisions.

Bulletin No. 1 deals with a fairly simple class of problems involving the determination of product costs in order to identify low-profit items and permit more effective utilization of existing facilities. In contrast, this bulletin is concerned with distribution costs and pricing policies, a somewhat more complex area because it involves not only the analysis of selling and promotional costs but also the analysis of changes in the price and quality of a product offered for sale.

COST-PRICE-VOLUME RELATIONSHIPS

Most discussions of price determination begin with the assumption that the characteristics of a product have already been determined. This is a crucial assumption, and one that will be explored in the third section of this text. This and the following section accepts this assumption and thus restricts attention to the effect that prices and other demand creating costs have on profits.

A simple example involving a firm that manufactures only one product facilitates discussion. The Radnor Corporation, a manufacturer of household vacuum cleaners, had the following operating results for 1964.

Exhibit 1

RADNOR CORPORATION

Statement of Income
For the Year Ended 1964

	Total Amount	Amount Per Unit
Sales (50,000 units)	$2,000,000	$40.00
Cost of goods sold:		
Materials	$ 700,000	$14.00
Direct labor	500,000	10.00
Factory overhead	400,000	8.00
Total factory cost	$1,600,000	$32.00
Manufacturing profit	$ 400,000	$ 8.00
Selling, general, and administrative expenses	250,000	5.00
Profit before taxes	$ 150,000	$ 3.00

The importance of price in determining a company's profitability is illustrated in Exhibit 1. In general, from that exhibit it is noted that there are three major ways in which price influences profitability:

1. Unit price has a direct effect on total revenue. In Radnor's case, the sales revenue of $2,000,000 is a result of selling 50,000 units at $40 each. Since the profit per unit is only $3, the company would have lost money for the year if it sold the 50,000 units below $37 each.

2. Selling price will influence the volume sold. The quantity sold is another factor which determines sales revenue, and for most products—particularly competitive ones—the quantity that can be sold is determined to some extent by the selling price.

3. Volume in turn will influence costs. Radnor's total costs in 1964 amounted to $1,850,000, but this figure would have been higher or lower depending on the number of units sold.

The interrelated variables (cost, price, and volume) are easier to consider if the conventional income statement is recast into a format which recognizes the differences between fixed and variable costs. Bulletin No. 1 describes the analytical techniques involved. The result of applying this analysis to the Radnor Corporation is illustrated in Exhibit 2.

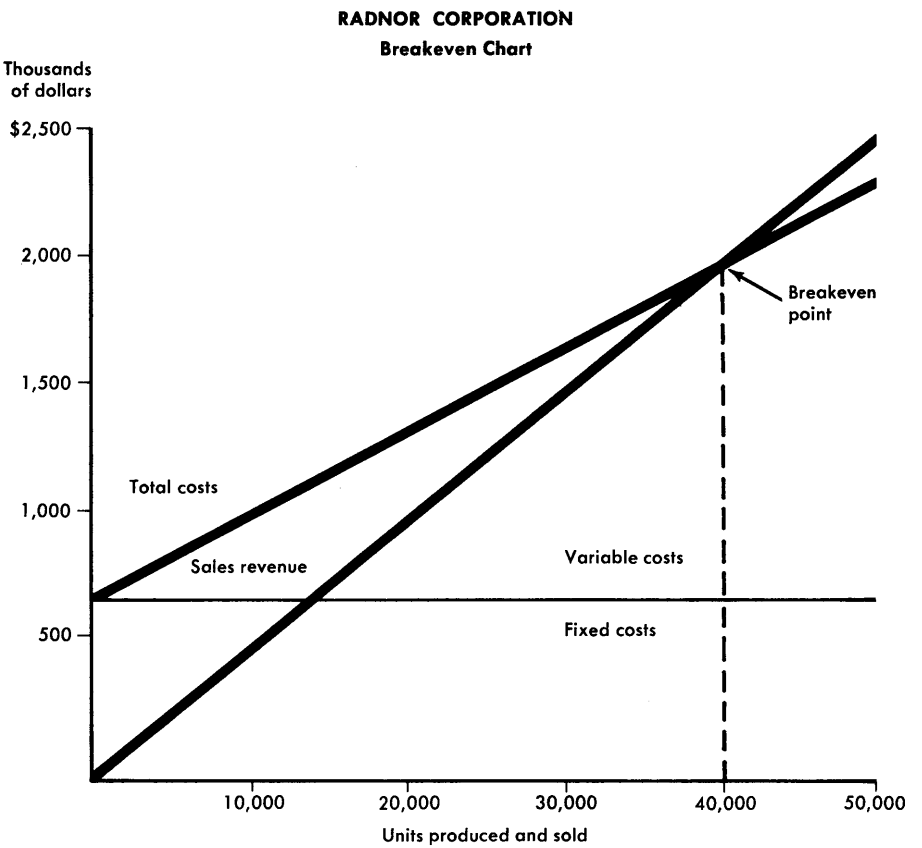
Exhibit 2

RADNOR CORPORATION

Statement of Income
For the Year Ended 1964

	Total Amount	Amount Per Unit
Sales (50,000 units)	$2,000,000	$40.00
Variable costs		
Materials	$ 700,000	$14.00
Direct labor	500,000	10.00
Variable overhead	50,000	1.00
Total variable costs	$1,250,000	$25.00
Contribution to fixed costs and profit	$ 750,000	$15.00
Fixed costs for factory overhead		
Selling, general, and administrative expenses	600,000	
Profit before taxes	$ 150,000	

Exhibit 3



In this example, the total overhead costs for factory, selling, general, and administrative expenses amount to $650,000, of which only $50,000 are identified as variable costs, resulting in a total variable cost of $25 per unit. One of the greatest advantages of a fixed-variable costs analysis is that it permits the determination of a contribution per unit—the difference between selling price and variable cost per unit. The contribution per unit of $15.00 incorporates two (price and cost) of the three profit factors mentioned above, thus making it much easier to observe the influence of volume on profits. In applying the contribution concept to the Radnor Corporation, this analysis shows that the company made a profit of $150,000 because it earned a contribution of $15 per unit on 50,000 units, or $750,000. From this contribution, Radnor Corporation must recover $600,000 of fixed costs,

leaving a profit of $150,000. A change in price might influence the quantity sold and the *total* amount of variable costs, but not the variable cost per unit. These effects can be measured in terms of the total contribution earned.

A familiar way of presenting the results of a fixed-variable cost analysis is through the use of a breakeven chart as illustrated in Exhibit 3.

Units Produced and Sold

Given only the two facts that Radnor's total fixed costs were $600,000 and the contribution per unit was $15, the Radnor Corporation's breakeven point can also be determined by the following computation:

$$\text{Breakeven Point} = \frac{\text{Fixed Costs}}{\text{Contribution per unit}}$$

$$\text{Breakeven Point} = \frac{\$600{,}000}{\$15}$$

$$\text{Breakeven Point} = 40{,}000 \text{ units}$$

Radnor's profit performance for 1964 is therefore a result of the 10,000 units sold above the breakeven point of 40,000 units multiplied by the contribution of $15 on each unit for a total profit of $150,000. These several ways of analyzing cost, price, and volume deal with the same data and yield the same profit result in any given situation. Nevertheless, it is useful to have several alternative ways of considering a company's profit structure.

Breakeven Point Analysis

The main reason that breakeven point analysis is so widely known is that it is an extremely useful pedagogical device for explaining the relationship between fixed and variable costs. More important, perhaps, breakeven point analysis has several practical advantages:

1. The concept is a simple one to comprehend. Many highly effective businessmen may be salesmen or may be production orientated, but are not able to comfortably deal with accounting and statistical data. A great advantage of the breakeven point is that the uninitiated can easily grasp it in concrete terms. The danger is that managers may place more faith in the breakeven point than it deserves, thus overlooking the limitations listed in (A) and (B) below.

2. The breakeven point is a useful diagnostic tool. Theoretically, knowing where a company's breakeven point is is not relevant in an evaluation of alternative courses of action. Any specific action that management is considering should be evaluated in terms of its effect on the profits of the firm, and there is no logical reason why this evaluation should be influenced by whether or not the firm is operating at a loss. As a practical matter, however, a knowledge of where the breakeven point lies can be quite helpful to management in determining the *need* for action. Businessmen are neither completely rational nor are they persistently logical. Certain desirable expenditures (particularly programmed or managed costs such as advertising and promotion, preventive maintenance, and research and development) are often incurred during a period of profitable operations, but are curtailed in opposite situations. To the theoretician, drastic revisions in the level of programmed costs may appear irrational, but to the businessman it is simply a matter of survival. Business management involves more than making a series of discreet, optimal decisions. Data on which decisions are based are often hazy projections at best, and the wise manager employs the cautious test of overall profitability in determining whether or not a company can "afford" to undertake certain programs.

3. Breakeven analysis is a useful method for considering the risk implications of alternative actions. Careful quantitative analysis of alternatives is an extremely useful way of comparing the net effect on profitability of those factors which can be measured. Alternatives, however, involve not only different expected profits but also different degrees of risk—an elusive, almost unmeasurable factor that must be considered in reaching a final decision. One way that a businessman can approach the problem of risk evaluation is to observe the effects of the alternatives on his breakeven point. One alternative may lower the variable costs and thus widen the contribution per unit on sales, but only at the expense of incurring higher fixed costs. Another alternative might permit lower fixed costs but only through increasing variable costs and narrowing the contribution margin. The relative attractiveness of the two alternatives cannot be measured in terms of profit alone. The first alternative may be more profitable, although it entails more risk. Comparing alternatives in terms of their effect on the breakeven point of a firm is useful in making a decision.

4. Breakeven point analysis provides the basic data for further profit-improvement studies. This last point may be the most important

advantage, even though it has nothing to do with the usefulness of preparing a breakeven chart. A breakeven chart cannot be prepared until the total costs of the firm have been broken into their fixed and variable components. Even though the resulting chart may be of little specific value, the detailed analytical data required are a useful starting point for subsequent investigations. Viewed in this way, a breakeven chart is not the end product of a fixed-variable cost analysis but merely a presentation of the revised cost data.

Against these advantages, two important limitations of breakeven point analysis should be noted:

A. The breakeven chart is a static measure of a dynamic process; that is, it is a picture of the cost and profit structure of a company at a given point in time. While it may present a true picture of a situation at a specific point in time, the chart may not be very useful for predicting what the situation will be like in future time periods. For example, the revenue line on a breakeven chart illustrates how the total sales revenue grows as the number of units sold increases. For example, Exhibit 3 (page 4) indicates that Radnor's $2 million sales volume was the cumulative effect of selling 50,000 units, one-by-one, at a price of $40 each. However, there is usually a relationship between price and volume, and the chart does not recognize this relationship. It does not, for example, indicate what the effect would be of selling 55,000 units at $38 each (although the effect of such a change could easily be measured by drawing another revenue line). The cost lines on a breakeven chart are also static; they show what the variable cost per unit and the total fixed costs were during one historical time period. These lines do not necessarily predict what the cost will be in the future. Costs are almost sure to change either because of the unexpected effects of changing volume or because of the planned action of management to improve profit results by spending more or less money for certain expenses.

B. The breakeven point is difficult to determine for multi-product firms. Few companies produce only a single product such as the Radnor Corporation. For multi-product firms, the breakeven point is hard to determine because the base line on the chart cannot be in terms of number of units. It must deal in terms of equivalent units (with some factor for converting units of one product into units of another) or in some measure of plant capacity such as direct labor hours. Further, different products earn different profits. The pin-

pointing of a breakeven point must therefore assume some specific product mix. For a two-product firm it may be possible to measure the breakeven point in terms of the combined sales of both products, but the breakeven point would be lower if more of those sales were of a higher-profit item, or it would be higher if the product mix assumption were weighted in favor of a lower-profit product. The product mix assumption is another example of the danger of using static, historical analysis to extrapolate a future situation, particularly when the product mix is almost certain to change.

In summary, breakeven analysis is frequently a useful place to begin an examination of the cost-price-volume relationship of a particular company. For the CPA-advisor, a breakeven chart may be the first tangible product which can be shown to management as a result of his analysis. The ultimate value of this analytical tool depends primarily on how well management understands the assumptions built into the determination of the breakeven point, and the subsequent use that it makes of the detailed data in evaluating the alternative courses of action.

Contribution Pricing

The value of variable cost information for pricing purposes may be illustrated by observing the way that Radnor Corporation's management might evaluate an offer from an exporting firm to buy 5,000 units for shipment to South Africa at a price of $30 each. (The ordinary competitive considerations of upsetting the price structure in a domestic market, and the potential legal problems of discriminatory pricing, may be ignored in this situation.) Radnor Corporation must decide to accept or reject the offer based primarily upon its effect on profitability. The cost data shown in the Income Statement in Exhibit 1 (page 2) are not useful in evaluating such a proposal. Factory cost of $32 per unit is a mixture of both fixed and variable costs, and would be an inaccurate measure for predicting the cost of accepting the order. The variable cost data shown in Exhibit 2 (page 3), however, are indicative of the effect of accepting the order.

Selling price of foreign order	$ 30.00
Variable cost per unit	25.00
Contribution per unit	$ 5.00
Total contribution (and increase in net profit) on 5,000 units	$25,000.00

Profits would be increased by $25,000 with the special order because each of the 5,000 additional units earns a contribution of $5.00.

Pricing based on variable costs, sometimes called "contribution pricing," has been widely discussed in accounting literature.[1] The general theory of contribution pricing is that it will be more profitable for a firm to accept an order which yields a contribution than to reject the order. This theory is logical, and is also extremely simple to illustrate. However, this theory is difficult to apply in practice.

Perhaps the most common argument against contribution pricing is the equally irrefutable, and eminently practical, observation that if all products are priced to yield only a contribution to overhead, there may not be a sufficient profit margin to cover all of the fixed costs of the business. Stated in terms of a single product, the selling price must be higher than the total cost per unit if the company is to generate a profit. Both statements, the theoretical and the practical, are true; neither by itself is of much specific value in reaching a decision on a specific pricing action. For special order, such as Radnor's sale to South Africa, contribution analysis is a valuable tool for handling the costs and revenues that would be affected by the decision. This simple analysis, however, does not reveal whether or not it would be wise for Radnor to hold out for a price of $31 or $32 per unit. Ways of dealing with this question, and other problems involved in pricing special orders or custom products, are discussed in the last section of this text.

The immediate concern of this section lies in the pricing of "proprietary" products, products designed by the manufacturer and sold through traditional marketing channels. Suppose that the proposal that Radnor Corporation received had come from a wholesaler in one of its regular domestic markets—a proposal in the form of an implication that if Radnor did not wish to fill the order at the $30 price, the wholesaler would find another manufacturer who would accept the order. In terms of the economics of contribution analysis, this proposal is no different from the South Africa proposal. As a practical matter, however, the situation differs radically because the wholesaler's proposal strikes at the very roots of Radnor's $40 domestic price. Although the theory of contribution pricing is not inoperative in evaluating the wholesaler's proposal, it is much harder to apply in such situations. The difficulty arises not because of any weaknesses in theory, but because of the difficulty of taking into account all of the ramifications of granting a special price to one customer. First, such a

[1] References 4 and 7 in the Bibliography discuss this subject at some length.

pricing action might be construed as a violation of the Robinson-Patman Act, or other legislation prohibiting discriminatory pricing. Even if the price concession took the form of a quantity discount that was made available to all large volume purchases, the new pricing policy could trigger a chain reaction of events. For example, other wholesalers and distributors may decide to bulk their purchases in order to qualify for the discount; Radnor's competitors may feel compelled to meet Radnor's lower price; at lower prices, consumers would probably buy more vacuum cleaners, if only because it would be relatively less attractive to hire repairmen to maintain their existing cleaners; and finally, Radnor's plant capacity may prove to be inadequate to meet the requirements of an expanded market, with the result that additional facilities would have to be built. The net effect of this complex series of events would be extremely difficult to predict. The point is that a simple contribution analysis is not all inclusive in determining whether a special quantity discount policy should be initiated.

The value of contribution pricing as an analytical tool is no greater than the adequacy and validity of the predictions which must be made about the future. It is difficult to predict how competitors and consumers will react to a price change. It is also difficult to predict what the variable costs of production will be in the future, particularly if the pricing action being considered requires a change in the quantity of productive facilities required. One of the dangers of contribution pricing is that it may not be explicit enough in requiring a consideration of the important indirect effects that result from a pricing decision. One way to overcome this potential disadvantage is to use the classical approach (discussed below) of comparing marginal revenue to marginal costs.

The Price-Volume Relationship

After deciding to reject the South African order, Radnor's management decided to evaluate the advisability of reducing its price by $1.00 per unit, which represents a price cut of 2½ per cent. After allowing for the possibility that some or all of their competitors will match the price reduction, Radnor's executives believe that the lower price will be sufficiently attractive to consumers to increase Radnor's volume by 4 per cent to 52,000 units per year. The various ways that Radnor's management analyzed this pricing action are described below.

The possibility of selling 2,000 additional units at a price of $39 might appear attractive when compared to variable costs of $25 per

unit. However, it must be recognized that it will not be possible to grant the price reduction solely to new customers. Existing customers will also share in the lower price. Exhibit 4 summarizes the relevant figures in terms of cost and revenue per unit.

Exhibit 4

RADNOR CORPORATION

Marginal Analysis of a One Dollar Price Reduction

Marginal revenue	
Revenue at a $40 price (50,000 units)	$2,000,000
Revenue at a $39 price (52,000 units)	2,028,000
Added revenue	$ 28,000
Average marginal revenue: $\frac{\text{\$28,000 additional revenue}}{\text{2,000 additional units}}$	= $14
Marginal cost – Variable cost (from Exhibit 2)	$25

Although the price cut will increase sales revenue by $28,000, this amounts to only $14 per unit on the additional 2,000 units sold. The increase in revenue, when compared to variable costs of $25, indicates that the price reduction would not increase Radnor's profits.

In reaching this conclusion, a careful analysis of variable costs and the effect that a 4 per cent volume change might have on the utilization of productive facilities must be made. As noted in Bulletin No. 1, labor costs are not always strictly variable. Possibly, Radnor's existing labor force could generate a small increase in production without a proportional rise in costs. On the other hand, at some point the increase in production costs might be more than proportionate because of the necessity of adding increments to certain fixed elements of expense in the plant.

At this point the primary concern is the effect of the pricing action on revenue. The $28,000 increase is the net effect of two opposing forces:

Revenue from added sales: 2,000 units @ $39	$78,000
Less: loss in sales revenue on existing volume 50,000 units sold for $1 per unit less	50,000
Net increase in revenue	$28,000

Since the net additional revenue is inadequate to cover marginal costs, the price reduction should not be implemented. In terms of

classical economic theory, the optimal price is the price at which marginal revenue equals marginal cost; that is, neither a price reduction nor a price increase would yield an average marginal revenue higher than marginal cost.[2] A lower price for Radnor yields no profit improvement, but suggests that the company explore the effect of a small price increase.

Analyzing the expected effects of a potential price change in terms of marginal revenue has the important advantage of forcing an explicit consideration of the change in volume that will occur as a result of the price change. The price-volume relationship (the "demand function") is the most critical factor to weigh in evaluating a pricing decision. Making such an estimate is frequently difficult, and an alternative approach is to determine the breakeven volume that will be necessary if the company is to earn the same amount of profit at the new price as it earned at the old price. In Radnor's case, the company earns a $750,000 contribution at a $40 price. If the price were cut to $39, the contribution per unit would be $14.[3] The company would then have to sell 53,571 units $\left(\frac{\$750{,}000 \text{ total contribution}}{\$14 \text{ contribution per unit}}\right)$ in order to earn the same profit. It might be difficult for Radnor's executives to specify just what the effect of a 2½ per cent price cut would be, but they might find it easier to make a decision if they realized that such a price cut could increase profits only if it resulted in an increase in volume of more than 7 per cent.

Summary

Changing the price of a proprietary product is a subject that has received a great deal of attention both from theoretical economists and practical businessmen. The reason for this attention is obvious: Management's pricing actions on such products have an appealingly direct impact on profits. But the impact is not always favorable, and the results of a price change may be so difficult to predict that pricing decisions are one of the most risky types of decisions that management may be called upon to make. Careful cost analysis is a manda-

[2] The reader wishing to review his knowledge on economic theory is referred to item 6 in the Bibliography.

[3] This $14 is the $15 shown in Exhibit 2, reduced by the $1 price cut; it is only coincidental that the marginal revenue in Exhibit 4 was also $14.

tory step in evaluating pricing actions, but the problem of predicting the price-volume relationship still remains. Because of the risk and difficulty in initiating intelligent price changes, many businesses, particularly smaller businesses, try to avoid direct pricing actions as a form of competition in the sale of proprietary products or services. Competition today takes the less direct forms of customer service, advertising and promotion, and product design. As the discussion of these topics in the next two sections will illustrate, the type of economic analysis that is essential for intelligent decision making in these areas is quite similar to that illustrated above in the evaluation of direct pricing actions.

DISTRIBUTION COSTS

The critical importance of the effective management of selling and distribution costs in a successful business requires little documentation. The fact that businesses in the United States spend $13 billion a year on advertising is fairly conclusive evidence that many businessmen believe these expenditures are justified in improving the profitability of their companies. But how does a company decide how much to spend on advertising? To some extent, as with direct pricing actions, decisions regarding advertising expenditures are influenced by the competitive situation; a cigarette manufacturer who did no advertising might never be able to build a market for his product. But the variation in the practices of individual competitors is much greater in the area of advertising expenditures than in the area of product prices. One company might spend significantly more or less for advertising than one of its competitors; although it is almost impossible to justify this difference and to observe its impact on corporate profits.

Theoretically, of course, it is possible to determine with great precision the *optimal* amount that a company should spend for its advertising. The advertising budget should be increased to the point where the last dollar spent will sell just enough additional units to produce an additional contribution of $1; that is, marginal revenue will equal marginal cost. The fact that this convenient rule is not widely used in evaluating advertising expenditures is not due to ignorance on the part of advertising executives. It is due to the impossibility of getting precise measurements of the effectiveness of most advertising expenditures.

Despite these problems, the degree of sophistication in the management of distribution costs is rapidly increasing. Although the analytical tools to be used may never be applied with the same precision as in the management of manufacturing costs, the value of better decisions is just as important in one area as it is in the other. The CPA who acts as an advisor to management is expected to bring a high level of technical skill to the analysis of manufacturing costs. But the *need* for analytical skill may be even greater in the distribution cost area, and the CPA should not retreat from this challenging problem simply because less precision is possible. Competent, professional analysis may be of great help to management in this area by narrowing the range of feasible alternatives, and by focusing management's attention on the critical factors that influence their decisions. The professional advisor who can do no more than this still has contributed greatly.

Types of Demand-Creating Costs

Using a term such as "demand-creating costs" rather than "distribution costs" permits a broader definition of the costs considered to be relevant for management analysis and action. Demand-creating costs include all the traditional distribution costs such as salesmen's salaries and commissions, advertising and promotional expenses, samples and premiums, entertainment, and so forth. However, another group of costs, frequently of greater importance, may not appear on the Income Statement at all: the costs (and profits) charged by wholesalers, distributors, and retailers for performing the function of selling the product to the ultimate consumer.

An example of the magnitude of a company's demand-creating cost can be illustrated in terms of the Radnor Corporation. The Radnor Corporation's expenditures for selling, general, and administrative expenses amounted to $250,000 in 1964. This consists of $150,000 of selling and promotional costs and $100,000 of plant overhead and other fixed costs. Radnor's distribution network involves selling vacuum cleaners to wholesalers for $40. Wholesalers, in turn, sell to retailers at a price of $47, and retailers typically charge consumers a price of $80. Thus, the retail value of Radnor's sales is $4 million, of which $2,150,000 is "spent" for demand-creating costs. It is easy to overlook the $2 million in distribution margins paid by this company on the grounds that Radnor's management has no control over prices charged by wholesalers and retailers, that Radnor Cor-

poration is a manufacturer and that its customers are the wholesalers. Such statements are true in terms of the way the company currently markets its products, but blind acceptance of the status quo is not the most suitable way to begin an analysis of distribution costs. For example, one of Radnor's more successful competitors, the Electrolux Corporation, receives the full retail price on its sales by distributing the product through company employed door-to-door salesmen. The management of Electrolux recognizes that demand-creating costs are its greatest area of expense; why should Radnor's management not admit that the same situation exists?

Viewed in this manner, marketing and distribution costs become more important than manufacturing costs for many businesses. As with manufacturing costs, some demand-creating costs are fixed over wide ranges of volume while others are variable, depending upon the quantity of product sold. In the case of the Radnor Corporation, the fixed costs amount to $150,000 per year while the variable costs amount to $40 per unit. The question that management must ask itself about these costs is the same question asked in the more technical area of manufacturing costs: Are these costs being spent in an efficient manner which yields more than a dollar of contribution for each dollar of cost incurred?

The Cost-Volume Relationship

As the above question implies, a useful way to approach the analysis of demand-creating costs is in terms of the impact on profits that would result from changing certain elements of expense. The Radnor Corporation serves as an example *(Exhibit 2)* to explore the three general kinds of action that management might undertake to improve profits through better utilization of its demand-creating expenditures.

Changes in programmed costs. One way that Radnor might improve its profitability would be to change the level of fixed costs incurred by the company. Actually, the costs incurred for salesmen's salaries, advertising, and so forth, are not irrevocably fixed; rather, they are controlled, or programmed, by management decision. One action that Radnor's management might take would be to increase its advertising expenditures with the expectation that the resulting increase in volume would fully cover the additional costs involved. An analysis of the profit effects of this action is shown in Exhibit 5 (page 16).

Exhibit 5

RADNOR CORPORATION

Effect of Increased Programmed Costs

1. Assumptions: A $50,000 advertising campaign would result in the sale of 5,000 additional units at the regular price of $40.

2. Contribution Analysis:

Additional contribution (50,000 units at $15 each)	$75,000
Additional programmed costs	50,000
Net increase in contribution and profit	$25,000

3. Breakeven Point Analysis:
   a. Effect on company breakeven point
      Total fixed costs $600,000 plus $50,000 = $650,000
      Contribution per unit (no change) $15

$$\text{Breakeven point } \frac{\$650{,}000 \text{ total}}{\$15 \text{ per unit}} = 43{,}333 \text{ units}$$

   b. Additional volume required to breakeven on this proposal

$$\frac{\$50{,}000 \text{ added costs}}{\$15 \text{ contribution per unit}} \qquad 3{,}333 \text{ units}$$

The wisdom of an increased advertising expenditure is determined by (1) the additional volume generated, and (2) the contribution per unit on the additional volume. If Radnor assumes that a $50,000 expenditure would result in the sale of 5,000 additional units, the campaign would produce a profit increase of $25,000. In terms of the company's breakeven point, 3,333 additional units would have to be sold in order to cover the costs of the campaign. Management should not initiate the campaign unless it believes that such a new volume can be obtained.

Changing variable costs. As an alternative proposal, Radnor's management might consider a change in its variable costs. There are many ways to do this, but the proposal analyzed in Exhibit 6 assumes that the company would give its retailers an advertising allowance of $1 per unit sold.

Exhibit 6

RADNOR CORPORATION

Effect of Increased Variable Costs

1. Assumptions: An "advertising allowance" of $1 per unit, given direct to retail dealers, would result in the sale of 5,000 additional units at the regular price of $40.

2. Contribution Analysis:

New contribution per unit of $14 ($40 less $26) times 55,000 units	$770,000
Old contribution per unit of $15 times 50,000 units	750,000
Net increase in contribution and profit	$ 20,000

3. Breakeven Point Analysis:

a. Effect on company breakeven point

Total fixed costs (no change)	$600,000
Contribution per unit ($40 less $26)	$14
Breakeven point $\frac{\$600{,}000 \text{ total}}{\$14 \text{ per unit}}$	42,857 units

b. Additional volume required to breakeven on this proposal

Units required to earn $750,000 contribution at $14 per unit $\left(\frac{\$750{,}000}{\$14}\right) = 53{,}571$

Units required to earn $750,000 contribution currently (at $15 each)	50,000
Number of new units required to earn the same profit	3,571

Superficially, the cost of this program appears to be the same as that of the advertising campaign because the advertising allowance would also amount to $50,000 based on the volume sold in 1964. As Exhibit 6 shows, however, the economics work out differently for this proposal.

If the advertising allowance to dealers produces an additional volume of 5,000 units, the profits of the company would be increased

by $20,000. Again, the breakeven analysis is a useful way to put the problem into perspective. Initiating an advertising allowance would increase Radnor's breakeven point, although not quite as much as a $50,000 advertising campaign. In this sense, the advertising allowance involves less risk because it increases the variable costs rather than the fixed costs. On the other hand, Radnor would have to sell a few more units under the advertising allowance program in order to make the same profit as it made in 1964.

Which of these two proposals is the more attractive? Certainly the analyses shown in Exhibits 5 and 6 (pages 16 and 17) do not provide a precise answer. Management's decision must be based on more than a careful examination of the cost-volume relationships of the two proposals. An effective advertising campaign, for example, may create additional sales revenue, and also create longer lasting effects by establishing the company's brand name more firmly in the minds of consumers. The advertising allowance program, on the other hand, may endear Radnor Corporation to its retailers with resulting beneficial side effects that cannot be measured in terms of sales volume alone. The final decision, would, no doubt, be highly subjective, but the analyses shown in Exhibit 5 and 6 would be of value to management as it approaches this difficult decision.

Trade-offs of fixed and variable costs. Another way of improving the efficiency of demand-creating expenditures is to substitute fixed costs for variable costs, or vice versa. For example, Radnor might consider the advisability of using company-owned branch offices instead of wholesale distributors. The analysis shown in Exhibit 7 (page 19) assumes that the branch offices would entail an annual fixed cost of $250,000, plus variable costs of $1 per unit sold, but that the company would be able to avoid "paying" the mark-up of $7 per unit which its wholesalers now receive.

As the analysis indicates, this proposal seems attractive. At existing volume levels, the company would earn an additional profit of $50,000 per year. The project has only a negligible effect on the company's breakeven point; in fact, the total volume sold could decline by 2,381 units without decreasing the company's profit below the level realized in 1964.

Exhibit 7

RADNOR CORPORATION

Effect of Substituting Fixed Costs for Variable Costs

1. Assumptions: A group of company-owned branch offices could be established to replace the existing independent wholesale distributors. Vacuum cleaners could be sold direct to retailers for $47 (the same price wholesalers now charge). The branch offices would cost $250,000 per year for fixed expenses, plus $1 per unit sold.

2. Contribution Analysis:

New distribution system:	
Contribution per unit ($47 less $26) = $21	
Total contribution on 50,000 units	$1,050,000
Less fixed costs ($600,000 plus $250,000)	850,000
Profit before taxes	$ 200,000
Old distribution system:	
Profit before taxes	150,000
Net increase in profit	$ 50,000

3. Breakeven Point Analysis:

   a. Effect on company breakeven point:

Total fixed costs ($600,000 plus $250,000)		$ 850,000
Contribution per unit ($47 less $26)		$ 21
Breakeven point	$\frac{\$850,000}{\$21 \text{ per unit}}$	40,476 units

   b. Additional volume required to break even on this proposal:

New units required to earn contribution of $150,000 in excess of fixed costs $= \frac{\$850,000 + \$150,000}{\$21 \text{ per unit}} = 47{,}619$

Old units required to earn contribution of $150,000 in excess of fixed costs $= \frac{\$600,000 + \$150,000}{\$15 \text{ per unit}} = 50{,}000$ units

Volume reduction possible without suffering loss of profit (2,381) units

The interesting aspect of this proposal is that it assumes that there will be no change in the number of units sold. Such an assumption

might be valid, but if the existing distributors are well entrenched there might be a temporary loss in volume. In addition, this proposal involves substantial risks about the accuracy of the cost estimates. Establishment of a series of branch offices involves more than merely spending money. New personnel to staff the branch offices must be found and trained. The program could not be accomplished overnight, and during the interim period the existing wholesalers might lose interest in selling Radnor's product. Furthermore, if all of these hidden costs were taken into account, the proposal might be rejected. However, the proposal could make a good long-term objective for the company. Once again, quantitative analysis in the distribution cost area is rarely conclusive.

Summary

The efficient utilization of expenditures intended to stimulate product demand is a subject of increasing importance for management. While direct pricing actions are an obvious form of competition, such actions may be extremely hazardous. Nonprice methods of competition, including advertising and promotion, salesmen's compensation, channels of distribution, and all the other aspects of a company's "marketing mix," can also be effective ways to improve profits. The above analyses illustrate that the analytical techniques appropriate for evaluating either price or cost changes are virtually identical; in order to evaluate either type of change, it is necessary to explicitly estimate the effect that the change will have on volume. Holding the selling price at a constant (or competitive) level does not actually simplify the analytical problem; the inexorable profit equation described by the interrelationship of costs, prices, and volume must still be solved.

Discussion of "demand-creating" costs has encompassed a rather broad group of business expenditures. However, the most significant factor in the creation of demand, the product itself, has been ignored. This is the subject of the next section.

PRODUCT DESIGN AND ITS RELATIONSHIP TO DEMAND

One important class of product pricing problems frequently cannot be solved by even the most sophisticated cost analysis. A broader view of the problem may indicate that the trouble is not in an inefficient manufacturing process, but in a product design that is not closely tailored to the market being sought. The best example of the importance of product design is probably the automobile industry, in which a manufacturer first selects a price category in which the car will compete, and then designs a product which can be produced to yield a profit at the "target price." The theoretical solution to this problem is essentially the same as the solution previously described for products in which the characteristics of the product were fixed and the price was the controllable variable which would determine the volume sold. For products designed to meet a target price, however, product costs become the controllable variable, based on the assumption that the greater the value of the product, the greater the demand will be. The analyst working on a pricing problem should carefully consider management's ability to vary the design of its product as a way to influence demand and improve profitability.

As with product design, the quality of a product can have a significant influence on product costs and on the demand for the product in the marketplace. The illusive nature of cost classifications is illustrated as follows. No one would disagree that the cost of a steering wheel is a part of the "product cost" of a car, or that advertising is a "demand-creating" cost; but what about the chrome-plated horn ring on the steering wheel? And how should the cost of the horn ring be classified if management decides to use stainless steel rather than chrome? While there are many situations in which factors of design and quality are largely controlled by the marketplace, the analyst should be aware that there are also many situations in which these two factors may be even more important than price in determining the profitability of a given product.

Viewed in this manner, product design, which includes the elements

of style, quality, and quantity, is actually another major form of non-price competition. There are few competitive products that are absolutely identical. Most manufacturers will endeavor to differentiate their product one way or another. Some differences may be only negligible (style or finishing differences), while others may be of a more substantial nature. The important matter is that these product differences, which often involve differences in the cost of creating the product, are not always reflected in the price charged to the consumer. Thus product cost, which is an important element in the cost-price-volume relationship, is adaptable to the same type of analysis illustrated previously for product price and distribution costs.

The Marginal Cost of Design Changes

The analysis of product costs can be illustrated by the example of the Radnor Corporation. Radnor's management is considering the advisability of approving a change in the product design which would result in increased variable costs of $1 per unit. If the change were adopted, Radnor would not increase its price; but it would expect that the higher quality product would find better market acceptance and that an additional 2,000 units per year could be sold. Exhibit 8 (page 23) analyzes the profitability of this proposal.

Exhibit 8 requires no explanation, although two points should be noted. First, there is an analogy between the calculation of marginal cost in this example and the calculation of marginal revenue for the proposed price change analyzed in Exhibit 4 (page 11). The design change cannot be incorporated only into the additional 2,000 units that will be sold; the extra $1 per unit must also be spent on the present volume of 50,000 units. Thus, the marginal cost of the additional 2,000 units is not simply the $25 of variable costs shown in Exhibit 2 (page 3) plus an additional $1 for the design modification. Rather, the marginal cost is $51: $26 per unit because the entire $52,000 cost of the design modification must be charged against the 2,000 additional units which may be sold, plus the regular $25 per unit manufacturing costs for those 2,000 units. As shown in Exhibit 8, this design modification would not be profitable for Radnor.

The second interesting thing to note from Exhibit 8 is that the analysis there is similar in almost every respect to the analyses of previous proposals in Exhibits 4 and 6 (see pages 11 and 17, respectively). Superficially, these three proposals are radically different: The first involves a price reduction of $1 per unit; the second increases

Radnor's distribution costs by granting retail dealers an advertising allowance of $1 per unit; and the third involves a $1 per unit increase in the direct manufacturing costs of the product. However, each of these proposals is essentially the same; Radnor proposes to reduce its contribution per unit by $1 with the expectation that the resulting increase in volume will improve the company's profitability. Each of these proposals has the same effect on Radnor's breakeven point, and each requires the same increase in volume in order for Radnor to earn the same amount of profit it earned in 1964. Although it would be possible for Radnor's management to adopt all three proposals at the same time, management might (appropriately) consider that such a

Exhibit 8

RADNOR CORPORATION

Effect of a Design Change Involving Higher Variable Costs

1. Assumptions: A design modification resulting in substantially higher product quality could be incorporated into the existing model, increasing variable costs by $1 per unit. Better consumer acceptance would result in additional sales of 2,000 units per year.

2. Contribution Analysis:

New contribution per unit of $14 ($40 less $26) times 52,000 units	$728,000
Old contribution per unit of $15 times 50,000 units	750,000
Net decrease in contribution and profit	$(22,000)

3. Breakeven Point Analysis:
   a. Effect on company breakeven point

Total fixed costs (no change)	$600,000	
Contribution per unit ($40 less $26)	$ 14	
Breakeven point $\frac{\$600{,}000 \text{ total}}{\$14 \text{ per unit}}$		42,857 units

   b. Additional volume required to break even on this proposal

Units required to earn $750,000 contribution at $14 per unit $\left(\frac{\$750{,}000}{\$14}\right)$	53,571
Units required to earn $750,000 contribution currently (at $15 each)	50,000
Number of new units required to earn the same profit	3,571 units

radical shift in its cost-price-volume structure would be an undesirable risk. But analysis of the three proposals in a consistent manner might make it much easier for Radnor's management to select the one that was most likely to succeed in terms of realizing the greatest volume increase.

The Cost-Price Relationship

Differences in product design and product costs are frequently passed on to the consumer in the form of price differentials. In fact, the Sears Roebuck and Company catalog is a veritable textbook on the economics of pricing product design differentials. Sears' policy is to offer "good," "better," and "best" items in many of its product categories. The design features of each product are described in great detail so that the careful, rational buyer may select the price-design combination that best suits his needs. It is worthwhile to reflect how difficult it must be for Sears to price these items in such a way as to yield the greatest profit for the company.

Such pricing decisions are really just another exercise in the analysis of cost-price-volume relationships. The Radnor Corporation will serve to illustrate the point. The engineering department has proposed that a new feature be added to Radnor's vacuum cleaner. Research and development necessary to refine the idea into a workable feature and to re-tool the production line will cost $100,000. The modified product (incorporating the feature) will not cost any more to manufacture. Radnor would not be able to patent the idea; thus its management expects that their competitors will also adopt the feaure within a year. The advantage in developing the idea is that during the year before its competitors perfect the same innovation, Radnor's product would be unique; thus the company may (1) either charge a higher price, (2) sell more units, or (3) some combination of the two. Exhibit 9 (page 25) analyzes this proposal with the assumption that this product advantage would be reaped in the form of a small price increase to $41 per unit plus a volume increase to 52,000 units.

Using these assumptions, the proposed new feature does not appear profitable. But knowing the company's fixed and variable cost structure makes it a simple matter to evaluate alternative ways of using this product innovation. For example, Radnor's management might find it useful to try to "price out" the value of this new feature to a consumer. Would the consumer be willing to pay 5 per cent more for a vacuum cleaner incorporating this feature? If so, Radnor could

Exhibit 9

RADNOR CORPORATION

Effect of Adding a New Feature to the Product

1. Assumptions: The engineering department has an idea for a new product feature. It will cost $100,000 to develop the idea and re-tool the production line, but the modified product (incorporating the feature) will not cost any more to manufacture. Competitors will probably copy the feature within a year. During that year a rise in price to $41 per unit and an increase of 2,000 extra units is expected.

2. Contribution Analysis:

With new feature:	
Contribution per unit ($41 less $25) = $16	
Total contribution on 52,000 units	$832,000
Less fixed costs ($600,000 plus $100,000)	700,000
Profit before taxes	$132,000
Without new feature:	
Profit before taxes	150,000
Net decrease in profit	$ 18,000

3. Breakeven Point Analysis:

   a. Effect on company breakeven point

Total fixed costs ($600,000 plus $100,000)	$700,000	
Contribution per unit ($41 less $25)	$16	
Breakeven point $\frac{\$700{,}000 \text{ total}}{\$16 \text{ per unit}}$		43,750 units

   b. Additional volume required to break even on the proposal:

Number of new units required to earn $150,000 $\left(\frac{\$850{,}000 \text{ total}}{\$16 \text{ per unit}}\right)$ =	53,125 units
Number of old units required to earn $150,000 $\left(\frac{\$750{,}000 \text{ total}}{\$15 \text{ per unit}}\right)$ =	50,000 units
	3,125 units

raise its price to $42 and pay for the cost of developing the new feature without requiring any increase in volume. In effect, $42 is a breakeven price for this feature; it is the price that Radnor would have to receive in order to breakeven on the development of the feature without benefiting from any increase in volume. On the other hand, Radnor could hold its price at $40 and attempt to capitalize

on the feature through a substantial volume increase. In any event, the proposal is a risk because the $100,000 for development must be spent against only an expectation that the feature will be sufficiently attractive to consumers to permit Radnor to recover its costs. As in almost every such analysis, the prime value of the figure work is in helping management obtain a better grasp on the profit requirements and risks that the proposal entails.

Summary

Discussion thus far has been restricted to pricing and profitability analyses of proprietary manufactured products, products for which the manufacturer determines the product specifications, marketing methods, and price which he will use in competing against similar products offered by other manufacturers. This discussion is also applicable to certain types of service industries. A retail laundry service, for example, is analogous in many respects to a proprietary manufacturer. Prices for certain high-volume items such as men's dress shirts may be established rather rigidly by local competition. Product (service) differentials may be difficult to achieve, but such factors as the quality of laundering, one-day service, free pickup and delivery, and so forth, may involve cost differentials that can be justified only in terms of the cost-volume relationship. As with a manufacturer, useful profitability analyses for a service activity can be made only after a careful investigation and classification of fixed and variable costs.

Through a series of simple examples, the pervasive importance of the inter-relationship between costs, prices, and volume has been illustrated. Competition for the profitable manufacture and distribution of proprietary products and services takes many forms. The CPA whose client says to him that he "has a pricing problem" cannot accept the client's diagnosis. A CPA can help management to improve product profitability only after a careful analysis of all three factors in the profit equation.

PRICING CUSTOM PRODUCTS AND SPECIAL ORDERS

In contrast to the complex analysis that is almost unavoidable in pricing proprietary products, there is one important class of problems

in which the price of the product is the single most important variable. Competitive bidding is the most common example of this type of pricing problem, but stated in more general terms, price assumes paramount importance in any situation in which the customer specifies the product characteristics (quantity and quality) and the major service requirements (delivery time). This definition is intended to be broad enough to cover not only custom products, such as those produced by machine shops, job printers, and building contractors, but also to include special orders for proprietary products, such as Radnor's opportunity to sell their vacuum cleaners in South Africa, in which the price quoted is the major factor in determining whether or not the order is received.

The determination of product price is more important for custom products than for proprietary products for at least two reasons. First, because custom products are not standardized, management itself must arrive at a new price for each product; prices cannot be set simply by meeting the price offered by competitors for similar products, because the competitor's prices are not known. Second, price is the most important method of competition in the manufacture of custom products; competing by means of extremely effective distribution policies or through product differentiation is impossible because the physical characteristics and service requirements for the product are specified by the customer. Similarly, manufacturing costs of custom products are primarily determined by the customer, not by management. With one element of the cost-price-volume equation thus determined, management's primary tool for influencing profitability is through its manipulation of the price-volume relationship.

Another important characteristic of pricing custom products is the frequency with which such decisions must be made. A small machine shop or job printer, for example, may find it necessary to prepare a dozen or more price quotations every day, and the sheer volume of work precludes the possibility of making a detailed analysis before reaching each decision. Instead, pricing policies, or bidding formulas, are established as a way of routinizing the task of determination. The discussion below, therefore, is divided into two parts. The first part deals with the type of analysis that would be theoretically appropriate for the determination of optimal prices for custom products, and the second part deals with the practical problems of establishing pricing policies which may be used to arrive at individual pricing decisions with a minimum amount of analysis.

Competitive Bids

In order to illustrate theoretically the proper way to determine a competitive bid, a simple example of a small, job-order machine shop will be utilized. The Robinson Company employs half a dozen machinists who use general-purpose equipment to turn out small metal parts according to customer specifications. A potential customer has asked Robinson to quote a price for manufacturing 30 steel pipe-fittings of a unique design, as specified by the blueprint submitted. What price should Robinson quote?

Contribution pricing. It is a fairly simple matter to determine the minimum price that Robinson should charge for this order: The price must exceed the variable costs that would be incurred in manufacturing the parts. Thus, as in most types of pricing decisions, the first step involves cost analysis. By examining the blueprint, Mr. Robinson determines that the fittings will require $10.25 worth of raw materials and that the machining will take about 1½ hours. The wage rate (including payroll taxes) for the machinist is $2.50 per hour, indicating a total labor cost of $3.75 and a total variable cost for labor and materials of $14 per unit. Frequently, labor costs are relatively fixed expenses because of the difficulty of hiring and firing skilled workers, but in Mr. Robinson's case one of his machinists is employed on a part-time basis as needed.

As in the case of the Radnor Corporation's South African order, it is easy to prove that at any price exceeding $14 the Robinson Company would be better off (more profitable) with this order than without it, if the capacity could not be used more profitably on other jobs. A price of $15, for example, would contribute $1 to overhead and profit that the company would not otherwise receive. But it is also obvious that Robinson would be better off having this order at a price of $16 than at $15. The question that Mr. Robinson must answer is not, "What is the minimum price?" but rather, "What is the most profitable price to charge?" While this latter question is very difficult to answer, it is unfortunately true that finding an answer to the first, easier question is not very helpful. In the Robinson Company, as in most companies, variable costs are usually substantially lower than selling prices. While variable costs are important, they are only one element in the determination of a profitable price.

The price-volume relationship. What is the most profitable price for Robinson to quote on this order? The answer, of course, is the highest possible price (above $14) that would still be successful in getting the order. A $30 price would be much more profitable than a $20 price, but Mr. Robinson knows that one of his competitors would almost surely bid less than $30. Thus a price quotation of $30 would yield no profit at all because Mr. Robinson would lose the order. In theory, nevertheless, the solution to Mr. Robinson's complex problem is quite analogous to the solution found earlier for the manufacture of a proprietary product: The most profitable price is the price that yields the largest total contribution to overhead and profit. For the *proprietary* manufacturer, this means setting a price at which the contribution per unit times the number of units that can be sold at that price yields a larger total contribution than any other combination of contribution and volume. For the manufacturer of a custom product like the Robinson Company, the best price is that price at which the contribution per order received times the number of orders received yields more total dollars of contribution than any other combination of contribution and volume. The important distinction between these two types of manufacturers is that the price-volume relationship is much more explicit for standardized products. The proprietary manufacturer who raises his price by 3 per cent may see his volume fall by 5 per cent, but the custom product manufacturer who raises his price by 3 per cent will either win the order at a more profitable price or lose it completely. Analyzing the effect of the price-volume relationship for a custom producer, therefore, requires the utilization of the analytical technique described below.

The concept of expected profit. One way of developing the price-volume relationship on custom orders is to make explicit estimates of the likelihood of winning the order at any given price. For example, Mr. Robinson might believe that he is "almost certain" to receive the order for the steel fittings if he quotes a price of $16. If the Robinson Company wins the order at a price of $16, it will earn a contribution of $2; if it loses the order, it will earn no contribution. In Exhibit 10 (page 30) we have taken a weighted average of these two possibilities on the assumption that there is a 95 per cent chance that the $16 price would be successful.

Exhibit 10

ROBINSON COMPANY

Evaluation of $16.00 Bid

Event	Probability of Event	Contribution at a $16 Price	Expected Profit
Win the order	.95	$2.00	$1.90
Lose the order	.05	0	0
Totals	1.00		$1.90

The "expected profit" of $1.90 at this price is not very meaningful by itself, but it assumes added meaning when that profit is compared with the profit expected at higher prices. Mr. Robinson knows that, as he raises his price, the chances of his getting the order decline. The CPA might ask Robinson to be explicit about what he thought his chances would be at a variety of higher prices. Exhibit 11 then permits a profit comparison of the alternative bids.

Exhibit 11

ROBINSON COMPANY

Evaluation of Alternative Bids

Price	Probability of Getting the Order	Contribution	Expected Profit
$16.00	.95	$2.00	$1.90
17.00	.75	3.00	2.25
18.00	.60	4.00	2.40
19.00	.50	5.00	2.50
20.00	.40	6.00	2.40
21.00	.30	7.00	2.10
22.00	.20	8.00	1.60

What is the most profitable price for Mr. Robinson to quote on this order? The answer, according to Exhibit 11, is $19.00. The reason that $19.00 is a more profitable price than any other is that it offers the best *combination* of (1) profit if the order is received, and (2) likelihood that the order will be received. A $20.00 price would be more profitable than an $18.00 price, but there is less chance that Robinson will receive the order at that price; the chances of receiving the order at an $18.00 price are greater than receiving it at a $20.00 price but Robinson would not earn as much profit at the $18.00 price. The

price-volume relationship is an important profit determinant, and the analysis in Exhibit 11 is an attempt to measure the profit implications of this interrelationship.

At this point it might be pointed out that, even though Exhibit 11 is designed to deal with the price-volume relationship, the result of this analysis is importantly determined by product costs. The best price was the one that yielded the largest expected contribution, not the largest expected revenue. Thus, if the variable costs on this order were $15.50 rather than $14.00 (*and* assuming that Mr. Robinson's probability estimates were not changed by this fact), the most profitable price would be $20.00 rather than $19.00.

The use of mathematical probabilities as an aid to business decision making has received increasing attention in recent years. The reader who wishes to pursue the matter further might begin with *Probability and Statistics for Business Decisions* by Schlaifer listed in the bibliography. Two further observations, however, are made here:

1. It is difficult, if not impossible, to obtain "accurate" probability estimates that can be used for analytical purposes in the manner shown in Exhibit 11. Likewise, it is also impossible to obtain accurate data on the price-volume relationship for proprietary products. Nevertheless, management must make pricing decisions. Subjective probability estimates, based on management's judgment and experience rather than on historical "facts," are just as useful for analytical purposes as similar subjective estimates of the quantity of a proprietary product that can be sold at various prices. Making such subjective, unprovable estimates is an inevitable part of managerial decisions.

2. The great advantage in making explicit estimates, either about the probability of receiving an order or of the quantity that will be sold at a given price, is the improvement that such estimates permit in the analysis and evaluation of alternative pricing actions. In the simple example of the Robinson Company, Mr. Robinson might have arrived at a $19.00 price without going through the analysis shown in Exhibit 11, but in more complex situations, and particularly in situations where the analysis of variable costs is complex, intuitive decision making may be dangerous. The two-step decision process in which management first estimates demand (or the probability of demand), and then combines this estimate with the other economic factors in order to evaluate the profitability of alternative pricing actions may be more useful than the familiar intuitive approach.

Pricing Policies

The analytical technique illustrated above, while theoretically appropriate, is too complex and detailed to be used for routine pricing decisions. Instead, the usual approach is to develop a pricing formula to calculate prices, with management occasionally intervening to change the calculated price based on its experience and judgment. In businesses where a large number of price quotations must be prepared, management's most important pricing action is not the determination of individual prices but the determination of the formula by which prices are computed.

Most pricing formulas for custom products involve an attempt to measure the total cost of manufacturing the order and add a desired mark-up for profit in order to arrive at a selling price. For example, the pricing formula for the Robinson Company might look something like the following:

Materials	$10.25
Labor: 1½ hrs. @ $2.50	3.75
Variable costs	$14.00
Overhead @ 100% of labor	3.75
Total costs	$17.75
Profit @ 7% of total costs	1.25
Selling price	$19.00

Pricing formulas involving an allocation of fixed costs to a specific order are commonly known as full-cost pricing formulas. The argument most frequently offered in defense of such formulas is that "each order must bear its share of the fixed overhead in order to recover overhead costs and earn a profit." This argument is fallacious because total fixed costs will not change as a result of volume fluctuations. However, contribution pricing (using variable costs alone) is also inadequate for pricing most custom products. The rationale for full-cost pricing, therefore, is not that it will in some magical way insure that the business covers its fixed costs, but rather that it is an extremely practical tool for arriving at a *competitive* price quotation.

Suppose Mr. Robinson were bidding against only one competitor. If he knew what the competitor's bid was, it would be very easy for Robinson to establish his own quote. Assuming a customer would place an order with the lower bidder, Robinson should bid one cent

lower than his competitor, and would have a 100 per cent chance of receiving the order. That price would yield the highest "expected profit" and Mr. Robinson would not need to make any elaborate calculations to reach this conclusion. However, the competitor's price quotation is not usually known, and a full-cost pricing formula may yield a reasonable approximation of the competitor's bid.

The logical defense of full-cost pricing is based on the premise that, over the long run in a free enterprise economy, an efficient producer is able to make a reasonable profit by charging a price high enough to more than cover his fixed and variable costs. When a producer uses a full-cost pricing formula, therefore, he is implicitly assuming two things: (1) that times are "normal," that is, that there is neither a shortage nor a surplus of capacity in his industry which might have a short-run impact on profits, and (2) that his productive efficiency is equal to that of his average competitor. The validity of both of these assumptions may be subject to frequent and rapid revision, but when they are valid, and when fixed costs are appropriately allocated to products, a full cost formula will be sufficiently successful to win enough orders at a competitive price to permit the producer to earn a reasonable profit.

The following theoretical base on which full-cost pricing rests permits a recognition of several key factors that must be kept in mind in an attempt to develop useful and practical pricing formulas:

1. Information about the industry. Because competitive pricing cannot be done in a vacuum, it is important for management, as well as its advisors, to have solid, current information about the industrial environment in which the company is operating. Several types of industry data are necessary before a practical, competitive pricing formula can be designed. Management must be aware of current economic conditions, for both the national economy and their particular industry, nationally and locally, including such data as current prices and price trends, the existence of excess capacity in the industry, and the current state and rate of technological change in the industry. Using this information, management must decide whether or not the current, short-term economic situation requires the (temporary) modification of its full-cost pricing formula. Data about the industry will also permit management to evaluate its own productive efficiency against that of its competitors; an inefficient producer will not be able to charge a higher price simply because he needs it in order to cover

his greater costs.[4] Finally, through trade associations in some industries, it may be possible to obtain information about competitors' prices and their pricing formulas. When such information can be obtained, it may prove invaluable to a company trying to revise its own pricing formula to reflect the current situation.

2. Selecting bases for allocation. One of the requirements of a full-cost pricing formula is that the fixed overhead be assigned to products using one or more bases of allocation. Realizing that one of the main purposes of allocating fixed costs is to aid in the determination of a competitive price may make it easier to select the most appropriate bases for allocation. Essentially, the goal of cost allocation is to load against each product an appropriate share of the fixed costs of the capacity that an efficient producer would have to incur in the long-run to manufacture a product. Machine operating hours, for example, are frequently a good basis for allocating the costs of the equipment and related plant facilities. Another way of viewing the allocation process is as a crude measure of the opportunity costs of devoting the plant capacity to the manufacture of a particular product. This does not represent an attempt to achieve a "fair" allocation of a particular company's historical costs, but rather to estimate what the costs would be for the average efficient producer in an industry. The cost allocation task is easier in industries where a fairly traditional pricing pattern has developed. Where an industry pricing formula is available, it should be adopted without regard to the company's own level of fixed costs, because a pricing formula leading to any other price would probably be too high or too low. When no industry pattern is available, each company must do its best to measure long-run production costs through the cost allocation device, although chaos sometimes results.[5]

3. The volume assumption. Allocating fixed costs requires not only the selection of a basis of allocation but also an assumption regarding the volume of production over which the costs are to be spread. The appropriate volume assumption to use provides a clear example of the

[4] For an interesting article on this subject see Robert S. Schultz, "Profits, Prices, and Excess Capacity," *Harvard Business Review*, July-August 1963, pp. 68-81.

[5] For a readable article on this point, see Louis E. Newman, "Diseases that Make Whole Industries Sick," *Harvard Business Review*, March-April 1961, pp. 87-92.

dangers of using historical or actual information about a specific company rather than information based on the current competitive situation. If, for example, a company expects that worsening competitive conditions will cause its volume to drop within the next few months to only 50 per cent of its capacity, that prediction does not mean that the company should attempt to allocate its fixed costs over a smaller volume base in an attempt to cover those costs at the lower volume. Such an action would only increase the prices that the company was attempting to charge during a period when prices will probably be dropping. Similarly, in a period of expansion, the fact that a company is operating at 100 per cent capacity does not mean that lower prices should be charged simply because the fixed costs can be spread over more units; if anything, prices should probably be raised during such a period. The result is that the actual volume currently or prospectively enjoyed by a company should not be built into its pricing formula. Instead, the formula should be based on some estimate of normal or standard volume which represents the approximate utilization of capacity that an average efficient producer could expect to achieve in the long run. This concept of standard volume, which would normally be between 75 per cent and 95 per cent of capacity, will rarely be appropriate for the economic circumstances that exist on any one date, but it is probably the best figure that is available. Clearly, trying to change the volume assumption to reflect current economic circumstances only causes the pricing formula to produce results (prices) that move in the wrong direction.

4. Adaptation to changing circumstances. The most important aspect of pricing formulas is that they are made to be changed. The measure of the success of a pricing formula is whether it works or not, i.e., whether or not the company is successful in receiving a volume of business which, in the eyes of management, is appropriate under the economic circumstances that exist at a given point in time. If the formula is not successful when measured by these standards, it should be changed. Perhaps the best, and certainly the easiest, way to modify a pricing formula is in terms of the profit allowance that is added to the total costs. The profit allowance can be easily raised or lowered, and has the effect of an across-the-board price reduction or increase, with the amount of the change reflecting the current economic situation. Recognizing this need for continually reevaluating the success of a pricing formula returns to the first point mentioned above: management's continuing quest for information about its industry.

Pricing formulas are imperfect tools at best, but when carefully developed by well informed management they can be vital tools for increasing profits. The CPA can be useful to management in developing pricing formulas for custom products in three ways: (1) gathering industry and other environmental data in order to assist management in adapting its pricing formula to the current situation, (2) analyzing product costs and devising useful ways for allocating fixed costs at an appropriate volume level against products, and (3) developing reporting systems to aid management in keeping informed about the success of its pricing mechanism, thus helping management to anticipate the inevitable need for modifications.

Summary

Traditionally, management actions in the area of pricing and distribution policies have been made on the basis of judgment and intuition. One of the greatest services the CPA can perform for his client is to increase the extent and quality of analysis that is brought to bear on such decisions. Analysis cannot eliminate uncertainty about the future, nor is it possible to eliminate the crucial factor of management judgment in making decisions. Nevertheless, it is possible to take some of the guess work out of decision making by breaking complex problems into smaller pieces. Most pricing problems are complex and involve two distinct phases: (1) estimating the effect that a change in product price and/or product cost will have upon the quantity of the product that the company will be able to sell, and (2) calculating the effect that this realignment of the company's cost-price-volume structure will have on its profits. Using this two-step approach to decision making should be both professionally rewarding to the CPA and financially profitable for his client.

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7. WRIGHT, WILMER, *Direct Standard Costs for Decision Making and Control.* McGraw-Hill, New York, 1962. A down-to-earth and readable book. Concerning the topic of this bulletin, see especially Chapter 11, "Product Pricing with Direct Costs," pp. 174-193.

LIST OF CASES

The remainder of this bulletin consists of four case studies. The cases are arranged roughly in order of increasing complexity in terms of the amount of analysis required by the reader using the cases for staff training purposes.

1. *Utility Equipment Company.* Pricing a special order for a proprietary product.
2. *Bartlett Lithographers.* Evaluating alternative prices, through modifying the bidding formula, for a job order printing company.
3. *Greenville Seaplane Service, Inc.* Pricing problems in a service organization with a high proportion of fixed costs.
4. *Industrial Heating Equipment Co.* Designing a control system to aid management in evaluating and changing its pricing policies.

Utility Equipment Co.

On March 1, 1962, Fred Hosmer, the President of Utility Equipment Co., a private owned manufacturer of pumps and hoists, received the following letter from National Paint Products, a large distributor of industrial paints.

Dear Mr. Hosmer,

From time to time over the last ten years, National Paint Products has offered valuable and useful items to its customers in the form of sales premiums. For instance, last year we gave a set of wrenches to each customer placing an order for over $100 worth of paint during the months of June and July. These promotions have been enthusiastically received by our customers.

It is our intention to offer another sales premium to our customers during November and December of this year. For this purpose we have selected three items ranging in wholesale price from $8 to $12 which might be suitable for this forthcoming sales promotion. Included among these items, only one of which can be selected as the premium, is your pump.

If you would like us to consider your pump for the premium would you please submit to us, by April 1, a firm price per pump. This price should include the costs of shipping the pumps from your plant to our customers, the vast majority of whom are located in the Midwest.

Should we adopt your pump as our premium, we would advertise it as a premium in those magazines which regularly carry our advertisements. You would be named as the pump's manufacturer. Also, the value of the premium that would be displayed in these advertisements would be your regular listed retail price.

Our sales department's research staff has estimated that the most likely demand for your pumps would be 10,000 units. Therefore, if your pump was selected as the premium, we would guarantee to purchase 8,000 pumps for delivery to our customers during Novembe and December. For your part, you would have to guarantee that these 8,000 pumps would be completed by November 1 and

that an additional 4,000 pumps could be provided, if needed, during the months of December and January. For any additional pumps we might need, beyond this initial 12,000, you would be given two months lead time.

It is not our policy to divulge the names of the other items being considered as premiums for our sales promotion. Nor is it our policy to reveal the prices paid for past premiums. However, should you require any other information before submitting a quote to us please feel free to contact Mr. Alvin Cresm of our Wichita sales office.

Yours faithfully,

Harold Sykes
President

After reading National Paint's letter, Mr. Hosmer believed he might be interested in National Paint's proposition but he was in a quandry as to what price he should quote.

On March 2, Fred Hosmer phoned Peter Jenkins, a partner of Smith, Adams, and Jenkins, a local firm of certified public accountants who prepared Utility Equipment's tax returns. Hosmer read the National Paint letter to Jenkins and then asked if he would be willing to help him arrive at a firm price to quote to National Paint. Jenkins said that he thought his firm might be able to offer some assistance and agreed to visit Hosmer at the Utility plant the next day to discuss the matter.

Smith, Adams, and Jenkins

Smith, Adams, and Jenkins was a firm of certified public accountants located in Wichita, Kansas. The firm consisted of three partners, Albert Smith, Nick Adams, and Peter Jenkins, assisted by eight staff men and three clerks. During 1961, the firm's gross billings had been over $250,000. Of this total, about $40,000 had come from management services work, most of which had been done for small manufacturing companies located throughout Kansas. The firm did not have a separate management services department. Each partner directed any management services work performed for his own clients, and drew on the firm's group of staff men for any assistance required. This policy had been adopted because of the firm's small size. It was hoped that this policy would give all members of the firm an exposure to management services engagements in addition to their regular audit and tax duties, thus increasing their awareness of the potential services the firm could perform for its clients.

In preparing for his meeting with Hosmer on March 3, Jenkins reviewed the office file on the Utility Equipment Company and spent some time discussing the account with Alexander Ryan, the staff man that had prepared Utility Equipment's tax returns for the past three years. The tax return for 1961 had been completed only a couple of weeks before, and Jenkins knew that it had been prepared from data provided by the client. The 1961 Income Statement and year-end Balance Sheet as provided by Utility Equipment Co. are shown in Exhibits 1 and 2 (pages 45 and 46). Mr. Hosmer had never requested an audit of his accounts by Smith, Adams, and Jenkins, and Ryan told Jenkins that Utility's "minimal sort of an accounting system" was maintained by a part-time bookkeeper. Ryan's brief review of Utility's books, as he collected the data needed for the tax return, had satisfied him that the records were adequate for tax reporting purposes, but he told Jenkins that he didn't think the accounting data would be of much help in making an important management decision. Jenkins, too, realized the limited value of Utility's current system, and wondered if Hosmer's call might be a tangible symptom of a more fundamental problem.

Jenkins' First Meeting with Hosmer

At his meeting with Hosmer the next day, Jenkins started off by suggesting that Hosmer give him a brief review of Utility Equipment Co., its products, its personnel, and its method of operations. Although the office file had contained an up-to-date series of notes about the company, these did not go into any great detail, and Jenkins wanted to hear Hosmer's own description of the context in which he saw his problem.

Utility Equipment Co.

Utility Equipment Co. was owned by the families of Fred Hosmer and his two brothers who together formed the company's management group. The firm, which had been founded in Wichita in 1920, manufactured pumps, hoists, pulleys, and blocks. Each of these items was offered in one style only. Pumps and hoists together accounted for over 95 per cent of the company's sales volume.

Since its founding, Utility Equipment had sold its products to farmers throughout the Midwest. Distribution of the products was achieved through two channels: (1) a sales agency organization which used door-to-door salesmen calling directly on farmers, and (2) cata-

log sales companies that specialized in the farm market. Sales made through the door-to-door agencies were shipped directly to the customer from Utility's plant; the catalog companies purchased in larger lots and filled orders from their own warehouses. Utility had more than a dozen small catalog sales companies as customers, but had been unsuccessful in getting any large national catalog company to stock its line.

Utility Equipment employed no regular salesmen, although Mr. Hosmer made it a practice to try to visit each of his major customers in both categories once a year. Nevertheless, to facilitate the sales of its products to the ultimate user, Utility Equipment regularly placed advertisements in farm journals. The company had made no effort to have its products stocked by retail hardware stores or farm supply stores. As for the future, Hosmer said he had no plans to expand the market for his products beyond the farm group. According to Hosmer, he "knew the farm market and had a good sales set up; to go after any other market would be too much trouble."

Utility Equipment's pump was a simple portable hand pump. In all, during 1961, Utility had sold approximately 20,000 of these pumps at an average selling price of $12.60. The wholesale list price to door-to-door sales agencies was $12.75; sales to catalog companies on all orders for 10 or more units were subject to a quantity discount of 20 cents per unit. No cash discounts were given. The $12.75 price, Hosmer believed, was in line with the wholesale prices for similar pumps offered by Utility's competitors.

Jenkins learned that the company employed about 20 persons, all of whom worked in the company's one-floor plant. The total area of the plant was 16,000 square feet, of which about 70 per cent was devoted to manufacturing and storage. The rest of the building was used for office space, and was occupied by the administrative group who divided their time equally between the two major product lines, pumps and hoists.

As for the National Paint offer, Hosmer told Jenkins that he believed he could meet the production schedule outlined in the National Paint letter. However, since it was anticipated that Utility Equipment's one-shift pump production capacity would be tied up well into 1963 producing for regular customers, a second shift would be necessary to meet the promotion's needs. Consequently, a second foreman would have to be hired as well as some part-time factory help. Finding skilled part-time help would not be difficult, Hosmer said, as many of the local farmers had previously worked for him and their productivity

after several days on the job was usually as high as his regular help. Hosmer thought he would have no problem hiring farmers, even during the late summer, to work on a second shift basis. All second-shift factory help would be paid the same hourly rate as the regular employees.

When questioned by Jenkins about the availability of reliable cost data, Hosmer replied that neither he nor his brothers "have any time for figures, except for tax purposes. My oldest brother, who died in 1959, used to pay quite a bit of attention to such things, and a year or two before he died he set up some kind of a standard cost system. I imagine we're still using it, because I haven't bothered to change it, but the only thing I pay any attention to is the over-all profit figure for the company."

In response to Hosmer's statement, Jenkins observed that the absence of useful, detailed, and current cost data would make it much more difficult to arrive at a price to quote on the National Paint contract. Jenkins suggested, however, that they defer a further discussion of the costing problem until they had explored, in general terms at least, the desirability of bidding for the National Paint order.

Jenkins explained that he was thinking of what might be called the "marketing implications" of the potential new business. Both Jenkins and Hosmer agreed that a National Paint promotion involving a Utility Equipment pump would have little, if any, impact on Utility's primary, agricultural market. This belief was based on the following considerations:

1. National Paint's promotion campaign would be limited primarily to industrial concerns.

2. All of the advertising carrying the premium offer would be in the trade journals which few farmers were likely to read.

3. The premium offer price to National Paint would have no impact on Utility's price structure since the value of the pump displayed in the premium advertisements would be Utility's list price.

Jenkins did raise two points which Hosmer agreed should be investigated or thought about further: (1) Jenkins did not believe that there were any Robinson-Patman problems in connection with this proposed reduced pricing but he suggested that Hosmer should check the point with his lawyer, and (2) the fact that National Paint thought that Utility's pump might make a good premium—with an expected volume equal to half of Utility's current annual volume—might indicate that

the industrial market for the pump was important enough for Hosmer to reconsider his marketing policy of selling exclusively to the farm market. The two men agreed, however, that even if Utility subsequently decided to enter the industrial market, taking part in National's promotion would not restrict the effectiveness of Utility's future marketing efforts.

As the discussion about marketing drew to a close, Jenkins asked if the company's bookkeeper was working that day, and said that before leaving he would like to spend some time with her to investigate the operation of the cost system that Hosmer's late brother had established. He arranged to meet with Hosmer the following day to make a proposal to carry out the work he thought was needed to help Hosmer solve his problems.

In the hour that he spent discussing the record-keeping system with the bookkeeper, Jenkins learned that a simple standard cost system was in use. By reviewing the general ledger and related workpapers, Jenkins found that (1) standard costs per unit for labor and for materials on each of the company's four products had been established in 1958, (2) cost variances against standard had been increasing each year, amounting to about 18 per cent in 1961, apparently because the standards had not been changed to reflect increases in materials prices and wage rates, and (3) the system was a "direct cost" system, in that factory overhead was not formally allocated to product lines. Inquiring into the availability of supporting detail, Jenkins also discovered that informal records were maintained by product line which would permit a breakdown of sales revenue, materials, labor, selling expenses, and postage and freight. The bookkeeper summarized these breakdowns as shown in Exhibit 3 (page 47).

Questions

1. Is Jenkins in possession of sufficient facts to make a proposal? If not, what further facts does he need for this purpose, and how would you suggest that he obtain them?

2. What form should the analysis of Mr. Hosmer's problem take? What proposal should Jenkins make?

3. In the light of your views as to the proposal to be made, what further information would you require to complete your analysis? What analytical steps would you follow in your work?

4. Should Jenkins plan to prepare a lengthy written report for Hosmer? If not, what should he do at the termination of the project?

Exhibit 1

UTILITY EQUIPMENT COMPANY

Statement of Income
For the Year Ended December 31, 1961

Gross sales	$417,247
Less: returns and allowances	2,966
Net sales	$414,281
Cost of goods sold:	
Materials	$168,514
Labor	45,275
Burden	
Factory supplies	8,043
Fuel, water, heat, etc.	1,673
Taxes—property	4,130
Insurance—property	3,803
Repairs—property	267
Depreciation—building	1,000
Depreciation—machinery	382
Foreman	6,813
Total cost of goods sold	$239,900
Gross profit	$174,381
Selling expense	
Bad debts	$ 184
Direct mail	7,325
Advertising	28,392
Printing and mailing	3,505
Postage	12,032
Total selling	$ 51,438
General and administrative expense	
Management salaries	$ 35,300
Administrative salaries	15,673
Stationery and supplies	1,161
Postage	8,539
Freight and express	6,006
Travel expense	152
Auto expense	477
Depreciation—auto	747
Depreciation—furniture	1,369
Telephone	610
Accounting and legal	600
Entertainment	2,459
Total general and administrative	$ 73,093
Income from operations	$ 49,850
Less corporate taxes	23,000
Net profit	$26,850
Less dividends	25,000
Increase in retained earnings	$ 1,850

Source: Smith, Adams and Jenkins file; prepared by Utility Equipment Company

Exhibit 2

UTILITY EQUIPMENT COMPANY

Balance Sheet

December 31, 1961

Assets

Current Assets		
Cash		$14,976
Accounts receivable		25,111
Inventories		18,618
Total current assets		$58,705
Property, Plant and Equipment		
Building	$36,123	
Less allowance for depreciation	29,123	7,000
Equipment	$15,675	
Less allowance for depreciation	10,118	5,557
Other Assets		
Loans to employees		3,900
Various other assets		8,038
Total assets		$83,200

Liabilities and Stockholders Equity

Current Liabilities	
Accounts payable	$22,909
Notes payable	5,000
Accrued wages	1,086
Total current liabilities	$28,995
Stockholders equity	
Capital stock	30,000
Retained earnings	24,205
Total liabilities and stockholders equity	$83,200

Source: Smith, Adams and Jenkins files; prepared by Utility Equipment Company

Establishing Objectives for the Engagement

Returning to Mr. Hosmer's office the next day, Jenkins remarked that he was sure that he could help Mr. Hosmer. He said he had spent several hours considering the problem on the previous day, after returning to his office, and was now ready to discuss an outline of the work he felt should be done.

Jenkins said that he saw Hosmer's original question on what price to bid as being split into two parts: (a) What would be the lowest acceptable price, and (b) how much higher, if any, should Utility

Exhibit 3

UTILITY EQUIPMENT COMPANY

Revenue and Expense Analysis—1961

	Total	Pump	Hoist	Pulley	Block
Gross sales:	$417,247	$252,788	$145,650	$3,454	$7,651
Less: returns and allowances	2,966	714	2,235	17	—
Net sales	$414,281	$252,074	$143,415	$3,437	$7,651
Materials—actual	$168,514	n.a.	n.a.	n.a.	n.a.
Standard costs	142,270	$ 98,652	$ 38,282	$1,678	$3,658
Excess	$ 26,244				
Labor—actual	$45,275	n.a.	n.a.	n.a.	n.a.
Standard costs	38,441	$ 22,234	$ 14,753	$ 409	$1,045
Excess	$ 6,834				
Selling expense:					
Bad debts	$ 184	—	$ 184	—	—
Direct mail	7,325	$ 1,268	6,057	—	—
Advertising	28,392	12,426	15,966	—	—
Printing and mailing	3,505	247	3,258	—	—
Postage	12,032	1,368	10,664	—	—
	$ 51,438	$ 15,309	$ 36,128		
General and Administrative Expenses:					
Postage	$ 8,539	$ 3,416	$ 5,123	—	—
Freight and Express	6,006	4,390	1,418	$ 60	$ 138

Equipment Co. bid? Jenkins explained that the lowest acceptable price in his opinion was a price which would both cover costs and provide a "satisfactory" profit, the latter being a quantity that Hosmer himself would have to determine. However, Jenkins said that in addition to price there were other related areas that needed analysis, which he would propose to do along with his pricing analysis. These areas were production scheduling and working capital requirements, both of which were significant because the size of the potential order was very large in relation to Utility Equipment Co.'s present pump output—40 per cent to 60 per cent of the 1961 unit volume.

Jenkins pointed out that good cost information was essential in determining the minimum price, since the actual costs to be covered were a part of the price. His questions to Hosmer and the company's bookkeeper on the previous day had brought out that the company possessed no data that could readily be used for this purpose. He proposed, therefore, to undertake a study of all the elements of cost

that would enter into the production of the pumps for National Paint. The specific purpose would be to determine the production cost (per unit) of an additional 8,000-12,000 units, but the study would necessarily cover many of the costs associated with the present (continuing) production volume. Jenkins assured Hosmer that this type of cost investigation was not a major undertaking. Alexander Ryan, Jenkins' staff man who had worked on Utility Equipment's tax returns, would be brought in to carry out the actual investigation; Ryan would have to have an hour or two of Hosmer's time, and probably two or three times as much of the bookkeeper's time, to answer questions and assist in locating and refining data, respectively.

Jenkins said that he himself would of course also work on the project. Once Ryan had finished his cost investigation Jenkins would take over and work on the pricing question. On the latter he would need to consult with Hosmer later in order to translate the latter's thinking into quantitative terms. Essentially this discussion would amount to an informal verbal report (which Jenkins felt would be appropriate because of Hosmer's stated dislike of figures), but Jenkins said that he would in any event follow up with a brief letter summarizing his findings and opinions.

In terms of time Jenkins estimated that Ryan would require no more than three days, and he himself no more than two. He told Hosmer that his billing rate on management services work was $25 per hour, and Ryan's, $15. There was little doubt that the job could be completed within the proposed time, unless Ryan's investigation turned up results requiring extended work, which would be known within a day or two of the beginning of the project. Jenkins concluded his presentation by saying that if Hosmer approved the proposal, work could be begun at the beginning of the coming week.

Hosmer accepted the proposal, stating that he knew a successful bid would pay for the cost, and that even an unsuccessful bid would not mean consulting fees wasted, in that Jenkins would have looked into the areas of the company's operations that probably needed some study in any event, particularly cost standards.

Ryan's Investigation

On the following Monday, Alexander Ryan arrived at Utility Equipment's offices to begin his investigation. His objective, as Peter Jenkins had expressed it to him, was to "survey the pump line's costs and specifically establish the costs that would be incurred in producing

the 8,000-12,000 units called for by the potential contract with National Paint."

Ryan's first move was to see Mr. Hosmer, as he needed some facts about the pump manufacturing operation. In answer to Ryan's questions, Hosmer provided the following information:

1. During 1961, pump (and all other) production had been on a single shift, all year. There had been no significant variations in monthly pump production, which was to all intents and purposes as close to single shift capacity as was practicable.

2. The company's manufacturing labor force totaled eleven men, including two men engaged in packaging the finished units, and excluding the foreman. Five men worked on the pump line more or less full time, although there was some interchanging of manpower allocations between lines from time to time.

3. As previously mentioned to Jenkins, production of pumps for the National Paint order would take place on a second shift, for which additional labor would be engaged, at the same hourly rate as first shift employees.

In response to another question Hosmer indicated that his late brother, Herbert, who had prepared the material and labor standards in 1958, had maintained files with his notes and working papers relative to the standards. These files had been kept after Herbert's death, and Hosmer turned these over to Ryan with the remark that he hoped they made some sense to him.

Before proceeding any further Ryan noted that his problem was in a sense simplified by the fact that all he was concerned with was the cost of operating a second shift. Since pump production in 1961 was approximately 1667 units per month (20,000 ÷ 12) Ryan decided to assume that second shift production would be 1,600 units per month, and that production would have to start on June 1 if 8,000 units were to be ready by November 1 as required by National Paint. Continued production at the same rate through mid-January would provide the additional 4,000 units that could be called for in December and January. (Ryan noted that he should suggest that Jenkins point out to Hosmer that second shift production beyond November 1 would essentially be speculative, at least until December when National Paint could request further deliveries.) If they did not, Hosmer would have additional inventory on his hands which would have to be disposed of

either by increasing sales through present outlets, finding new markets, or allowing the first shift production rate to slow down below the regular sales rate.

Ryan then reviewed the late Herbert Hosmer's files. He was pleased to find that the 1958 standards had been based on detailed studies that Herbert had made of production time and labor productivity and detailed bills of materials. After familiarizing himself with what Herbert Hosmer had done, Ryan next spent several hours with the production foreman. He later reported to Peter Jenkins as follows:

"I decided to start with the assumption that Herbert's basic calculations were correct, and only needed updating for variables that had changed. If this were so, I would save a great deal of time that would otherwise have been required to go into basic detail. A full check on this approach would be whether revised standards calculated for all product lines accounted adequately for actual material and labor costs in 1961. I did not in fact make this check since I restricted myself to pump standards only, which I am satisfied are now very much more accurate. I did not think that our client would wish us to revise material and labor standards for the other lines at this time, although I believe that it would be in his interest if this were done, perhaps after this engagement is completed." (Jenkins nodded his concurrence, and Ryan continued.) "I established the following facts from my discussion with the foreman.

"1. There has only been one minor design change in the pump since 1958. This simplified the manufacturing process somewhat, and reduced process time by perhaps 2 per cent and material content by 3 per cent.

"2. Subject only to the 2 per cent I have just mentioned, there have been no changes in the manufacturing procedures from those noted by Herbert Hosmer. The foreman wrote down his estimate of the time presently required for each step in the manufacturing process as listed by Herbert, and came up with a total of 39 minutes of labor per unit, including 8 minutes for packaging, compared to 41 in 1958. Allowing for the 2 per cent design change (0.82 minutes) this meant that productivity had increased by 1.18 minutes (41-39-0.82), or 2.8 per cent, which the foreman said seemed reasonable to him. On the basis of these estimates I computed that second shift production of 1,600 units per month would require 827 hours of manufacturing labor and 213 hours of packaging labor. Since we are dealing with a completely new second shift, we have to talk in terms of whole men;

on the basis of a 40 hour work-week and a 4⅓ week month, an employee works 173 hours per month, so Utility Equipment will need five manufacturing labor employees (865 hours) and two packaging labor employees (346 hours). This allows an excess of 4 per cent in manufacturing labor hours and 61 per cent in packaging labor hours. I think that Utility Equipment ought to be conservative and expect less efficiency or productivity on the second shift, but the appropriate figure is undoubtedly higher than 4 per cent and less than 61 per cent. On a total basis, 1,040 hours per month are required and 1,211 will be provided by seven men, or an excess of 16 per cent. This is probably more than enough, provided that one of the men on packaging can be assigned to manufacturing for part of the time. In essence, what I am saying is that the second shift will require seven men: five manufacturing, one packaging, and one floating to fill in where required.

"As far as material usage is concerned, the foreman reviewed Herbert Hosmer's calculations and stated that the only change that needed to be made was the 3 per cent adjustment for the design change which I have already referred to. He specifically stated that Herbert's scrap and spoilage allowance of 5 per cent was still a fair estimate."

[Ryan next worked with Utility Equipment's bookkeeper to investigate relevant costs. The next portion of his report to Jenkins ran as follows.]

"My first line of inquiry with the bookkeeper was to price out the labor and material quantities I had just established with the foreman.

"By examining the general ledger account for labor expense I found that, as I had suspected, it included payroll taxes and employee benefits. By examining payroll records I found that the average hourly rate for production employees was $1.80 for manufacturing labor and $1.55 for packaging labor. I investigated further and established that state and Federal payroll taxes amount to 5.2 per cent of wages and benefits, about 14.7 per cent. I compared these figures with Herbert Hosmer's calculations for 1958 and confirmed that the total hourly labor costs had risen about 20 per cent since then, which fits with a 2.8 per cent productivity increase and the 18 per cent wage variance for 1961 based on the 1958 standards. The bookkeeper confirmed that there had been no wage increase this year so far, and when I double-checked with Hosmer, he said that none was in sight for this year.

"Based on the figures I have just quoted, the incremental labor cost for the second shift can be estimated as follows:

	Manufacturing	Packaging	
Base wage	$1.80	$1.55	/hour
Benefits – 14.7%	.265	.228	
Taxes – 5.2%	.094	.081	
Total	$2.159	$1.859	
(Rounding)	$2.16	$1.86	/hour
Assume that a differential of 10¢ is paid to the "floating" laborer, which will increase the packaging average rate by		.05	
		$1.91	
Hours per month	865	346	
$ cost per month	$1,868.40	$660.86	
Total per month	$2,529.26		
No. of units per month	1,600		
Labor cost per unit	$1.58		

"On materials, I asked the bookkeeper to pull the latest invoices from her files for raw material purchases, and I priced each item on the bill of materials. The material cost per pump came out at $5.79, as against the old standard of $4.95. Again, I compared price changes since 1958 and noticed an average increase of about 22 per cent. Subtracting the 3 per cent material usage saving through change in design leaves a net increase of about 19 per cent, which is close enough to the total material variance for 1961 of 18.4 per cent." (Ryan added that a schedule showing his calculations of the revised standard material cost was included in his working papers; it is not reproduced here.)

"I next considered what items of factory burden expense would be incurred in the operation of a second shift. I checked off the items in the 1961 Income Statement as follows:

"Factory supplies	Yes
Fuel, water, heat	Yes
Taxes—property	No
Insurance—property	Yes
Repairs—property	No
Depreciation—building	No
Depreciation—machinery	No
Foreman	Yes

"Depreciation on manufacturing equipment might increase because of increased usage, but the absolute amount of this expense ($382 in 1961) was so small that I decided to ignore it. On each of the other items, this is what I found out."

"*Factory supplies:* In the foreman's opinion these vary in proportion to both material and labor cost although there is no way to check or confirm this. I decided to relate this cost to the total of the two, as follows:

"Factory supplies cost, 1961		$8,043
Materials expense, 1961	$168,514	
Labor cost, 1961	45,275	
Total	$213,789	
Factory supplies cost %	= 3.76%	
Material standard	$5.79	
Labor standard	1.58	
Total	$7.37	
3.76% of $7.37 = $0.28		

"*Fuel, Water, and Heat:* Although all the bills were available to support the 1961 expense under this heading, there is no way to determine, without considerable study, just how much of each item is attributable to each product. We do know that the bulk of the expense is for heat and light; the amount of power used by manufacturing equipment is nominal. Since the 1961 expense is relatively so small, I do not feel the detailed study would be worthwhile at this stage. As we know, manufacturing and storage occupy about 70 per cent of the building. When the second shift is in operation, the whole of this space will have to be heated and lit. I therefore assumed that the monthly expense will be 70 per cent of the 1961 average, i.e.,

$$70\% \times \frac{1{,}673}{12}, \text{ or } \$97.58$$

On the basis of 1,600 units per month, the per unit cost is 6.1 cents—call it 6 cents. Since the proportion of cold to warm months in the 7½ month (maximum) period in which the second shift will be operating is about 50:50, I do not think it necessary to load this estimate with a seasonal factor for heat. I'm no engineer, but I imagine any additional

cost to keep out the cold of winter nights will be offset by the fact that the building will be somewhat warmer in the morning to start with.

"*Property insurance:* This expense amounted to $3,803 in 1961, and would increase if the National Paint contract is received because the inventory would be higher during the months until shipments begin. The insurance contract covering inventory requires a report at the end of each month about the amount of inventory on hand. Based on this report, an adjustment in the premium is computed. I estimated that this adjustment would amount to about $400 for the first six months of the contract, or about 5 cents per unit on the guaranteed 8,000 units. If the number of units is increased, the inventory turnover will be faster, but 5 cents per unit is still a pretty fair figure.

"*Foreman:* A foreman will obviously be needed for the second shift. I discussed this with Hosmer and he anticipated no difficulty in obtaining one. He said he would approach one of the senior first shift employees, and replace him temporarily with a new employee. Hosmer anticipates that the second shift foreman will have to be paid $3.00 per hour, inclusive of benefits. With taxes at 5.26% that comes to $3.16. Multiply this by 167 hours per month and divide by 1,600 units, and the unit cost comes out at 33 cents.

"No selling, or general and administrative expense will be incurred as a result of the operation of the second shift, with the exception of two items—shipping expense and interest. Hosmer says that he and his regular office staff will be able to handle the extra purchasing and payroll chores, and that he will be able to store the inventory until shipped without renting any extra space. According to the letter from National Paint, Utility Equipment Co. will have to ship the pumps direct to National Paint's customers. These are located in the Midwest, which is also the area served by Utility Equipment's sales agency organization, and they, too, ship individually. With the assistance of the bookkeeper, I sampled shipping records for a three month period, and found that the average shipping cost was 37 cents. The dispersion around this average was very close; two thirds of the values were in the 32 cents to 42 cents range, and they were evenly split on either side. I think 37 cents is a fair estimate to use.

"In order to approximate what the interest cost might be for carrying the inventory until it is shipped, I assumed that production for the contract would start on June 1, and continue at the rate of 1,600 units

per month. I also decided to assume that Utility Equipment Co. would have to pay its labor and supervisor costs in the month incurred, and that other costs would be paid on 30-day credit terms, i.e., one month after being incurred. Shipping expense would be paid when shipping took place. I then constructed a cash flow table, which appears on page 56.

"Next, I assumed that Hosmer could get a 6 per cent bank loan to carry this inventory, once he had the contract in hand. The loan would amount to $3,000 at the end of June, rising to $72,000 at the end of November just before he collects for the first 8,000 units. Thus, interest at ½ per cent per month on each month's loan balance would amount to a little over $1,000, or about 13 cents per unit on the minimum quantity.

"To summarize my work, Mr. Jenkins, I have ascertained the following as the likely costs to be incurred in the monthly production of 1,600 pumps on a second shift:

	Per Unit
"Labor	$1.58
Material	5.79
Factory supplies	0.28
Fuel, water, heat	0.06
Property insurance	0.05
Foreman	0.33
Shipping	0.37
Interest	0.13
Total, per unit	$8.59

"Perhaps the most interesting aspect of my study was the realization that if Utility Equipment gets the contract, all the costs it incurs will be variable. While it is true that, for example, the cost of employing a foreman will not be incurred at the rate of 33 cents per unit, the fact is that this expense will only be incurred if the contract is obtained and, if it is, the production can be stated with confidence at 1,600 units per month. This being so, this cost *can* be expressed in per unit terms. In my opinion nothing would be gained by introducing a fixed dollar cost element into any analysis you make for Mr. Hosmer."

Jenkins thanked Ryan for his excellent presentation and after reviewing Ryan's work papers immediately arranged to have another meeting with Hosmer.

Table 1

Inventories and Cash Outflow on Contract*

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Units—Production	1,600	1,600	1,600	1,600	1,600	1,600	1,600	800	
Shipment						8,000	2,000	2,000	
EOM inventory	1,600	3,200	4,800	6,400	8,000	1,600	1,200		
Cash outflow									
June: Labor & supv.									
(1,600 × [1.58 + .033])	$3,056								
July: June exp.									
(1,600 × [5.79 + .28 + .06])		$9,808							
July Labor & supv.		3,056							
August: July exp.			$9,808						
August L & S			3,056						
September: Aug. exp.				$9,808					
September L & S				3,056					
October: Sept. exp.					$9,808				
October L & S					3,056				
November: Oct. exp.						$9,808			
November L & S						3,056			
Ship 8,000 units (55¢)						4,400			
December: November exp.							$9,808		
December L & S							3,056		
Ship 2,000 units							1,100		
January: December exp.								$9,808	
January L & S (½ mo.)								1,528	
Ship 2,000 units								1,100	
February: Jan. exp. (½ mo.)									$4,904
Month's outflow	$3,056	12,864	12,864	12,864	12,864	17,264	13,964	12,436	4,904
Cumulative outflow	$3,056	15,920	28,784	41,648	54,512	71,776	85,740	98,176	103,080

*Assume contract for 12,000 units, manufactured at rate of 1,600 per month, starting in June.

Jenkins' Second Meeting with Hosmer

Exactly one week after his first meeting with Hosmer, Jenkins returned to review the results of his investigation with him. After the usual round of pleasantness, Jenkins began: "Mr. Hosmer, this morning I plan to tell you what we have found out about your potential costs on the National Paint contract, and to be of as much help as I can in setting a price for you to bid on. I would also like to review with you an important consequence of your getting the order—if you do, you will have a need for working capital quite in excess of the company's apparent resources. As I said to you a week ago, I plan to follow up this meeting with a letter to you describing what we have done and repeating my findings, which we will be discussing in a minute. That part of the letter you can skip, if you want to. I would urge you, however, to take a look at the second part of the letter because there I am going to list some areas of your operations where I believe we might be able to do additional and valuable work for you.

"Coming back to the matter at hand, I would like to start by saying that the absolute rock-bottom price for your bid is $8.59 per pump, which is the best estimate of the total *additional* costs, including shipping, without any allowance for profit. Why don't we concentrate on that area, profit, for a minute? Is there a minimum total dollar or dollar-per-unit profit figure which you would want to feel certain of securing if you had the contract? Or would you take it if it were available at, for instance, a nickel more than projected cost per unit?"

"My feeling," Hosmer replied, "is that I am not really interested in the deal unless I make a before-tax profit of about $5,000. This would be about 10 per cent of our 1961 profit. I just don't see how it would be worth our while to do it for less. After all, the second shift won't just materialize out of thin air. There has to be something in the deal for top management's time and effort too."

"Is that $5,000 figure really your minimum? You wouldn't put in a bid that allowed for a profit of only $4,000 for instance?"

"Don't try to pin me down by getting those numbers too close. $4,000 is just not really enough. No, I wouldn't do it for that price."

"Very well, then. National Paint has talked of a minimum order of 8,000 units, a likely order of 10,000, and a possible total of 12,000. Which do you think is the safest 'base' to use to calculate the desired profit per unit?"

"Oh, the 8,000 minimum," Hosmer replied. "If I'm talking about a sure $5,000 profit, then I want it to be a sure profit."

"In that case," said Jenkins, "your profit objective is 62½ cents per unit, and your total minimum revenue per unit is $9.22 ($8.59 cost + 62½ cents profit). Go lower than this and you miss your profit target. On the other hand, if the order exceeds 8,000 units you will make an additional profit of $625 per thousand at a price of $9.22. Being an 'odd' number, the cost figure of $8.59 might give you the impression of being the result of a very precise calculation. I would just like to caution you, therefore, to realize that while $8.59 has been arrived at by what I consider to be the best and most precise means appropriate to your situation, it is impossible for me to guarantee its accuracy. I'm sure you realize that. The best statement I can make about the figure of $8.59 is that it is the *most likely* outcome of a series of contingent future events. It is quite possible that the 'correct' figure, determined after the completion of the contract, will be something different. I am also quite sure that any such difference will not be major."

Hosmer replied that he understood the necessity of using the $8.59 figure with caution, but nevertheless would appreciate Jenkins' advice on what price to charge. He followed the argument that $9.22 should be the minimum, but felt that he might well be able to go higher, and make more profit.

Jenkins remarked that setting a figure above $9.22 was a matter for the most delicate business judgment, and in the last analysis would have to be Hosmer's decision alone. He said that Hosmer ought to bear several facts in mind:

1. At $9.22 Utility Equipment would make a "satisfactory" profit, even on a minimum order (8,000 units).

2. National Paint would be evaluating Utility Equipment's bid, along with others, and each bid would of course state only one price. This was important because the final result would be an "all or nothing" affair, at the bid price.

3. At a high enough price, possibly $12.00, Utility Equipment's chance of getting the contract was probably minimal.

4. From a strategic point of view, Utility Equipment's chance of winning the contract would probably not vary with *small* variations in price. For example, if the next bid above Utility Equipment's possible bid of $10.00 were $10.40, Utility Equipment's chances would probably not have been adversely affected had their bid been $10.25. Jenkins said he doubted whether National Paint would be able to

trade-off any supposed difference in the drawing power of different premiums with minute differences in their prices.

5. What it all amounted to, in Jenkins' opinion, was that Hosmer ought to pick a price somewhere between $9.22 and $12.00 that he felt would be competitive with other, necessarily unknown, bids. Jenkins said he favored a bid of $10.00 because it straddled National Paint's stated range of $8.00 to $12.00 and, therefore, he felt, stood a good chance of success without being "too low."

Hosmer said that Jenkins' analysis had been very helpful, and added that he would give the matter of pricing some serious thought before making his decision. He said that Jenkins' very clear analysis had helped him to realize that there was no neat formula that could be used for pricing, and that it was a matter that involved a high degree of business judgment.

At this point Jenkins told Hosmer that he would like to take a few minutes to discuss the working capital problem that would arise if the bid were successful. He gave Hosmer a copy of the cash flow schedule he had prepared (See *Table 1*, page 56), and explained the assumptions on which it was based. Hosmer was most intrigued with this schedule, and remarked that although it could not in any way be described as profound, it set things out in a way he had never envisaged them, and very clearly as well. He said that he had known that the contract would call for working capital above the firm's resources, but had not realized that the amount would reach $54,500 by November 1; he assumed that money would begin to come in from National Paint soon after that date. He felt that perhaps $5,000-$10,000 of Utility Equipment's existing resources could be applied to this need; he doubted, however, that he would be able to defer dividend payments unless the situation were desperate, so that he would need external financing of up to $50,000. Jenkins suggested that a line of credit at the local bank could solve the problem. Hosmer agreed that this was one alternative, and said that he was very glad that Jenkins had drawn his attention to this potential problem far enough in advance for it to be solved before it really became a problem.

Before leaving, Jenkins mentioned to Hosmer that it had occurred to him that there might be an opportunity for savings in material costs if Hosmer could obtain price reductions from his suppliers by virtue of his doubling his purchases of materials for the pumps line, as he would do, starting June 1, if he obtained the contract. Jenkins said he had not taken account of any such potential saving in his calculations.

Jenkins' Letter to Hosmer

The following day Hosmer received a letter from Jenkins, which read in part as follows:

Dear Mr. Hosmer:

It was a pleasure to work with you on the National Paint pricing problem. There follows a summary of the work we performed on this engagement, and the results which I discussed with you in your office yesterday. Our bill for services is attached. [Section of letter summarizing work and results omitted here as repetitious.]

In the course of our work on this engagement we became aware of several areas in your company's operations where we feel we could be of further assistance to you, and where we feel that you would benefit by having the work done. These are listed below for your reference.

1. Revise material and labor standards on hoist, pulley and block lines.

2. Institute a system for continuous updating of material and labor standards for your staff.

3. Design and install an improved chart of accounts and cost accounting system which would provide more accurate information on product line costs on a continuing basis than we were able to develop for the pump line where in many instances we had to rely on historical records. Accurate cost information will enable you to measure product line profitability by channel of distribution, either those presently used or those which you might want to consider in the future.

We would be glad to discuss any of the above with you at your convenience if you are interested in pursuing this further.

Very truly yours,

s/ Peter Jenkins
Smith, Adams and Jenkins

Bartlett Lithographers

Bartlett Lithographers was one of the larger job printers in the metropolitan Boston area. In 1961, it employed approximately 100 persons, and for several years its sales volume had been approximately $2,000,000 annually. Bartlett was known as a "city firm" that catered primarily to Boston companies; very little of its regular printing volume was done for customers beyond a 100-mile distance from Boston. The printing jobs that it handled ranged all the way from very small to very large volume runs. A high premium was placed on providing good, dependable service, and roughly half of Bartlett's volume came from regular, long-time customers.

Bartlett Lithographers was a closely held, family corporation. Top management were members of the owner group and were actively engaged in running the business. The two most important executive positions were filled by Joseph Donovan, president, and George Peters, Jr., executive vice president. The owner-manager structure preceded both Mr. Peters and Mr. Donovan; a generation earlier Amos Hopkins and George Peters, Sr. had operated Bartlett as its founding partners.

Hopkins and Peters established a thriving business that was, in time, incorporated. At Mr. Hopkins' death, his wife inherited majority control of the corporation, and Mr. Peters, Sr. ran the shop. His son, George, Jr., joined the organization and progressed in capability to the point where he assumed responsibility for the printing shop at his father's death. Later, Joseph Donovan married Mrs. Hopkins' daughter, and assumed the presidency of the corporation. Mrs. Mildred Hopkins treated both Donovan and Peters as equals, and in the opinion of the two executives, she had contributed immensely to the effectiveness of their joint activities. In 1959, a third generation had joined management; Roger Peters had succeeded his father in supervision of

shop activities. As a result, George Peters, Jr. said that he now had more time to devote to upper-level management matters, including sales and pricing problems.

James & Pearce, CPAs

For more than twenty years, James & Pearce—a large national firm of certified public accountants—had conducted audit and tax work for Bartlett Lithographers out of their Boston offices. Thus, in March 1962, it was with considerable background that James Turner and John Schmidt sat down to review the 1961 annual audit report that had been prepared for the principals at Bartlett. In 1961, Turner was partner-in-charge of the Bartlett account. Schmidt, formerly the senior accountant, was now manager of the account. It was customary at James & Pearce for those directly involved to study the audit report and all associated information in preparation for a review session with the client.

During the course of their discussion, which covered all of the usual routine matters, both Turner and Schmidt found their conversation turning frequently to the area of costs, pricing, and the adequacy of Bartlett's internal accounting system. They saw several symptoms that suggested to them conditions that should be investigated. For one thing, Turner was concerned about the large volume of adjusting entries that were required annually. He wondered if that condition might be indicative of an unnecessarily weak basic accounting structure. He questioned whether or not the general accounting system in use at Bartlett was adequate, and he hypothesized that if the basic system was inadequate, it might follow that the cost data used in pricing would also be highly suspect.

As the two men reviewed what they knew of Bartlett, and studied the information that was available to them, they became more and more convinced that management should be alerted to a potentially undesirable situation. They knew, for instance, that the quarterly reports that were prepared for management's guidance were outdated by more than a month when they were issued. They also knew that the standards used in costing production were several years old, and had been "adjusted" to current conditions by the application of a flat-rate percentage adjustment factor. They suspected that these costs might be quite inappropriate in the current competitive market.

Turner and Schmidt were also keenly aware that the cost system in use at Bartlett did not effectively contribute to the pricing and bid-

costing procedures. Frequently, job-cost estimates that were compiled on the basis of existing accounting data were discarded in favor of "intuitive" quotes. That fact, in itself, caused both men serious concern. They were firm in their belief that an accounting system could —and should—provide useful information for pricing, and that a properly devised system of cost accumulation should prove itself superior to purely intuitive procedures.

When they reviewed industry conditions in late 1961 and early 1962, it appeared all the more necessary to these men that Bartlett should look more closely at its costing procedures. For one thing, a large portion of customer potential had "dried up"—the result of technological advances that had made it economical for large consumers of printed material to run their own in-plant printing operation. Bartlett, for example, had suffered the loss of a major customer who decided to operate what was referred to in the trade as its own "captive print shop." It was possible that as much as one-third of Bartlett's volume was lost when that customer invested in its own printing facility.

At the other end of the line, many short-run, relatively simple jobs were being successfully bid away from established printers by low-cost "basement shop" operators. Again, technological advances had made it possible for these operators to obtain relatively inexpensive equipment which was quite adequate for turning out small jobs that did not impose rigid quality specifications. As a result, competition—in the form of lower prices—for these jobs had increased sharply.

Thus, established print shops with relatively high capacity potential found themselves faced with a demand situation that had been confined, effectively, to the middle of the customer range that had existed previously. This created severe problems, not the least of which was constructing sensible, competitive, profit-generating bids to capture as much of the available market as was possible, consistent with sound business operations.

With demand off, Mr. Turner knew that a large number of critical pressures were being felt by the management of Bartlett Lithographers. In an attempt to maintain a reasonable level of production, he knew that it had become necessary for management to submit bids on marginal, low-profit business that, under more favorable conditions, would scarcely have been considered at all.

Turner and John Schmidt saw two dangers here. One was, of course, that profit margins tended to be thinned as marginal business was added. Consequently, sustained dollar volume might quite possibly provide much smaller profit than had been the case under more

favorable demand conditions. Reviewing the financial data for several earlier years, both men agreed that the influence of slackened demand and consequent trimming of profit margins was clearly to be observed. The following summary figures for 1959, 1960 and 1961 demonstrated the point:[1]

Year	Sales (In thousands)	Before-tax profit
1959	$1,992	$87
1960	2,084	97
1961	1,917	11

There was another side to the problem, too. James Turner observed that although many of the marginal jobs did not carry with them returns that were, under normal conditions, considered to be satisfactory, there was real danger of misappraising the value of marginal opportunities. In a severe cost-price squeeze, such as faced Bartlett in 1961, both Turner and Schmidt feared that inadequate accounting data—particularly production cost information—could seriously interfere with maximizing the effectiveness of profiting from marginal opportunities. Also, both men knew that Bartlett was dependent on a number of highly skilled personnel; it was imperative that adequate volume be maintained in order to retain the basic skills that had come to be considered characteristic of the Bartlett organization.

Many of Turner and Schmidt's apprehensions had been presented to Bartlett's management in the past. However, management at that time was not responsive to the client review sessions or the management letters sent by James & Pearce, CPAs.

Since the new management, under the direction of George Peters, Jr., had become more management-minded, Turner and Schmidt decided to present all of their findings to their client at the forthcoming review session.

In mid-March of 1962, both Turner and Schmidt met with Joseph Donovan and George Peters to review the 1961 audit report and present their analysis of the situation. The Bartlett executives were, of course, aware of the deterioration of their profit position. They understood quite clearly the change that had taken place in the competitive situation as well. Thus, Mr. Turner's discussions made some sense to them and raised many questions for their consideration.

[1] See *Exhibit 1* (page 65) for Bartlett's 1961 income statement.

Exhibit 1

BARTLETT LITHOGRAPHERS

Statement of Income

For the Year Ended December 31, 1961

(In thousands)

		% to Sales
Sales, less discounts and allowances	$1,916.9	100.00
Less: Commissions and brokers' fees	185.4	9.67
	$1,731.5	90.33
Manufacturing costs:		
Direct materials	$ 770.0	40.16
Direct labor	226.6	11.82
Charged factory overhead	391.1	20.40
	$1,387.7	72.38
Manufacturing profit	$ 343.8	17.95
Less: Unabsorbed factory overhead	46.2	2.42
Gross profit	$ 297.6	15.53
Operating expenses:		
Selling expenses	$ 138.8	7.24
General and administrative expenses	133.2	6.95
	$ 272.0	14.19
Profit from operations	$ 25.6	1.34
Other income (expense)	(14.0)	(.73)
Profit before federal income taxes	$ 11.6	.61

Discussion of the internal accounting system consumed a major portion of the meeting, and the appropriateness of the accounting data for purposes of costing and quoting also received extensive consideration. At the end of the conference all four of the men agreed that further study was clearly desirable, and that they should, without question, meet again to consider specifically what might be done to assist Bartlett's management in its new, uncomfortable, and highly competitive environment. As they left the meeting, Turner remarked to John Schmidt, "Well, we have been thinking in the right direction; I suspect that a good job of variable cost analysis is what will do the most good."

Exhibit 2

BARTLETT LITHOGRAPHERS

Engagement Confirmation Letter

March 16, 1962

Mr. Joseph Donovan, President
Mr. George Peters, Jr., Executive Vice President
Bartlett Lithographers
Boston

Gentlemen:

We thank you for the opportunity of meeting with you last Thursday to discuss the study you wish made of your present cost system and related pricing practices. We are writing this letter to summarize the main points covered in our conversation.

As you pointed out during our discussion, the broad purpose of the engagement is to establish a working method for pricing analysis which takes into consideration the relationship between a series of possible prices and product costs in competitive bid situations. This is particularly important in view of the highly competitive situation which exists in the printing industry today.

As we see it, the major purpose of our work will be to make a general review of the present cost accounting system to make certain that your management has a firm basis for evaluating available alternate pricing possibilities. While all aspects of the present system will be covered, we will concentrate our effort in those areas which you have indicated required review. Specifically this would include:

1. Reviewing the present system in terms of the accumulation, flow, accuracy and reporting of cost information.
2. Evaluating the cost system structure in terms of the number of cost centers and the allocation of manufacturing burden to those cost centers.
3. Identifying the variable and fixed expense components of costs in each cost center and department.
4. Providing variable and fixed machine hour burden rates for quotation purposes.

In addition, our efforts will be directed toward providing you with a method that will aid in determining the financial effects of a series of alternate prices, taking into consideration:

1. The present volume of business in relation to plant capacity.
2. The desirability of accepting or rejecting additional business based on breakeven calculations.

This engagement will be directed by a member of our Manage-

Exhibit 2 continued

ment Services Department. We estimate that this work will require approximately two days a week over the next 12 to 14 weeks for completion.

We will keep you advised of our progress during the course of the engagement and will prepare a final report covering findings and recommendations at the conclusion of our work.

Very truly yours,

/s/
James & Pearce

The Management Services Engagement

Once he had presented the problem areas for his client's consideration, James Turner returned to his office and discussed the situation with Joseph Quinn. Quinn was functionally responsible for the management services phase of James & Pearce's Boston operation. Turner briefed Quinn on the problems at Bartlett and brought him up to date on the meeting with the client. Together they surveyed the need-potential and agreed that an early meeting with Donovan and Peters would be desirable.

In late March, Quinn and Turner met with the two officers from Bartlett and discussed quite thoroughly the problems of costing and pricing, of meeting competition, of maintaining adequate productive volume, of retaining the basic work force, and of earning satisfactory profits. All were agreed that the cost data that were provided by the existing system were neither current nor useful; further study of the situation was agreed upon.

Thus, on the basis of their meeting with Donovan and Peters, Turner and Quinn decided to formalize the project, and to proceed. Essentially, the late March meeting established the basis on which a management services engagement would be conducted. Accordingly, Mr. Quinn took care of the arrangements incident to commencing the study; he sent a confirmation letter to the company (see *Exhibit 2*, page 66) and he assigned John Burns, a member of his management services staff, to the project.

In rapid order, John Burns was introduced to the officers at Bartlett, James Turner handling the introductions personally, and the study commenced. Burns spent one or two days at the Bartlett plant each week, and prepared a weekly written report for Mr. Quinn. He

studied the cost accumulation and reporting system intensively, and compiled an extensive file of work papers and analyses, developing data on current cost and production relations. (See *Exhibit 3* below for a typical weekly progress report filed by John Burns.) By late June, Burns' study was completed and the task of drawing conclusions and making recommendations began.

Exhibit 3

To J. C. Turner
M. A. Quinn

James & Pearce
Management Services Department
Weekly Progress Report

Client Bartlett Lithographers Code No. ____
Survey Cost Accounting Review and Pricing Procedures

Friday Ending May 15, 1962
Submitted by John C. Burns

Time Summary

Staff	Hours This Week	Hours To Date	Hours Budgeted
J. C. Burns	16	97	200
Supervision			
Total			

In Charge ____
Budget Status ____

Expected Report Date
June 22-30

Comments
(Report Progress This Week and Program for Next Week)

Progress this week - Completed the variable and fixed direct labor and manufacturing expense rates. Prepared the income and expense statement for the year ended December 31, 1961 showing the application of the variable and fixed expense "Contribution" concept. Determined the breakeven data and developed the breakeven point. Met with the President and Executive Vice President to explain the concept, its application at Bartlett and the effect of the new rates upon quoting and cost reporting. Left copies of the data with them for "skull" sessions.

Form 51

Turner, Quinn and Burns focused their attention on four main sections of Burns' work. First, Burns had reviewed Bartlett's procedures for preparing price quotations. Next, he had studied current manufacturing cost relationships and recalculated departmental manufacturing expense rates. Beyond that, as a third phase of his work, Burns endeavored to reclassify the departmental expense rates into their fixed and variable components. Finally, Burns had gathered production performance and capacity utilization data so that he might, if appropriate, relate cost information to the volume of activity actually planned or attained. A brief review of his findings in each of these four areas is presented below.

The quotation system. Price quotations at Bartlett were prepared by combining basic data for the several categories of cost that applied to each order. First, direct materials and purchased outside services were calculated. To those costs were added the in-plant charges for direct labor and other manufacturing expenses. The labor and manufacturing expense charges were determined by extending the units of measurement (man-hours, press-hours, or weight of material) by the appropriate departmental cost rates to obtain dollars of cost. (See *Exhibit 4* for the separate departmental rates used in 1961 for costing and quotations.) No separate charge for selling and administrative expenses was made since the departmental rates included an allowance for selling and administrative expenses. However, commissions and brokers' fees were computed separately and all costs were then added to develop total costs for the order under consideration.

The addition of a desired profit amount to the total cost figure provided a selling price which might or might not be quoted to the customer. The calculated price, including profit, was used as a benchmark to determine pricing strategy; the final price quoted depended upon prevailing conditions. Such factors as size of the order backlog, the desirability of obtaining the business, and existing competitive conditions had much to do with the degree of departure from the calculated company price.

Burns noted two significant points about this system. The first was that certain costs were literally "pulled out of the air" without consideration of the cost rates established for individual departments. For example, the time required to process art work varied depending upon the complexity of the job and the type of art work required. To save time, it had become normal practice to estimate an overall

dollar cost for complex art work without attempting to establish the time required for the actual operation. In several instances the final cost of the work had exceeded the estimated cost, resulting in a reduction in the profit realized on the order. Here, of course, the validity of the expense rate for the Art Department had little bearing; this type of situation, Burns pointed out, could be corrected only by electing to quote such operations on a more detailed basis using more explicit cost estimates.

Also, Burns cautioned that the merging of selling and administrative rates with the manufacturing rates obscured the cost quotation picture by burying selling and administrative expenses in the combined rates. Frequently, when comparisons were needed between actual and estimated costs, company analysts had to separate and identify the several types of costs incorporated into the overall departmental rates. Such a process had proved to be slow and excessively time-consuming.

Departmental manufacturing expense rates. Manufacturing expenses (costs of production) were applied through 17 separate production departments or cost centers. (See *Exhibit 4*, page 71.) Burns analyzed the manufacturing, selling, and administrative costs for each month of 1961 in order to ascertain the nature and behavior of costs incurred in each of the operating cost centers. He considered, as well, changes in cost structure that were anticipated in 1962; such changes as determination of current labor rates, increased charges for depreciation, and redistribution of general (service) cost center expenses were involved. (See *Exhibit 4* for a comparison, by manufacturing cost center, of the cost rates in use at Bartlett, and the rates developed by the Burns' study.)

James Turner was not surprised to see the spread between the company's rates and those developed in the study. Tentatively, he believed, the study had confirmed his original judgment that the present rates used for quoting and cost purposes were severely out of date. The study seemed to indicate that the cost center quotation rates did not reflect current conditions. Two obvious reasons for the differences, of course, were (1) the elimination of unabsorbed factory overhead by spreading overhead costs on the basis of 1961 actual volume, and (2) the different treatment of selling and administrative expenses proposed by Burns. But all the cost center rates had not changed by the same proportion, indicating that the "adjustments" made in prior years had been inaccurate.

Exhibit 4

BARTLETT LITHOGRAPHERS

Comparison of Current and Proposed Manufacturing Rates

Cost Center	Rates Used in 1961 for Costing and Quotations	Proposed Rates*	Increase (Decrease)
Art	$ 6.29	$ 7.88	$1.59
Camera	8.72	9.11	.39
Photo composing	15.55	16.64	1.09
Vacuum frame	11.08	19.98	8.90
Deep etch	10.47	9.42	(1.05)
Presses #1 and #9	6.73	7.90	1.17
Press #4	12.74	14.97	2.23
Press #5	11.49	15.21	3.72
Press #6	16.33	16.00	(.33)
Press #7	26.29	25.83	(.46)
Press #8	19.94	22.41	2.47
Cutting	6.13	6.33	.20
Bindery	4.10	3.85	(.25)
Paper handling	.77	.48	(.29)
Shipping	.78 skids 2.21 other	1.03	Not comparable
Packaging	.09	.40	.31
Delivery	.55	.26	(.29)

* Rates include direct labor and total manufacturing expenses only; selling and administrative expenses are excluded.

Note: See Exhibit 5 (page 73) for unit of measurement on which the rates are calculated.

Fixed and variable cost analysis. While the revision in manufacturing expense rates would be helpful for cost accounting purposes, Burns decided to extend his analysis to cover fixed and variable components. He felt that the job of pricing (preparing bids) required more detail than was contained in the aggregate departmental expense rates. He developed new variable and fixed manufacturing expense rates for production cost centers based upon units of measurement such as man-hours of direct labor, press-hours utilized, and weights of material. As shown in Exhibit 5, Burns calculated separate costing rates for:

Direct labor
Variable expenses
Total variable costs
Fixed expenses
Total costs.

As noted in the exhibit, the rates as calculated were based on 1961 cost and volume levels. In addition to the manufacturing expense rates, Burns also calculated new percentages for the selling and administrative expenses, showing the variable and fixed components of cost where applicable. Burns expected that use of the new rates, considering the fixed and variable factors separately, would be far more realistic than pricing by the old, single-rate system.

To summarize the results of his fixed-variable cost analysis, Burns prepared a new version of the company's 1961 income statement (see *Exhibit 6*, page 75). This statement indicated that, on the basis of most recent experience, variable costs approximated 80.19 per cent of sales revenue at the 1961 prices and product mix.

In reviewing his analysis with Turner and Quinn, Burns suggested that these average cost rates might be used to facilitate the task of preparing quotations on small items or orders which did not require the detailed analysis that was necessary for larger or more important orders. The average cost rates, he pointed out, could also be used to measure the profit content of orders which had already been priced and which were ordered repeatedly on the basis of the original price quotation.

In order to illustrate his point, Burns used the data in Exhibit 6 to develop average manufacturing costs expressed in terms of their percentage relationship to direct labor dollars:

Variable manufacturing expenses	128.03%
Fixed manufacturing expenses	65.06%

These average cost rates could then be used, Burns said, to estimate total manufacturing costs for a particular job, as shown on page 74:

BARTLETT LITHOGRAPHERS

Composition of Manufacturing Expense Rates

Cost Center	Direct Labor Rate	Variable Expense Rate	Total Variable Cost Rate	Fixed Expense Rate	Total Manufacturing Expense Rate	Unit of Measurement
Art	$ 3.34	$ 2.41	$ 5.75	$ 2.13	$ 7.88	Man hrs. of direct labor
Camera	3.36	4.98	8.34	.77	9.11	Man hrs. of direct labor
Photo Composing	3.60	10.63	14.23	2.41	16.64	Man hrs. of direct labor
Vacuum Frame	3.63	12.85	16.48	3.50	19.98	Man hrs. of direct labor
Deep Etch	3.75	4.15	7.90	1.52	9.42	Man hrs. of direct labor
Presses #1 & #9	3.40	2.83	6.23	1.67	7.90	Press hrs.
Press #4	6.28	4.80	11.08	3.89	14.97	Press hrs.
Press #5	6.52	5.43	11.95	3.26	15.21	Press hrs.
Press #6	6.60	5.15	11.75	4.25	16.00	Press hrs.
Press #7	9.30	9.18	18.48	7.35	25.83	Press hrs.
Press #8	8.34	8.20	16.54	5.87	22.41	Press hrs.
Cutting	3.10	1.52	4.62	1.71	6.33	Man hrs. of direct labor
Bindery	1.56	.68	2.24	1.61	3.85	Man hrs. of direct labor
Paper handling	——*	.36	.36	.12	.48	Cwt. of paper handled
Shipping	——*	.76	.76	.27	1.03	Cwt. of shipments
Packaging	——*	.35	.35	.05	.40	Number of packages
Delivery	——*	.24	.24	.02	.26	Cwt. of deliveries

*Included in determination of department variable expense rates.

Supplementary Rates for Selling and Administrative Expenses:

Department	Variable %	Fixed %	Total %	Basis
Selling (excludes all commissions and fees for brokers)	10.14	11.07	21.21	Ratio of class expenses to the total of direct labor and total manufacturing expenses.
Administrative	——	20.06	20.06	
Total	10.14	31.13	41.27	

	Estimated Costs	
Materials	$1,500	
Direct labor	500	
Variable manufacturing expenses	640	($500 × 128.03%)
Total variable cost	$2,640	
Fixed manufacturing expenses	$ 325	($500 × 65.06%)
Total manufacturing cost	$2,965	

The addition of selling and administrative expenses to the manufacturing costs would complete the cost analysis and would provide a basis for comparing the estimated total cost with the previously established sales price; thus, the company could predict the profitability for each order going through the shop, and could evaluate the necessity of changing its prices on some of its reorder business.

Burns stressed that the use of this short form of estimating should be confined to those instances where the price had been established in the past, and repeat business was contingent upon quoting the original price. He observed that the use of average cost rates prevented meaningful analysis of costs because the costs of the individual operations, by cost center, would not be available for comparative purposes. In addition, the use of averages implied that operations and costs are similar throughout the plant, and applied equally to all printing materials processed. Such implications were incorrect, he believed, as evidenced by the differing cost center rates for direct labor and expenses as he had determined them.

Plant capacity. The last major area investigated by Burns was the availability and utilization of Bartlett's plant facilities. As Burns said to Turner and Quinn when they were reviewing his work, "If the plant were running full with work that covered its full cost, a variable cost or contribution analysis would be purely academic." In consultation with company management, Burns had quickly ascertained that production facilities were available to handle a sizeable increase in sales volume. Printing capacity (i.e., the capacity of the seven printing presses) was the limiting factor in determining plant capacity. Management agreed that all other production and service centers would be capable of functioning at levels determined by press requirements, even if the presses were run around the clock.

Exhibit 6

BARTLETT LITHOGRAPHERS

Pro Forma Statement of Income

For the Year Ended December 31, 1961

(In Thousands)

		% to Sales
Sales, less discounts and allowances	$1,916.9	100.00
Variable costs:		
Direct materials	$ 770.0	40.16
Direct labor	226.6	11.82
Variable manufacturing expenses	290.0	15.13
Variable selling expenses	65.3	3.41
Commissions and brokers' fees	185.4	9.67
Total variable cost	$1,537.3	80.19
Variable gross profit	$ 379.6	19.81
Fixed costs:		
Fixed manufacturing expenses	$ 147.3	7.69
Fixed selling expenses	73.5	3.83
Fixed general and administrative expenses	133.2	6.95
Total fixed costs	$ 354.0	18.47
Profit from operations	$ 25.6	1.34
Other income or (expense)	$ (14.0)	(.73)
Profit before Federal income taxes	$ 11.6	.61
Breakeven point	$1,787.0	

Note: The breakeven point is determined by dividing the fixed costs by the 1961 variable gross profit from operations ($354.0 ÷ 19.81% = $1,787.0).

Exhibit 7

BARTLETT LITHOGRAPHERS

Press Hour Capacity

Press No.	No. of Presses	Working Days in Year	Hrs. Operated Per Day 1 Shift Basis	Maximum Hrs. Per Yr. 1 Shift Basis	20% Allowance For Repairs & Down Time
1 & 9	2	254	14	3,556	711
4	1	254	7	1,778	356
5	1	254	7	1,778	356
6	1	254	7	1,778	356
7	1	254	7	1,778	356
8	1	254	7	1,778	356

Press No.	Productive Hours 1 Shift	Productive Hours 2 Shift	Productive Hours 3 Shift	Hours Reported for Year 1961 Operations	Equivalent Shift Ratio
1 & 9	2,845	5,690	8,535	4,933	1.73
4	1,422	2,844	4,266	2,361	1.66
5	1,422	2,844	4,266	2,824	1.99
6	1,422	2,844	4,266	2,707	1.90
7	1,422	2,844	4,266	3,527	2.48
8	1,422	2,844	4,266	2,942	2.07

Note: 1-shift productive hours are determined by subtracting the 20% down-time allowance from the maximum hours per year on a 1-shift basis. 2-shift and 3-shift productive hours are straight multiples of 1-shift productive hours.

Statistics gathered by company personnel for each press, when compared with potential press hours available, showed that the presses had operated at substantially a two-shift level during 1961. (The details of the plant capacity study are shown in Exhibit 7, page 76.) Bartlett executives considered that sufficient press capacity existed to increase sales volume by an additional $1,000,000 at the 1961 price level. However, they observed, an increase in volume could be realized only through accepting additional business at reduced prices.

Questions

1. Evaluate the analysis done by John Burns on this engagement. Do you agree with the decisions he made that are reflected by Exhibit 5? What other areas would you have investigated if you had been assigned to this job?

2. What type of pricing formula do you believe Bartlett should use in preparing price quotations?

3. Using the data available in the case, compute the effect that a price decrease might have on profit. From your examination of this company's cost-price-volume structure, what recommendations would you make to Bartlett's management about their pricing policies?

4. Prepare, in outline form, a final report to the client as promised by James and Pearce in their confirmation letter (Exhibit 2, page 66).

Commentary on Bartlett Lithographers

James Turner decided that the best way to utilize the cost data developed by his assistant, John Burns, was to attempt to project what effect alternative pricing policies might have on Bartlett's profitability. As he saw it, the company's major concern was to reverse the obvious profit decline. Three alternate courses of action seemed to be available. They were:

1. Reducing costs;
2. Increasing prices at current or reduced volume levels; and
3. Increasing volume at current or reduced prices.

As Turner saw it, the company was continuously reviewing costs

and reducing them whenever cost reduction opportunities presented themselves. Increasing prices, in Turner's opinion, was not consistent with the economics of the printing market at the time; strong pressures were being exerted upon prices by Bartlett's competitors. Traditional practices of requesting competitive bids probably meant that printing customers were fairly "price conscious," and if this were true, raising prices might result in rather substantial reductions in volume. Although short-run profits might not suffer as a result of such an action, Turner was more pessimistic about the longer-run implications of losing customers during the current, hopefully temporary, period of over-capacity in the printing industry.

A more positive program, in Turner's opinion, would be one aimed at increasing Bartlett's market share now by seeking higher volume through lower prices. Such a course of action also held out the prospect of increasing short-term profits as well as the longer-run market position of the company. The first step in evaluating this course of action was a careful examination of the capacity utilization data that Burns had collected.

After studying the data contained in Exhibit 7 (page 76), Turner surmised that, except for presses #5, 7 and 8, there was room for additional volume even on a two-shift basis. Further, an entire third shift of plant capacity was available if work could be priced at a level that would bring it into the plant. Turner believed that the establishment of available plant capacity defined the limits within which alternative sales targets could be evaluated. Then, each targeted volume of sales—and the costs of those sales—could be analyzed to determine the profitability of the additional business being considered. The profitability of additional volume could be determined fairly easily using the variable cost data from John Burns' analysis.

In order to test the effect of price and volume changes on Bartlett's profits, Turner selected four possible price reduction levels that could be handled without exceeding Bartlett's capacity, even though "fixed costs" might increase as more of the available capacity was utilized. Analyzing these four price levels illustrated the possible effects of lowering prices for additional business, and suggested a floor below which prices could not be set without experiencing losses. Turner's four illustrations, as presented below, were subsequently included in the report which James and Pearce submitted to Bartlett Lithographers.

Example Number 1:

Assumptions: 1) A three-shift operation producing $1,916,900 sales on two shifts, and a potential of $1,000,000 on the third shift.

2) A price reduction of 5 per cent applied to the $1,000,000. (This would reduce the additional revenue to $950,000.)

3) Variable costs will not exceed 1961 experience. (80.19 per cent of sales)

4) No increase in fixed costs.

	1st and 2nd shifts	3rd shift	Total	% to sales
Sales	$1,916.9	$950.0	$2,866.9	100.00
Variable cost	1,537.3	801.9	2,339.2	81.59
Variable gross	379.6	148.1	527.7	18.41
Fixed costs	354.0	0	354.0	12.35
Profit	$ 25.6	$148.1	$ 173.7	6.06

Comments: 1) The variable cost per cent to sales has increased from 80.19 per cent to 81.59 per cent. This increase is due to the reduction in sales prices of the additional volume. Company experience has shown that variable costs are 80.19 per cent of net sales after discounts and allowances. The variable costs of $1,000,000 in sales would be $801,900; if the same units are priced 5 per cent less (at $950,000) the costs would still be $801,900.

2) Fixed expenses in this illustration have been charged to operations on the first and second shifts only, because the example assumes no increase in fixed costs for the third shift.

3) The results are self-evident; if the assumptions are valid, operating profits would increase by $148,100.

Example Number 2:

A more conservative assumption might recognize that fixed costs would increase on the third shift and the Company, after appraising the increase, might decide that $35,000 should be added for new fixed costs. In this example, prices will be reduced by 10 per cent and fixed costs increased by $35,000.

Assumptions: 1) A three-shift operation producing $1,916,900 on two shifts and a potential of $1,000,000 on the third shift.

2) A price reduction of 10 per cent applied to the $1,000,000. (This reduced the additional revenue to $900,000.)

3) Variable costs do not exceed the 1961 level.

4) Fixed costs increase by $35,000.

	1st and 2nd shifts	3rd shift	Total	% to sales
Sales	$1,916.9	$900.0	$2,816.9	100.00
Variable cost	1,537.3	801.9	2,339.2	83.04
Variable gross	379.6	98.1	477.7	16.96
Fixed costs	354.0	35.0	389.0	13.81
Profit	$ 25.6	$ 63.1	$ 88.7	3.15

Comment: 1) In this illustration, the reduction in prices and the additional fixed expenses would return $63,100 in additional profits if the assumptions concerning prices and costs are valid.

Example Number 3:

The company might find that prices would have to be reduced by 15 per cent in order to obtain the additional volume. These forecast conditions are incorporated into this third illustration.

Assumptions: 1) A three-shift operation producing $1,916,900 sales on two shifts and a potential of $1,000,000 on the third shift.

2) A price reduction of 15 per cent applicable to the $1,000,000. (This reduces the additional revenue to $850,000.)

3) Variable costs do not exceed the 1961 level.

4) Fixed costs are increased by $35,000.

	1st and 2nd shifts	3rd shift	Total	% to sales
Sales	$1,916.9	$850.0	$2,766.9	100.00
Variable cost	1,537.3	801.9	2,339.2	84.54
Variable gross	379.6	48.1	427.7	15.46
Fixed costs	354.0	35.0	389.0	14.06
Profit	$ 25.6	$ 13.1	$ 38.7	1.40

Comment: 1) The profit increase under these conditions would be $13,100 assuming that the price-cost-relationships followed the forecast.

Example Number 4:

It is evident from the preceding illustrations that prices on the increased volume cannot be reduced by as much as 20% without showing losses at the variable gross profit level. The reason for this is that variable costs, based upon company history, equal 80.19% of the sales dollar. If prices were set at 20% below 1961 prices for the $1,000,000 additional volume, the loss at the variable gross profit level would adversely affect the profit of the two-shift operations. Thus:

	1st and 2nd shifts	3rd shift	Total
Sales	$1,916.9	$800.0	$2,716.9
Variable cost	1,537.3	801.9	2,339.2
Variable gross	$ 379.6	($ 1.9)	$ 377.7

After he had reviewed the entire study with John Burns and Joseph Quinn, Turner undertook to prepare a brief written report to the executives at Bartlett Lithographers. The report was followed by an oral presentation.

Basically, Turner's proposed quoting procedure recommended that the company:

1) use the manufacturing cost rates that had been developed in the study;
2) determine separate quotation costs for selling and administrative expenses;
3) compare the desired selling price to the total variable costs in order to determine the variable gross profit (contribution to fixed costs) contained in each price; and
4) compare the desired selling price to total costs (variable plus fixed) to check the net profit after the absorption of allocated fixed expenses (net profit from operations).

Turner advised that provision should be made for testing quotations against more than one price so that profit potentials of alternate prices could be compared before settling on a final price. He designed a new form for quotation purposes which incorporated his recommended changes. (See Exhibit 8, page 84). The new quotation form revealed two important control figures: (1) the variable gross profit, and (2) the final profit from operations. The two profit figures, Turner explained, would point out the profit impact of alternate prices for individual orders, and would also show how much of the fixed costs would be absorbed by that order.

In his report, Turner pointed out that he had illustrated the selling price, sales volume, and cost relationships for Bartlett Lithographers as a whole. The same concepts, he said, were applicable to individual quotation and pricing situations. If a potential order could be priced lower than competition, and the lower price used as a selling point for increasing the order's size or getting the order if it would otherwise have been lost, the effects upon profit could be evaluated before making a final price commitment. Conversely, using the new quotation form, the effect of higher prices could be analyzed, and the price-cost-profit relationships of these prices could be related to other prices being considered.

The Client's Reaction

The James and Pearce report was mailed to Messrs. Donovan and Peters on July 13, 1962. The last paragraph in the transmittal letter

stated, "We will be pleased to meet with you in the near future to discuss these recommendations in greater detail." In a meeting with Bartlett management in early October 1962, Mr. Turner found the executives to be considerably less receptive to the report proposals than he had anticipated. One of the reasons for the client's negative reaction was simply that, during the last few months, Bartlett had enjoyed an upswing in its business. In Mr. Turner's opinion, the additional gross margins provided by this upswing had dampened management's interest in going after additional dollars of profit through adopting a contribution concept of pricing. Discussing the matter a few days later with his colleagues, Messrs. Schmidt, Quinn and Burns, Turner observed, "This is another example of the way management's interests change. As we've all seen before, it's difficult sometimes to hold its attention on a particular problem long enough to get it resolved. In this case, we will have to wait until the next cycle—that is, until profits drop off again—to make another major thrust at this approach. Fortunately, our continuing relationship with this client will permit us to stay on top of the situation, so that we can raise the pricing issue again at the appropriate time. In fact, this continuing relationship is a unique capability which CPA-consultants possess, and we must be sure that the client receives the benefit of it.

"There's perhaps an even more fundamental reason why our proposals to Bartlett have been ineffective," Turner continued, "and that is simply management's resistance to change. The reasons given by Donovan and Peters for not adopting our proposals were: (1) an unwillingness to enter into any pricing arrangement that did not recover 'full costs,' and (2) a fear that committing part of their capacity to marginal jobs at less than total cost might mean that they would have no room for more profitable work if it should come along. Both of these objections can perhaps be best understood if we try to view the proposed change through the eyes of Donovan and Peters. Recovery of 'full costs' has been ingrained in this generation of Bartlett's management since the beginning, and the current upswing just provides a convenient excuse for maintaining the status quo. In order to implement our suggestions, greater utilization of capacity, and therefore closer scheduling, would be required. At present, all scheduling in done by George Peters in the back of his mind, and without a compelling reason to revise his practices, the easiest thing to do is just to carry on as in the past.

"There's no easy way to lick this problem," Turner concluded, "but it does make it easier to tackle if we define the problem for what

it is. Our approach really has to be an educational one, and hopefully, by continuing to work with this client during the months and years ahead, we can improve their own knowledge and ability to manage their business."

Exhibit 8

BARTLETT LITHOGRAPHERS

Proposed Quotation Analysis Form

Comparison of Costs and Selling Prices

	Price Levels		
	(1)	(2)	(3)
Desired selling prices	xxx	xxx	xxx
Commissions and broker's fees	xxx	xxx	xxx
Total selling price	xxxx	xxxx	xxxx
Variable manufacturing costs	xxx	xxx	xxx
Variable selling costs	xxx	xxx	xxx
Commissions and broker's fee	xxx	xxx	xxx
Total variable costs	xxxx	xxxx	xxxx
Variable gross profit	xxx	xxx	xxx
Fixed expenses	xxx	xxx	xxx
Profit from operations	xxxx	xxxx	xxxx
% variable gross profit to total selling price	——%	——%	——%
% profit from operations to total selling price	——%	——%	——%

Greenville Seaplane Service, Inc.

Kingsbury, Chase & Co., CPAs, was a large New England firm with headquarters in Boston, Massachusetts, and offices in Hartford, Connecticut; Providence, Rhode Island; and Augusta, Maine. The firm had a total of 10 partners. Its practice comprised mainly audit and tax work, and most of its clients were medium-sized business establishments in the southern New England area. The firm's partners were, however, well aware of the fact that they were in a position to render valuable advisory services to many of their clients, and had therefore established a Management Services Department in 1960. In July that year Robert Chase, the senior partner in the Boston office, appointed Kenneth Morrison, a young CPA who had just completed his M.B.A. degree, as the firm's first specialist in management services. Mr. Morrison had been on a two-year leave of absence from the firm to undertake graduate study. The firm's arrangement with Mr. Morrison was that he would be located in the Boston office, and would temporarily be assigned to audit work but would primarily be available for work on management services assignments. Mr. Chase hoped that within a year Mr. Morrison would be specializing almost exclusively in management services work, and would eventually become the firm's partner in charge of the Management Services Department.

The new department proved to be very successful. By 1963 Mr. Morrison had been formally appointed Manager of the department, and had a staff of 4 people, two CPAs and two recent business school graduates. Mr. Morrison still reported to Mr. Chase, but had considerable autonomy in the operation of the department.

In March 1963, David Edwards, partner in charge of the Augusta office, received a telephone call from one of the firm's oldest clients, Leonard Vogel, President of Greenville Seaplane Service, Inc., of

Greenville, Maine. Mr. Chase and Mr. Vogel had met while serving in the same unit of the Army Air Corps during World War II. After the war Mr. Vogel and two other Air Force friends had set up a small seaplane harbor and service establishment in Greenville, on Moosehead Lake. One of Mr. Vogel's partners had been killed late in 1946 when his seaplane crashed on a mountainside in northern Maine, and the other left to set up his own business in California a year later. From late 1947, therefore, Mr. Vogel had operated the business as sole owner. He had incorporated as Greenville Seaplane Service, Inc., shortly after his second partner had left him. The business had become one of Kingsbury, Chase & Co.'s first clients when the CPA firm was established on Mr. Chase's return to Boston in 1946. For the first few years Mr. Chase personally had handled the work on the account, but it was transferred to the Augusta office when that was set up in 1950. However, Mr. Vogel and Mr. Chase had maintained contact with each other.

When Mr. Vogel telephoned Mr. Edwards in March, 1963, he explained that he was preparing plans for the spring, when his busy season started, and needed some help for a review of his prices and pricing policies. He said that Mr. Chase had told him about Mr. Morrison and the new Management Services Department and wondered if they could handle the assignment. Mr. Edwards said he would be glad to have Mr. Morrison call Mr. Vogel and explore the question further.

Morrison's Meeting With Vogel

Mr. Morrison arranged to meet with Mr. Vogel the following week at the firm's Boston office, as Vogel had been planning to fly down to Boston on other business. Prior to the meeting, Mr. Morrison reviewed Greenville Seaplane Service, Inc.'s 1962 and 1961 financial statements, which Mr. Edwards had mailed to him. (See Exhibits 1 and 2, pages 87-89.) Mr. Edwards had also included a short memorandum in which he described Greenville's five "activities" in the following terms:

1. *Charters.* The company offers a charter service to fishermen and hunters wishing to travel to northern Maine, New Brunswick and Quebec. The company's charter services are also often used by wealthy individuals desiring fast transportation to their summer homes in the same area. In addition, other charters of a miscellaneous nature are sometimes requested.

Exhibit 1

GREENVILLE SEAPLANE SERVICE, INC.

Comparative Balance Sheet

December 31, 1962 and 1961

Assets	December 31, 1962	1961
Current Assets		
Cash	$ 1,082	$12,261
Accounts receivable	21,967	6,300
Merchandise inventory	6,906	17,359
Prepaid expenses	4,519	4,994
Total current assets	$34,474	$40,914
Fixed assets		
Flight equipment, tools, fixtures, automobiles and furniture—at cost	$50,118	$45,335
Less: accumulated depreciation	15,528	21,816
	$34,590	$23,519
Building at cost	20,230	—
Net fixed assets	$54,820	$23,519
Total assets	$89,294	$64,433

Liabilities	December 31, 1962	1961
Current Liabilities		
Accounts payable	$ 5,582	$ 7,062
Notes payable (bank)	9,000	1,000
Greenville Marina	4,799	(1,161)
Income taxes	2,082	169
Accrued taxes (Other)	3,453	2,286
Total current liabilities	$24,916	$ 9,356
Leonard Vogel—Note payable	$ 7,000	—
Total liabilities	$31,916	$ 9,356
Stockholders' equity		
Capital stock	$50,000	$50,000
Less: treasury stock	7,500	7,500
	$42,500	$42,500
Earned surplus	14,878	12,577
Total equity	$57,378	$55,077
Total liabilities & equity	$89,294	$64,433

Exhibit 2

GREENVILLE SEAPLANE SERVICE, INC.

Comparative Statements of Income

For the Years Ended December 31, 1962 and 1961

	December 31, 1962	1961
Sales of merchandise		
Parts—shop	$22,811	$11,052
Parts—other	16,512	20,123
Gas and oil	9,935	8,261
Airplanes	4,500	18,475
Total sales	$53,758	$57,911
Less: cost of sales		
Purchases	$40,646	$49,341
Less: inventory increase	972	5,583
Cost of sales	$39,674	$43,758
Gross profit on merchandise	$14,084	$14,153
Service revenue		
Flight instruction, dual	$12,401	$17,353
Flight instruction, solo	12,779	18,342
Charter	23,495	19,807
Tutoring, aircraft rental, etc.	2,285	1,450
Total flight revenue	$50,960	$56,952
Less flight expense	1,781	3,616
Net flight revenue	$49,179	$53,336
Labor (shop)[1]	37,111	34,085
Moorage	6,175	5,964
Total service revenue	$92,465	$93,385
Other income		
Gain on sale of used aircraft	$ 7,179	$ 5,705
Commissions	3,290	3,867
Miscellaneous	2,111	3,816
Total other income	$12,580	$13,388
Total gross profit, service & other income	$119,129	$120,926

[1] Labor hours charged to customers were 9,664 in 1962 and 8,458 in 1961.

Exhibit 2 (continued)

	1962	1961
Operating expenses		
Advertising	$ 1,378	$ 1,362
Bank charges	48	48
Building repairs and maintenance	433	541
Car expense	865	846
Depreciation[2]	7,555	11,487
Donations	65	136
Dues and subscriptions	105	43
Gas and oil—Aircraft	5,419	6,685
Equipment repairs	694	559
Rent	6,850	7,400
Insurance	2,967	3,503
Laundry	736	751
Legal and audit	3,028	263
Licenses and permits	540	301
Office supplies and postage	1,223	1,346
Outside labor	2,400	577
Ramp and ground maintenance	1,090	3,576
Salaries—Flight	15,148	12,886
Salaries—Office	9,358	5,485
Salaries—Shop	29,272	25,546
Shop supplies	1,123	1,234
Taxes—payroll	3,077	2,446
Taxes—other	1,974	3,592
Telephone and telegraph	1,233	1,376
Travel and entertainment	671	193
Utilities	800	845
Total Operating Expenses	$98,052	$93,027
Other expenses		
President's salary	$14,400	$14,400
Interest paid	1,576	1,839
Miscellaneous	971	1,865
Total other expenses	$16,947	$18,104
Total operating and other expenses	$114,999	$111,131
Income before Federal income taxes	$ 4,130	$ 9,795

[2] Includes $2,000 depreciation on nonflying equipment each year. The balance is for depreciation of various aircraft owned for part or all of each year.

2. *Maintenance Service.* The company provides maintenance for seaplanes regularly moored in its harbor, and also for seaplanes specially flown in for that purpose. Seaplane owners from upper New England and the Eastern provinces of Canada often fly their planes several hundred miles to Greenville for service.

3. *Moorage.* The company rents storage space in a small hangar it has constructed, and also provides outside storage on land that it has rented at the shore of the lake. (Mr. Vogel is the owner of the land.)

4. *Flight Instruction.* Mr. Vogel and the other pilots on his payroll offer flight instruction in any of the company's airplanes. These include a Cessna 180, a Piper Super Cub, and a Champ.

5. *Sales of Merchandise.* The company operates a general seaplane supply store that stocks gas and oil, seaplane parts, charts, log books, and miscellaneous items all the way down to soda pop. In addition, the company acts as sales representative for many of the manufacturers of light airplanes, and usually handles the sale of at least two light planes per year. Airplane sales are not, of course, as predictable or as regular as general merchandise sales.

When he arrived, Mr. Vogel told Mr. Morrison that he had been wondering recently whether the prices that he charged for the company's various services were correct. He had started thinking about this because, as he put it to Mr. Morrison, "We're usually pretty busy, and at the end of the year it seems as though we've done an awful lot of hard work and yet we sometimes don't seem to come out with enough profit." In effect, Mr. Vogel was wondering whether changing any of his prices would improve his profitability. He told Mr. Morrison that the prices that he was charging had been set several years ago, and had not been changed at all except in recognition of some cost increases over the years. He said that it had now occurred to him that it might be advantageous to have someone like Mr. Morrison review his price structure, and perhaps come up with some recommendations that would hopefully lead to increased profits.

Mr. Morrison replied that he thought that he and his saff could handle this type of assignment. He told Mr. Vogel that it was his practice to ask prospective management services clients to spend some time with him describing their operations and the nature of their problem so that he could form an opinion as to the amount of work

which would be required. If Mr. Vogel had time to do this on this visit he would try to give him an estimate before he left for Greenville. Mr. Vogel said that he did have the time. Mr. Morrison suggested he start by giving him a rundown on the important factors affecting each part of the business. The discussion which ensued is reported below.

1. *Flight Charter*

The two planes used for charters were the Cessna at $35 per hour and the Super Cub at $16 per hour. Direct expenses incurred in connection with charter flights were mainly gasoline consumption, at the rate of 12 and 7 gallons per hour, respectively. Mr. Vogel said that pilot's salary was also one of the applicable costs, but when Mr. Morrison questioned him on this point he admitted that the pilots' terms of employment were fixed by contract, either 12 months or 6 months per year, and that in addition the pilots also doubled as flight instructors when required. Mr. Vogel said that there were four or five operators of charter flights in the area that he served, but that he did not experience too much competition. He felt that the service that he provided was far superior to that offered by his competitors in that, for example, his service was more personalized, and his flights were better, faster, and used more modern equipment. He said that he did more charter business than his typical competitor and therefore achieved some of the advantages of specialization.

2. *Servicing*

Shop labor was charged out at $6.00 per hour. Before charges were finally billed, it was Mr. Vogel's custom to review the total bill and adjust it downwards, if necessary, depending on the value of the job to the customer and on how well it had been done. Mr. Vogel said that repair work on aircraft was mostly a question of labor time, rather than expensive parts. The result was that the cost of aircraft repairs was very high. He had known cases in which the cost of a repair job exceeded the market value of the aircraft after the repair had been carried out.

Repair work was one of the areas in which Mr. Vogel thought he ought to increase his rates, but he said that repair work was so expensive that he did not feel it was possible for him to charge more for it. He had no corporations among his repair clients, and he felt that the individuals who came to him would lose their interest in flying if he made repair work too expensive. He believed that his customers only

had a limited amount of money to spend on aircraft maintenance. Mr. Vogel said that he had no competition in his repair service because his company was the only establishment in the area that had the specialized facilities necessary to take care of float aircraft. In addition, he pointed out that many of his repair mechanics had been with him for as long as 15 years, and were well known for the quality of their work. These factors, he believed, were the primary reasons why people often flew several hundred miles to bring their aircraft to Greenville for repair work.

Mr. Vogel told Mr. Morrison that he had heard that very few repair shops in the light aircraft service industry were profitable. However, he said that he would never think of closing down his own shop, because he needed its facilities to take care of the aircraft that he operated himself. He estimated that the shop had worked about 1,500 hours on servicing his planes in 1961 and a somewhat lesser amount, perhaps 1,300 hours, in 1962. In addition, having a well set up repair shop often meant that additional profits could be obtained from the rebuilding of wrecked aircraft which could be bought for a low price and sold for a good profit after being rsetored to operating condition. He felt that this kind of profit made up for the losses that were incurred in the shop on routine jobs. Another variation on this idea was to buy and use a new aircraft and then, after a few hundred hours of flying time, renovate it and sell it at a price that was below the new machine price at retail, but still above the company's wholesale cost.

3. *Moorage*

The company charged $15 a month for outside storage and $25 a month for six of the eight inside stalls. The seventh inside stall was rented at $30 a month, and the eighth was used to store the company's Cessna plane. Mr. Vogel was hoping to raise all inside rentals to at least $30 per month. Mr. Vogel explained that he used a forklift truck to move seaplanes from the lake shore ramp to the storage area between the hangar and the repair shop. When a customer came to use his plane, or a service or repair job was scheduled, the forklift truck would then simply drive to the storage area and pick up the plane in question.

In response to a question from Mr. Morrison, Mr. Vogel said that while repair work did not bring much in the way of other types of business with it except moorage, it was often the case that planes

were brought in for moorage and that the owners would then later request that Mr. Vogel have them serviced during the winter at any convenient time. Apparently some repair shops that Mr. Vogel knew about gave free moorage for airplanes brought in on repair jobs, but it was Mr. Vogel's practice to charge separately for moorage for all the time that a moored plane was not in the repair shop. Because of the protected position that the company's premises enjoyed at the foot of Moosehead Lake, it was quite safe for aircraft to be stored outside during the winter. Theoretically there was danger from both high winds and heavy snow, but in all the years that Mr. Vogel had known Greenville, the southern portion of the lake had never been subject to high winds at any time of the year, and it was a relatively simple matter to prevent excessive amounts of snow from piling up on aircrafts' wings when snow fell during the winter.

4. *Flight Instruction*

The company employed two instructors during the six summer months, and kept one of them on for the six winter months as well. The permanent instructor received $500 per month and the summer instructors $450 per month. Mr. Vogel said that they averaged 80 to 90 hours a month chargeable time in the summer each, and 30 to 40 hours a month in the winter. The instruction charges and gas consumption rates for the three airplanes used were as stated below:

	Solo	Dual	Gallons of gasoline per hour
Champ	$10	$15	5
Super Cub	12	17	7
Cessna 180	30	35	12

Mr. Vogel told Mr. Morrison that he was fairly certain that flying lessons were unprofitable. He said that the $5 differential between solo and dual rates was "obviously not sufficient to cover the cost of employing an instructor." Mr. Vogel told Mr. Morrison that the volume of flying instruction had declined steadily since the end of the war, when many ex-servicemen had decided to take flying lessons under the GI Bill. In addition, his company experienced severe competition for instruction business because they were at a considerable disadvantage compared to the many land plane operators in the area. Compared with these people, Mr. Vogel's seaplanes required a larger

investment and upkeep cost and involved a much greater risk in providing flying instruction.

5. *Merchandise Sales*

There was about a 25 per cent average gross profit on the sale of general merchandise and parts (the latter were sold mainly in connection with repair work, but occasionally were delivered directly to the customer). Mr. Vogel said that, of course, there was some expense connected with the handling of parts sales. For instance, he estimated that about 20 per cent of his full-time pilot's time was spent on parts sales activities. The gross profit percentage on gas and oil was about 30 per cent, and Mr. Vogel remarked that his company was selling gas for 2 to 3 cents a gallon less than competitors.

As a final point, Mr. Vogel pointed out that it was not really strictly necessary for depreciation to be charged in his annual income statements, although he had been doing so. With the exception of the Cessna, which had depreciated somewhat, Mr. Vogel had found that it was usually possible to sell used airplanes at approximately the wholesale cost of the plane to the company, so that no loss in value was ever sustained.

Mr. Vogel summed up by saying that he had flight equipment that could be flown more than it was being flown, and facilities that could be used more than they were being used. What he wanted to do was to use this unused capacity and to do so in the most profitable way. If, for example, a price reduction in charter flights would increase total charter flight profits by adding more in volume than was lost through the price reduction, then he thought that this was a sound and constructive way to put his idle capacity to use.

By the time that this point was reached it was almost midday, and Mr. Vogel mentioned that he was having lunch with Mr. Chase. He said he would return after lunch to see whether Mr. Morrison had been able to form any opinion about the project. As he left Mr. Vogel made a casual comment that seemed to indicate that he was somewhat apprehensive about the potential cost of the project. Mr. Morrison replied, "Let's talk about that when you get back from lunch."

Questions

1. What type of fee arrangement do you think Mr. Morrison should offer to Mr. Vogel? If Mr. Vogel requested some rough estimate of the total billing, how would you respond?

2. Do you think that Mr. Morrison should formalize this project by sending Mr. Vogel a letter confirming the nature and the scope of this engagement? Draft a letter that you think might be suitable for this purpose.

3. Using the data available in the case, prepare an analysis of product line profitability for Greenville Seaplane Service, Inc., for 1962 and and/or 1961. What comments can you make about Mr. Vogel's pricing policies as a result of your analysis?

4. What kinds of additional data could Mr. Morrison try to get from a visit to Greenville in order to improve upon your analysis?

5. As Mr. Morrison, prepare a memorandum to Mr. Vogel reporting your major findings and recommending the way that he might proceed to modify his prices in order to improve his profitability.

Commentary on Greenville Seaplane Service, Inc.

When Mr. Vogel returned to Mr. Morrison's office the latter was ready with a suggestion. He told Mr. Vogel that he felt that there were two interrelated elements in the problem—not only pricing as such but also product profitability. For a multiproduct company an analysis of these two elements could be quite a large job. He appreciated, however, that Mr. Vogel did not want a large and expensive job done. He proposed, therefore, that the firm undertake a limited review of the problem. This review would be exploratory rather than decision-oriented, but would serve to open up the problem, and in all likelihood indicate whether and where any additional work was necessary. Mr. Morrison said that it was quite possible that some preliminary conclusions might in fact be drawn from the review he had in mind, but he cautioned Mr. Vogel against expecting too much in the way of results. Nevertheless, he pointed out, the cost would be limited in accordance with Mr. Vogel's wishes, and yet some useful results might be obtained. He said that to minimize the cost he would assign Mr. Dexter Cleve, one of his staffmen, to do the bulk of the work. Mr. Cleve, one of the two M.B.A. graduates on Mr. Morrison's staff, was billed at the rate of $12.50 per hour. Mr. Morrison said that Mr. Cleve would probably need to devote the better part of a week to the project. He, himself, would supervise Mr. Cleve, and bill his own time at his regular rate of $20 per hour. He further suggested that his report be informally presented by way of an informal memorandum, to avoid unnecessary expenditure of time in

presentation (although he added that he would certainly be available to discuss his findings if Mr. Vogel so desired). In total he estimated the cost of the job at between $500 and $600. He pointed out that the firm normally did not undertake jobs of such small size.

Mr. Vogel replied that Mr. Morrison's proposal seemed to be in line with his own wishes, particularly in the matter of cost, and authorized him to proceed as soon as he was ready. Mr. Morrison promised to start Mr. Cleve on the assignment within the next three weeks. Since the assignment was defined as a review, Mr. Morrison expected that Mr. Cleve would be able to do most of his work in the Boston office, relying primarily on the firm's files and the notes that Mr. Morrison had made during his conversation with Mr. Vogel, and supplementing these with a one-day trip to Greenville and telephone calls to Mr. Vogel.

Mr. Cleve's Investigation and Analysis

Later that week Mr. Cleve found an opportunity to begin his review of the material that Mr. Morrison had given him, which included the company's 1962 and 1961 financial statements (Exhibits 1 and 2, pages 87-89) which Mr. Edwards had mailed to Mr. Morrison. After reviewing the material, Mr. Cleve's first conclusion was that the dominant characteristic of the company's operating situation was the fact that a very substantial portion of its total expenses was fixed. In addition, many of the expense headings in the income statement were items that could not be allocated to any of the business' five areas of operations. In other words, Mr. Cleve visualized the company's total annual operating expenses as being made up of the following three types:

1. Expenses that varied more or less directly with the volume of business in a particular operation.

2. Expenses which could be assigned to one of the company's operating activities, even though the expense itself was unlikely to vary with volume.

3. Expenses which were fixed for the business as a whole, and could not be assigned to any of the individual operations.

To Mr. Cleve, the importance of this breakdown was that under pricing theory, any business operation should make a contribution over

and above the directly variable costs associated with it, and that the total of such contributions over variable costs should at a minimum provide for the fixed costs of operating the business entity. If the company's cost framework had been the reverse of what it was (i.e., if variable costs had been greater and fixed costs lower), Mr. Cleve reasoned that it would have been relatively easy to gauge overall profitability from individual product line profitability because the bulk of the expenses could properly be allocated to individual operations. If fixed overhead costs were small, then it would not be necessary for the required contribution to rank large in comparison with the variable costs per unit. In the case of Greenville Seaplane Service, Inc., however, Mr. Cleve recognized that his problem was much more difficult, as the two types of overhead "pools" which had to be covered were very large in relation to the variable costs of running each operation. Because of the large overhead factor, Mr. Cleve thought that here indeed was a case where "direct cost" pricing could lead a firm into financial difficulties.

Referring to Mr. Morrison's notes, Mr. Cleve noted that Mr. Vogel himself had been aware of this problem, although he had expressed it in a different way, when he had pointed out that he had facilities and equipment ready for use and that his problem was getting more use out of them. The mere fact of having the equipment and facilities available accounted for the bulk of the company's costs, and these costs had to be met by the margins over and above the variable costs earned from providing services. As a first step in his analysis, therefore, Mr. Cleve decided to identify as accurately as possible those expenses which were fixed and those which varied with the volume of business. Taking the 1962 and 1961 income statements, he prepared the schedule on page 98, which identified costs which could be allocated, and which therefore provided a total figure for fixed "general overhead" costs.

Several of the items in the schedule on the following page gave Mr. Cleve some difficulty which he eventually finally resolved by discussing them with Mr. Vogel. The first of these was depreciation. According to the notes that Mr. Cleve had received from Mr. Morrison, there was no real decline in market value on airplanes, even though Mr. Vogel's books showed an item for depreciation expense, and this statement was corroborated by the gain realized from the sales of used aircraft in 1962 and 1961. For the purpose of his analysis, therefore, Mr. Cleve decided to ignore all depreciation expense except the $2,000 per year depreciation on non-flight equipment.

Computation of General Overhead, Years 1962 and 1961

	1962	1961
Expenses per income statements:		
"Operating expenses"	$ 98,052	$ 93,027
"Other expenses"	16,947	18,105
Total expenses	$114,999	$111,132
Less items not to be included in general overhead (i.e., to be allocated)		
Depreciation on flight equipment	$ 5,555	$ 9,487
Gas and oil	5,419	6,685
Insurance	2,740	3,300
Laundry	736	751
Salaries—flight	15,148	12,886
Salaries—shop	29,272	25,546
Shop supplies	1,123	1,233
Taxes—payroll	2,534	2,100
Officers' salary[1]	2,400	2,400
Total to be allocated	$ 64,927	$ 64,388
General overhead	$ 50,072	$ 46,744

The next item requiring special consideration was insurance expense. On inquiring into the nature of the policies held by the company, Mr. Cleve found that the company's insurance expense could be allocated partly to general overhead and partly to the flight department and the repair shop. The amount listed in the schedule above was the total that could be allocated to these two departments. Payroll taxes were similarly analyzed and allocated. (See departmental analysis on the following pages.)

Finally, Mr. Cleve noted that Mr. Vogel's salary was charged at $14,400 per year. Mr. Cleve felt that it was reasonable to assume that

[1] Officers' salary at $1,000 per month included in overhead (see text for explanation). The $2,400 deduction is not actually allocated to a product line; it is deducted only because general overhead is to include only a $12,000 salary, as against $14,400 paid.

a business of this sort would, in the absence of an owner-manager, have to employ a manager at a substantial salary and that this salary ought to be included in the general overhead pool. After some discussion with Mr. Vogel, therefore, Mr. Cleve decided that a managerial salary of $1,000 per month would be appropriate to include in the general overhead, and he accordingly deducted from the total the excess over that amount that had actually been included in the expense totals on the schedule on the previous page.

Having established the size of the general overhead pool, Mr. Cleve then decided to compare the contribution rates being earned by the different departments of the business. He decided to classify the company's operations into three groups for purposes of analysis. The first was merchandise sales, the second was the flight department i.e., instruction and charter), and the third was the repair shop. This grouping omitted moorage as a separate income producing activity. In Mr. Cleve's opinion (substantiated by a discussion with Mr. Vogel), there were no expenses at all that were directly allocable to moorage, and so he decided to credit moorage income against the general pool. Mr. Cleve's computations of departmental gross profits for the three groups are shown in Schedules I, II, and III, which follow.

I—Computation of Gross Profit from Sales of Parts, Airplanes, and Gas and Oil—Years 1962 and 1961

	1962	1961
Sales—		
Parts	$39,323	$31,175
Airplanes	4,500	18,475
Gas and oil	9,935	8,261
	$53,758	$57,911
Less cost of sales (per income statements)	39,674	43,758
Gross profit	$14,084	$14,153
% of gross profit	26.2%	24.4%

II—Computation of Gross Profits from Flight Department
Years 1962 and 1961

	1962	1961
Income—		
Instruction, including tutoring	$26,430	$36,203
Charter	23,495	19,807
Aircraft rental	1,035	942
	$50,960	$56,952
Direct expenses—		
Salaries—flight	$15,148	$12,886
Taxes—payroll	865	700
Gas and oil	5,419	6,685
Insurance	2,626	3,100
Flight expense	1,781	3,616
Shop hours @ $4 per hour	5,284	6,000
	$31,123	$32,987
Gross profit	$19,837	$23,965
% of gross profit	38.9%	42.8%

III—Computation of Gross Profit from Shop Labor
Years 1962 and 1961

	1962	1961
Sales of shop labor	$37,111	$34,085
Direct expenses—		
Salaries—shop (after deducting charges on own aircraft)	$23,988	$19,546
Taxes—payroll	1,669	1,400
Shop supplies	1,123	1,234
Laundry	736	751
Insurance	114	200
	$27,630	$23,131
Gross profit	$ 9,481	$10,954
% of gross profit	25.5%	32.1%

The schedules (II and III) for the flight department and shop labor both included expense headings such as insurance and payroll taxes which had been allocated based on Mr. Cleve's analysis. In addition, Mr. Cleve decided to include as a flight department expense the value

Analysis of Net Earnings, Years 1962 and 1961

	1962	1961
Gross profit—		
Sales	$14,084	$14,153
Flight department	19,837	23,965
Shop labor	9,481	10,954
	$43,402	$49,072
Less general overhead, net of moorage*	43,897*	40,778*
Operating profit	$ (495)	$ 8,294
Other income, net of depreciation over $2,000**	7,025**	3,901**
Net earnings before officer's salary adjustment	$ 6,530	$12,195
Adjustment to bring officer's salary to actual amounts	(2,400)	(2,400)
Net earnings per statements	$ 4,130	$ 9,795
Notes:		
* Total general overhead	$50,072	$46,744
Less moorage	6,175	5,964
Net general overhead	$43,897	$40,780
** Other income, per income statements	$12,580	$13,388
Less depreciation as charged	(7,555)	(11,487)
Add depreciation included in general overhead	2,000	2,000
Net other income	$ 7,025	$ 3,901

of the shop labor performed for the flight department. An analysis of Greenville's records showed that 1,321 hours had been spent by the shop in 1962 on planes owned by Greenville. Mr. Cleve valued these hours at $4.00, a rough average of the hourly rates actually charged to commercial customers in 1961 ($4.03 per hour) and 1962 ($3.84 per hour). Because Mr. Vogel's 1962 estimate of "inside" shop hours was so accurate, Mr. Morrison accepted the 1,500 hour estimate for 1961 without verification. The amounts thus determined were treated as an expense of the flight department in Schedule II, and the same amounts were used to reduce the expense of shop salaries in Schedule III.

After preparing the departmental gross profit analyses, Mr. Cleve prepared the schedule (above) to reconcile departmental gross

profits with net earnings as reported for the corporation in its 1962 and 1961 income statements. This reconciliation, as will be noted, shows departmental gross profits, less general overhead net of moorage (i.e., operating profit), plus other income net of additional depreciation not included in overhead, less additional officer's salary not included in overhead, resulting in the before-tax earnings total as reported in the financial statements.

Mr. Cleve then turned to an examination of the variability of the departmental gross margins that he had just computed. He realized that while the departmental contribution percentages that he had calculated were accurate guides as to the extent to which present prices produced margins to cover general corporate overhead, it was nevertheless true that many of the expenses that he had included in the departmental statements were fixed rather than variable. This meant that additional or marginal business could be more profitable than the calculated gross profit percentages indicated. He reasoned that it was important for Mr. Vogel to know the marginal profitability of his different operations, in the event that it was later decided that price changes might produce greater total contributions and thus increase profits. As far as the gross profit on merchandise sales was concerned, it was clear that the margin calculated, roughly 25 per cent, was reasonably accurate, because all of the costs deducted from sales were variable with sales. As it appeared in the corporation's income statements, "cost of sales" was simply the normal calculation of purchases less inventory adjustments.

As far as the flight department was concerned, Mr. Cleve concluded that the only expenses which were truly variable were the following: gas and oil, flight expense, and shop hour charges. (While the latter was an internal charge, Mr. Cleve thought it was probably a fair representation of the costs actually incurred in maintaining the company's aircraft.) The major "direct expense" for the flight department was "flight salaries" which could only vary in large steps, depending on Mr. Vogel's decision to hire or fire his pilots. Once they were on the payroll, their salaries were incurred whether or not they flew charters or provided student instruction. The other major direct flight department expense, insurance, was definitely fixed, as it related to the coverage that Mr. Vogel bought each year against the various risks that were associated with having a flight department in operation. The three truly variable items totalled $16,300 in 1961 and $12,484 in 1962. These totals were 29 per cent and 24 per cent respectively on the flight department revenue in each year. This meant that, on the

average, flight revenue provided a 75 per cent contribution. Mr. Cleve decided to look into this more deeply, and prepared the following schedule to show the hourly costs of operating the three different aircraft which the company owned.

Computation of Estimated Hourly Cost of Operating Aircraft

	Champ	Super-Cub	Cessna
Gas consumed (at cost)	$1.26	$1.76	$3.02
Maintenance			
Manhours (at $4 per hour)	1.30	1.92	2.32
Material	.40	.50	1.25
	$2.96	$4.18	$6.59

The costs included in the schedule above were the only costs that varied with actual operation volume. Mr. Cleve contrasted these hourly costs with the standard hourly rates that the company charged for the use of its aircraft. This comparison showed the following: (all figures *per hour*).

	Champ	Super-Cub	Cessna
Revenue			
Solo instruction	$10.00	$12.00	$30.00
Dual instruction	15.00	17.00	35.00
Charters	—	16.00	35.00
Costs (previous schedule)	$ 2.96	$ 4.18	$ 6.59
Contribution			
Solo instruction	$ 7.04	$ 7.82	$23.41
Dual instruction	12.04	12.82	28.41
Charters	—	11.82	28.41
Contribution %			
Solo instruction	70%	65%	78%
Dual instruction	80%	75%	81%
Charters	—	74%	81%

As can be seen from the above, none of the different flying operations offered a substantially different contribution rate to the average 75 per cent referred to above. Perhaps the most notable conclusion to be drawn from this particular portion of the analysis was that the Super-Cub appeared to be the least profitable plane on a percentage contribution basis. One conclusion which Mr. Cleve drew from the

Combined Results of Flight Department and Its "Subsidiary Operation," the Repair Shop

	1962	1961	Calculations
Flight department direct expenses	$31,123	$32,987	
Less volume—variable items	12,484	16,301	
Flight department fixed expenses	$18,639	$16,686	(1)
Add: Repair Shop fixed expenses:			
Direct expenses	$27,630	$23,131	
Less: volume—variable items*	1,859	1,985	
Gross fixed expenses	$25,771	$21,146	
Less: net sales revenue (net of variable costs)	35,252	32,100	
Repair shop net fixed expenses (gain)	$(9,481)	$(10,954)	(2)
Flight department net fixed expenses	$ 9,158	$ 5,732	(3) = (1) + (2)
Flight department contribution %	76%	71%	(4)
Flight department breakeven volume	$12,000	$ 8,100	(5) = (3) ÷ (4)
(Actual volume	$50,960	$56,952)	

* Supplies and laundry

percentage contribution figures was that if Mr. Vogel believed that the demand for instruction or charter flights was very susceptible to price reductions, there was plenty of latitude for them.

As far as the repair shop was concerned, Mr. Cleve came to the conclusion that practically all of the "direct expenses" were in fact fixed, once the repair shop was set up and in operation. Mr. Vogel indicated that he had had many of his mechanics in his employ for a considerable period of time, and he had told Mr. Morrison that he had no intention whatsoever of laying them off when business was slack. As he had told Mr. Morrison, many of his repair customers came to him because they knew of the reputation of his mechanics. The second thing that struck Mr. Cleve about the repair shop was the other statement Mr. Vogel had made to Mr. Morrison; namely, that as far as he was concerned, it was necessary for him to have a repair shop in existence in order to cater to the needs of his flight department. He was thus not particularly concerned if the repair

shop did not show a profit on the outside repair work that it performed. (In actual fact, as the schedule included earlier shows, this department did provide a contribution of between 25 and 30 per cent.) The important point, however, was Mr. Vogel's insistence that his having a repair shop was in no way related to the volume of repair work that came from outside.

Bearing this in mind, Mr. Cleve prepared the schedule on page 104, which showed the results for the flight department and the repair shop combined, with the revenue earned by the latter being deducted from its total expenses, and the net excess being deducted from the direct expenses of the flight department. This calculation produced an interesting "breakeven" result.

The schedule on page 104 showed that with this reorganization of the figures, the flight department together with its "subsidiary service department," the repair shop, actually had a very low net fixed cost to be covered from service revenue in 1962 and 1961. As the schedule shows, the breakeven sales volume for the two years was $12,000 and $8,100, respectively, compared to over $50,000 realized in each year.

Reverting to the point made earlier that variable expenses in the repair shop only amounted to a little under $2,000 in both 1962 and 1961, against revenue of $37,000 and $34,000, respectively, Mr. Cleve noted that the actual contribution percentage in the shop (disregarding the treatment in the immediately preceding paragraph) was therefore 94 per cent. Whether or not repair shop contribution was allocated to the fixed expenses of the flight department, Mr. Cleve realized that the fixed nature of practically all of the repair shop expenses meant that marginal business was extremely profitable.

Mr. Cleve's Conclusions

When he had completed the preceding analysis, Mr. Cleve wrote a memorandum to Mr. Morrison enclosing the various schedules reproduced on the preceding pages, and commented as follows:

> The main accomplishment of my analysis has been to bring out very forcibly the extent to which Greenville Seaplane's costs of doing business are fixed, even at the departmental level. This means that additional business in both the flight department and the repair shop would be extremely profitable; the only department with "conventional" profit margins is the merchandise sales department.
>
> I have always felt that one of the most important factors to be taken into account in pricing decisions is the competition which

any particular businessman faces. In the case of this particular business, by Mr. Vogel's own admission, there is not very much actual competition. In fact, most of the competition felt by Greenville Seaplane Service, Inc., is in the instruction field, where land plane operators are at considerable advantage, compared to Mr. Vogel. On the other hand, Mr. Vogel experiences little competition for most of the other lines of his business, simply because his is the only float aircraft company in the area. For the bulk of his business, therefore, Mr. Vogel is actually in the position of a local monopolist. As evidenced by his actions regarding the adjustment of repair bills, Mr. Vogel in fact demonstrates no intention of acting like a monopolist. Apparently he believes that repair bills at "standard" rates or at posted rates are "just too high" for all or many of his customers. Presumably, Mr. Vogel's business judgment tells him that he would suffer more from the alienation or shock caused by large repair bills than he would gain by the increased revenue to be gained by full-price billing.

This last point is particularly relevant as far as a pricing recommendation is concerned. Despite Mr. Vogel's local monopoly (perhaps because of it), he avoids billing excessive charges for repair work. It may be presumed that he knows what he is doing. In any event, it was entirely beyond the scope of this particular study to determine whether Mr. Vogel would in fact lose more by increasing his repair charges and taking the risk of losing other business.

As far as merchandise sales were concerned, my conclusion is that Mr. Vogel is probably in the usual type of retail selling situation there, namely one in which his selling prices are fairly well fixed or established, either by custom or by the manufacturers. In fact, retail prices might even be determined by competition for items such as gasoline, although it is hard for me to imagine how anyone dissatisfied with Mr. Vogel's gasoline price could take his plane elsewhere to obtain gasoline. Here again, it was primarily a question of public relations. If the customer knows that because of Mr. Vogel's local monopoly, he is being charged excessive or "above normal" prices for gasoline, oil, etc., it is quite possible that he would feel alienated and that Mr. Vogel would stand to lose future business.

The flight department is, in my opinion, the most likely candidate for price experimentation and changes. As my analysis has pointed out, the variable costs included in the provision of all of the flight departments' services are very small indeed, so that at current price levels the contribution earned is extremely high. From the analysis, it is clear that Mr. Vogel could experiment by lowering his instruction rates, in order to see whether volume would increase sufficiently, without risking the possibility of not covering variable costs. My conclusion is that the charges for flight instruction should probably be reduced, perhaps below that charged by land-

based flying schools. If the market were price sensitive at all, this would be likely to increase the instruction volume, either as a result of expansion of demand, or at the expense of Mr. Vogel's competition. Suitable experimentation would indicate what the most advantageous reduction would be.

On the other hand, the demand for charter services is probably insensitive to price changes mainly because it is very much a luxury type of purchase. I would therefore recommend that Mr. Vogel experiment by raising his charter prices in an effort to test this assumption. If it is found that net revenue increases, Mr. Vogel's profits would improve. If on the other hand he finds that the demand for charter services is sensitive to price, he could experiment in the other direction. Charter rates are, of course, subject to the same limitation that Mr. Vogel has already placed upon repair shop work; namely, that the charges should not be so high as to alienate customers. In my opinion, Mr. Vogel is the best judge of the extent to which prices could be raised without incurring the intangible costs of customer ill will. However, a conscious program of price experimentation, i.e., 10-lesson prices, group prices, reduced prices on Mondays, etc., might provide very useful data about market sensitivity.

The combined effect of raising charter rates and reducing the rates for instruction may have the additional longer-run advantage of broadening the market for private seaplane flying. If Mr. Vogel makes it less expensive for a repeat charter customer to learn to become his own pilot, he may succeed in converting some charter customers to pilot-owners, with a resulting increase in Greenville's revenues from plane sales, servicing and moorage.

After Mr. Morrison had reviewed Mr. Cleve's memorandum, he forwarded it and the supporting schedules to Mr. Vogel, with a note indicating that he thought that Mr. Cleve's analysis covered all relevant points in adequate detail. Mr. Morrison said that he would call Mr. Vogel the following week to see whether he wished to discuss the analysis with him.

When he called Mr. Vogel, Mr. Morrison found that he was well satisfied with the analysis that had been done. He asked for some technical explanations on some of the schedules compiled by Mr. Cleve and told Mr. Morrison that he felt that the study had been very helpful to him, and that he would give serious consideration to following the various recommendations. He added that he did not wish to have any additional work done by Kingsbury, Chase & Co. on the pricing question at the present time, because he was not certain whether additional expenditure would produce results that were more helpful or meaningful to him than the initial report, with which he

repeated he was extremely pleased. However, he pointed out that he would be seeing Mr. Edwards of the Augusta office from time to time in connection with the audit and tax work they performed for him, and would again make his contact via Mr. Edwards if further reflection convinced him that additional analysis of the pricing problem was merited.

Industrial Heating Equipment Company, Inc.

Fuller & Co., a local accounting firm in Cleveland, Ohio, numbered among its clients of long standing the Industrial Heating Equipment Company, Inc., (HeatCo). HeatCo sold and serviced a wide variety of industrial heating systems in the Greater Cleveland area. Fuller & Co. had performed an annual audit for HeatCo and had served as tax advisers to the company and its owner-president, Mr. Joseph White, for more than 20 years. A very friendly relationship existed between Mr. White and Mr. Norman James, the partner in charge of the HeatCo account.

During the first week of January, 1962, when Mr. James was holding a preliminary tax meeting with Mr. White, the latter mentioned that he was concerned because his internal record-keeping and reporting system did not give him information on the costs generated by the various departments within his company. This concern had apparently developed in December, 1961, when Mr. White had tried to review his pricing schedule for the company's service department because he suspected that the department was operating at a loss. He asked if anyone at Fuller & Co. could help him with this problem. Upon hearing this, Mr. James suggested that Fuller & Co.'s Management Services Department might be of assistance and suggested that a meeting be arranged later that week with the partner in charge of the department to see what Fuller & Co. could do for HeatCo. Later that day Mr. James dropped into the office of Mr. Joseph Brooks, the Fuller & Co. partner in charge of the Management Services Department, to set up the appointment and tell him some of the background.

Fuller & Co. had six full partners, including Mr. Fuller, the founder, Mr. James, Mr. Brooks and three others, and an equal number of junior partners. In all, Fuller & Co. employed 35 accountants and 10 additional office employees. Its audit clients ranged from a small seven-man specialty manufacturing concern to a heavy equipment builder with annual sales of $30 million. Most of its clients were companies with between 50 and 250 employees. Over and above its audit clients, many of whom were tax clients as well, Fuller & Co. served a number of companies only as tax counselors. These included companies which did not wish to be audited or who were audited by small local accounting firms which had no tax department and which had referred their clients to Fuller & Co.

The Management Services Department of Fuller & Co. had been established in late 1956 under the direction of Mr. Joseph Brooks, who was now a full partner in the firm. Originally management services work took only a fraction of Mr. Brooks' time, but by 1962 the department had grown to the point where not only did he spend most of his time with management services work, but he also had a young staff accountant assisting him full time and used a portion of the time of several other audit staff members. Mr. Brooks expected that by mid-1963 the volume of work in the Management Services Department would support a full-time, five-man staff which would include three CPAs and two men with general business background who were to be hired in mid-1962 and put through a 6-12-month training program. Mr. Brooks' department currently accounted for about 10 per cent of Fuller & Co.'s total billings.

Mr. Brooks had joined the firm in 1955, after spending several years in a U.S. Navy audit office following his graduation from college in 1952. In 1953, while in the Navy, he passed his CPA exams and subsequently had worked closely with several small and medium-sized Navy contractors and became quite interested in their operating problems. Upon joining Fuller & Co., he was assigned to the tax department, where he spent almost two years before Mr. Fuller asked him to accept responsibility for setting up a Management Services Department.

During the first eight months of Mr. Brooks' new assignment, he spent almost all of his management services time in improving his professional competence in his new field. He also continued to spend a diminishing proportion of his time on the tax problems of clients he had served previously. His "training program" included reading books

on management techniques and concepts, attending seminars and trade shows held by manufacturers of computers, machine tools, and other equipment, visiting the plants of many of Fuller & Co.'s clients, and reading on a regular basis all the leading management journals. During this period, he also talked to each of the firm's audit and tax partners to acquaint them with the types of management service jobs he felt he could undertake. He asked them to look for opportunities to suggest possible consulting engagements to their clients.

Mr. Brooks' early management services jobs were concentrated primarily in the area of inventory control, and he performed all the work on each engagement himself. Virtually all of these jobs were referred to him by the Fuller & Co. audit partners. By 1962, however, the Management Services Department was being called in for many different types of tasks.

As of early in 1962, Mr. Brooks was spending his time approximately as follows:

50%—Analyzing data and developing recommendations for the management services jobs handled by himself.

30%—Supervising the Management Services Department and the management services jobs handled by juniors.

10%—Unbilled (new business development, self education, etc.)

5%—Working with other Fuller & Co. partners in connection with Audit or Tax Department engagements.

5%—Performing tax work for the Fuller & Co. tax department.*

Fuller & Co. billed for management services work in the same manner as for regular audit or tax work. The fees were set up at the usual rate for the individuals who worked on a job, and the client was charged for all actual time spent. There were, however, two exceptions to this rule (which also occurred occasionally in both tax and audit work). If a specific engagement took much less time than might have been expected based on the results, or if the client received far more value than the fee would indicate, Fuller & Co. would increase

* Primarily connected with the litigation of a specific tax case on which Mr. Brooks had done much of the initial work prior to the establishment of the Management Services Department.

the fee to reflect these factors. On the other hand, if client goodwill or new account cultivation considerations indicated that a fee smaller than the amount actually generated should be charged, Fuller & Co. would reduce the fee appropriately. About 10 per cent of the firm's management services work fell into this latter category. Separate invoices to cover each management services job were sent to the firm's clients (even to those which retained Fuller & Co. on an annual basis for audit and/or tax work). This was done to help establish the management services group in the minds of its clients as a separate department of Fuller & Co. providing a service separate and distinct from that of the regular audit or tax staff.

Industrial Heating Equipment Company, Inc.

After Mr. James had left Mr. Brooks, the latter called John Park and asked him to bring in the office file on HeatCo. A summary of some of the recent financial statements in the file is contained in Exhibits 1 and 2 (Balance Sheets and Income Statements, respectively) which appear on pages 117 and 118. In addition, the file contained a descriptive memorandum which Mr. James had prepared some years previously, and which is summarized below:

> Industrial Heating Equipment Company, Inc., which is known by its trademark, HeatCo, is located in [one of the industrial areas on the outskirts of Cleveland]. The firm sells and services a wide variety of industrial and institutional heating systems in the Greater Cleveland area. HeatCo.'s annual sales run between $400,000 and $500,000. Mr. Joseph White, president of HeatCo., owns 100 per cent of the stock of the firm. He is assisted in the management of his company by Mr. Buldon Ives, who as sales manager is the second "key man" at HeatCo. Mr. Ives is thoroughly familiar with all the statistics and figures of the company's operations and participates in all management decisions.
>
> HeatCo performs two distinctly different, although inseparable, types of activities. The major type, which produces by far the greater portion of its sales income and takes the majority of its management's time, is the sales and installation of industrial heating systems. (The phrase "industrial heating systems" as used here refers to systems for institutions such as hospitals and schools as well as for industrial plants and office buildings.) HeatCo's second type of activity is the servicing of these heating systems. This service is a necessary and important part of the company's activities, because without it the sale of systems would be virtually impossible.

The sales activities of the company are, of course, a year-round activity, but the installation of heating systems is highly seasonal, reaching a peak during the summer and dropping to almost a standstill during winter. The company varies its work force in accordance with these seasonal fluctuations as much as possible, although it has to maintain its supervisory personnel and a nucleus of skilled workers on the payroll throughout the year in order not to lose them.

Service, on the other hand, is a relatively stable activity. The decline in "repair" types of service calls during the summer months is compensated for by the annual cleaning and inspection of customers' systems. The service force consists of five men who work under the direction of Mr. "Mac" Fisher. Reporting directly to Mr. White, Mr. Fisher is responsible for scheduling service calls, dispatching the men, and maintaining an adequate stock of repair parts, as well as training and supervising the servicemen. The entire service department, therefore, operates relatively independently of the rest of the company.

As he read this description of the service department, Mr. Brooks wondered why there was no provision in the company's accounting and bookkeeping system for the separation of the costs incurred by the service department. Mr. Brooks knew that it was this fact, and the suspicion that the service department was being run at a loss, that prompted Mr. White to ask if Fuller & Co. could help him.

Introductory Meeting

The introductory meeting was held at the office of HeatCo on January 10, 1962. Messrs. White, Ives, James, Brooks, and Park attended. After the usual initial pleasantries, Mr. Brooks suggested that before any discussion of the problem itself, Mr. White might go into some detail about the operations of his company in order that the Fuller & Co. men could develop a mental framework within which to consider the service department problem.

Mr. White began by explaining that most of HeatCo's dollar volume was made up of sales of furnaces, although the company also handled boilers, controls, and the ductwork or piping necessary in a system. HeatCo usually would bid on a job and then buy the necessary equipment, although it worked on a commission basis for some items. Mr. White referred to his copy of the 1961 income statement (see Exhibit 2, page 118) to show the breakdown between various types of sales. He explained that the "parts" figures referred both to parts used in

connection with servicing and repairing customers' heating systems and to parts used for occasional small jobs to change or improve present systems. (These smaller jobs usually were done on a "time and material" basis.)

Mr. White stated that HeatCo carried no inventory other than the most frequently needed repair parts. He said that the equipment manufacturers gave excellent delivery service on most parts from regional warehouses, and that manufacturers would give a firm price commitment to HeatCo for all equipment which it would need for the contract jobs on which it was bidding.

Mr. White explained that the business of selling and installing industrial heating systems was highly competitive. Entry into the business was relatively easy because dealers did not have to carry inventory and did not need a large plant. The equipment manufacturers would give the same price and delivery commitments to any reputable firm. Although local competition was not "cutthroat," it was certainly severe. Mr. White stated that to win a satisfactory volume of contracts, HeatCo not only had to price its bids quite carefully, but had to offer warranties and the guarantee of continuing availability of service for its installations. The pricing of each quote was done with an eye both to equipment and installation costs, all of which were quite predictable, and to the market and competition for the job. Often HeatCo was forced to "throw in" certain "extras" to win a bid. This kind of competition, Mr. White said, was common whereas actual price cutting was not considered by those in the trade in Cleveland to be an acceptable form of competition and was extremely rare. The "extras" most often used in the bidding were the warranty terms. Therefore, in "building up" the cost estimate that was prepared prior to submitting a bid on a job, the cost allowance for the free servicing that might be required under the warranty clause rarely bore any close relationship to the expected cost of fulfilling the terms of the warranty. Mr. White said that the amount allowed for warranty work was his competitive "fudge factor," reflecting what he thought could be charged without jeapordizing the firm's chances of winning the contract.

Mr. Ives stated, in response to a question asked by Mr. Brooks, that the warranty allowances on the past year's contracts had ranged from about $100 to $1,500 per contract, with the majority being in the $200 to $450 range. He said that only about 20 per cent of recent contracts had warranty allowances of over $500 and that he felt on the basis of

current experience that performing warranty service on most of the others would cost HeatCo more than had been allowed in their bids on the contracts. He had no way of confirming this, however.

"The important thing that we want to know," said Mr. Ives, "is how much this service operation is costing us. The servicemen spend their time doing warranty work, other service work for which we can charge time and materials, a small amount of "free service" when one of us feels that customer relations considerations call for this, and in addition they work on making panels for contract installations. At the present time we have no idea whether or not we are losing a lot of money on these operations or only a little and, in either event, how much on each. Although competition for new business means that we are pretty well stuck with the losses on the warranty work, we can adjust our pricing for billable service somewhat, and we should be costing the panel work realistically. What we want you to do is to tell us what our costs are, how much we are losing in each of these areas, and then set things up so that in the future our bookkeeper can tell us how we are doing on a monthly basis."

After some additional discussion, Mr. Brooks was able to determine that the two top executives of HeatCo were unable to provide any further significant information. It was also apparent to Mr. Brooks that Messrs. White and Ives had already made the decision to retain Fuller & Co. to examine their problem and were not waiting for a formal proposal from his department. Mr. Ives' remark, quoted above, had convinced Mr. Brooks of this, and he attributed it to the fact that over the years Mr. James had succeeded in developing an extremely good relationship with the two men. Apparently, once Mr. James had suggested that Mr. Brooks' Management Services Department examine the problem, there was no question in the minds of Messrs. White and Ives that this should be done. Now they appeared anxious for Mr. Brooks to get on with the job. He sensed that he should rapidly conclude the current conference in order not to risk annoying the two men with what to them could be boring repetition of "obvious" facts. Mr. Brooks also sensed that not only was no formal presentation expected, but that at this meeting the two HeatCo executives expected him to indicate what he expected to do and when he would do it.

When they returned to the office Mr. Brooks informed Mr. Park that he would have the responsibility of gathering the data and doing the bulk of the analysis of the HeatCo problem. He suggested that Mr. Park return to HeatCo the following day to look briefly at the

bookkeeping system before the two men worked out a plan for the job. Mr. Park did so, and on the basis of a discussion with HeatCo's bookkeeper, Mrs. Sampson, prepared the description of the existing methods included as Exhibit 3 which appears on page 119. Mr. Brooks also dictated a short letter to Mr. White in which he recalled that Mr. White had told him to omit the formalities, but that he nevertheless preferred to confirm the terms of the engagement. He added that he expected that no more than 15 man days of work would be required, and that HeatCo would be billed at Fuller & Co.'s usual management services rates for the time actually spent on the job.

Questions

Up to this point, this case contains insufficient data to permit you to analyze HeatCo's costs or prices in order to arrive at specific recommendations for management. The major problem faced by Fuller & Co., in fact, is the collection of the necessary data. Before you read the commentary, therefore, it is suggested that you:

1. Prepare a list of the kinds of information that will need to be gathered on this engagement.

2. Decide how you would go about getting these data.

3. Consider the form that Fuller & Co.'s recommendations should take. Specifically, should Fuller & Co. concentrate on analyzing costs and prices in order to be able to suggest particular changes, or should they devote their main attention to the creation of an improved reporting system?

In addition to the above, you should consider the following questions on Fuller & Co.'s relationship with HeatCo.

4. Did Brooks act too hastily in making his brief verbal proposal?

5. Should Brooks' letter have been sent? If so, should it have contained a detailed proposal rather than a repetition of Brooks' verbal summary?

6. Did Brooks handle the question of the fee correctly? Specifically, should he have made a point of discussing it with his client?

Exhibit 1

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Comparative Balance Sheet

October 31, 1960 and 1961

ASSETS

	October 31, 1960		October 31, 1961	
Current assets				
Cash		$ 63,647		$ 41,626
Accounts receivable	$ 68,820		$ 96,957	
Allowance for uncollectible accounts	2,500	66,320	3,500	93,457
Inventories		13,455		13,049
Fixed assets				
Plant and equipment	$ 23,402		$ 25,670	
Accumulated depreciation	13,039	10,363	14,306	11,364
Other assets*		5,750		5,157
Total		$159,535		$164,653

LIABILITIES AND EQUITY

Equities				
Accounts payable		$ 14,752		$ 10,237
Accrued payroll & bonuses	$ 16,300		$ 14,206	
Accrued, withholding, & payroll tax	10,702		10,801	
Accrued profit sharing contribution	16,127	43,129	15,144	40,151
Reserve for warranty service		10,000		10,000
Equities		$ 67,881		$ 60,388
Common stock		31,500		31,500
Retained earnings		60,154		72,765
Total Liabilities and Equities		$159,535		$164,653
*Other assets				
Prepaid expenses		$ 3,692		$ 1,800
Work in process		256		
Panel inventory				935
Cash surrender value & accum. Dividend—life insurance		1,802		2,422
Total		$ 5,750		$ 5,157

Exhibit 2

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Comparative Statements of Income

For the Years Ending Oct. 31

	1959	1960	1961
Sales			
Contracts	$438,577	$419,303	$347,972
Service and repair	13,428	12,397	13,102
Parts	38,322	37,828	34,183
Commissions earned	9,326	24,759	39,796
Discounts earned	10	984	648
Miscellaneous		76	30
Total sales	$499,663	$495,347	$435,731
Cost of goods sold			
Inventory decrease	$ (1,966)	$ 1,701	$ 406
Freight	6,419	4,383	3,844
Materials & parts	256,567	258,406	211,963
Labor	45,511	54,381	55,166
Total	$306,531	$318,871	$271,379
Gross profit	$193,132	$176,476	$164,352
Expenses			
Office supplies & postage	$ 1,596	$ 1,793	$ 2,043
Telephone & telegraph	4,016	4,686	4,979
Union insurance & pension fund	697	769	1,035
Fed'l. & state income tax	17,515	7,991	6,564
Uniforms	380	384	376
Blueprints & diagrams	177	139	255
Contract labor	1,637	518	294
Employee travel	5,574	5,801	5,129
President's travel	796	1,329	1,739
Vehicle expenses	5,155	5,058	6,868
Entertainment	2,599	3,917	2,272
Repair & maintenance	163	1,725	532
Depreciation	3,722	4,298	5,269
Rent	6,300	6,300	6,300
Salaries (excluding president)	26,092	30,313	28,886
Insurance	3,340	1,417	1,893
Life insurance	253	253	253
Utilities	734	683	677
Payroll taxes	3,010	3,421	3,572
Other taxes	645	917	936
Professional fees	2,275	1,650	1,300
Dues subscriptions	562	695	743
Donations	534	1,200	1,209
Interest expense	5	23	—
Miscellaneous	997	1,119	681
Bad debts	1,643	748	1,038
Bonuses	19,800	22,400	17,200
Discounts allowed	224	205	188
Commissions paid	1,161	1,084	150
Organization expenses	249	249	249
President's salary	41,957	33,994	32,175
Profit sharing trust contribution & expenses	14,969	16,127	16,346
Total expenses	$168,777	$161,206	$151,151
Net profit	$ 24,355	$ 15,270	$ 13,201

Exhibit 3

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Notes on Accounting Procedures in Use, 1/11/62

1. Payroll Book

   All wages and salaries broken into three accounts:
   a. Labor (shown as Cost of Goods Sold)
   b. Salaries (shown as an Overhead Expense)
   c. President's Salary (shown as an Overhead Expense)

2. Sales Book

   Kept by category; sales made entered under one of the following columns:
   a. Contracts: including all contract installation work
   b. Service and Repair: including actual charges billed to customers for service labor and travel
   c. Parts: including actual charges billed to customers for parts needed for service and repair or other noncontract work
   d. Commissions earned: including total commissions received on equipment sold under this arrangement
   e. Miscellaneous

3. Voucher Register

   Kept as a chronological record of invoices received by the company. Distributions made into columnar accounts for end-of-month posting to ledger accounts.
   Distributions include:
   a. All material purchases entered under "Material and Parts" (a Cost of Goods Sold)
   b. All traveling expenses (except President's Travel) entered under "Employees Traveling Expenses" (an Overhead Expense)

Commentary on Industrial Heating Equipment Company, Inc.

The next day, Mr. Brooks called Mr. Park into his office to discuss a specific approach to the problem which the officers of HeatCo had posed. It was obvious that the investigation would have to go beyond the costs of each segment of the service operation, because costs were only half the picture. While the company's income statement did break out service revenue by department, Mr. Brooks wondered whether this revenue was correctly determined. It was obvious that there was a connection between prices on installation jobs and the financial results of the service department (i.e., the losses that Messrs. White and Ives suspected). Mr. Brooks agreed with their premise

that if there were losses a review of pricing was appropriate, but he suspected that further analysis was needed. Mr. Brooks also recognized that under the present cost accounting system and contract pricing methods, while it seemed that the profits from at least some of the contract installation jobs were being completely wiped out by losses incurred by performing the warranty service, it was probably necessary to be more specific in the determination and reporting of these "losses." For example, a loss incurred because a warranty allowance was too small to pay for average warranty service requirements was not the same as a loss incurred because an installation required abnormal and excessive warranty service; and neither of these was the same as a loss arising out of inefficiency or waste in the service department. Mr. Brooks wondered what criteria were used in establishing the so-called profit on a contract installation. He suspected that clarification of this point and the provision of better cost figures would assist Messrs. White and Ives in pricing their bids on installation contracts, or would at least give them a better understanding of the effects of the many variables built into each bid.

Mr. Brooks and Mr. Park agreed immediately that their approach to the HeatCo problem should have these basic goals:

1. Determine both the direct and the total costs* of operating the panel work, billable service and warranty service portions of the service department, or of the department as a whole.

2. Determine the income provided by billable service and the portion of the warranty cost allowance included in previous contract installations which should be considered to offset the warranty service costs for the period under consideration.

3. Develop a system which would allow HeatCo to monitor both income and costs in the future.

With these goals in mind the two men proceeded to discuss first the data which were needed in order to determine the costs of operating the service department. They realized that some of the needed information was necessarily already being collected by HeatCo's bookkeeper and merely had to be segregated from installation contract costs. Other needed data might not be flowing into the accounting

* Total costs would include both direct costs and appropriate allocations of HeatCo's administrative expenses.

system at present, and systems would have to be developed to provide these. They proceeded to list the information which would be needed, and the probable means of obtaining it.

1. Service Department Payroll—can be easily broken out from total labor costs by establishing a separate account for servicemen's salaries.

2. Separation of warranty labor from billable service labor and panel work in order to allocate properly the labor cost between these areas. This information would have to be provided by the service department, through time cards to be kept by the servicemen or through Assignment Records to be kept by the service supervisor, Mr. Fisher. (The two men speculated that some records of this type must now be kept by someone in order that the amount which was to be invoiced for billable service work could be determined. Mr. Park made a note to check into this on his next visit to HeatCo.)

3. Value of parts used for warranty service work and those used for billable service and panel work. Again, records must have been kept previously for billable parts in order to invoice customers. This information should be easy to have recorded and kept if this is not already done.

4. Travel expenses for servicemen. This information should be readily available from servicemen's travel and expense reports.

5. Administrative, occupancy, and other indirect expenses properly allocable to the service operation. The information needed for this allocation would have to be developed by Mr. Park in future visits to HeatCo. The amount of the various overhead items to be allocated to Service would have to be decided on the most logical basis after each overhead expense was examined for its contribution to the Service operation.

6. Breakdown of billable service income into parts charges, travel charges, and labor charges. This should be available from invoice worksheets if not broken down on the invoices themselves.

7. Amounts included in contract bids to cover future warranty work. Should be available from bid worksheets.

At the conclusion of this discussion, Mr. Brooks asked Mr. Park to visit HeatCo again, investigate the availability of the data outlined above, and based on what he found, recommend how the HeatCo

accounting system might be modified to generate service-cost data on a continuing basis.

Park's Investigation

Mr. Park spent most of the next week at the HeatCo plant, and spent the greater part of his time working with Mrs. Sampson. From her he learned that much of the needed information listed on the outline he had drawn up with Mr. Brooks was available in raw form from the company's basic records; when it came to be recorded in the books, it was not kept separate, however, which was why Mr. White had claimed that he could not get departmental costs. All that would be required, therefore, to make it available was to refine the chart of accounts. The formal monthly reports, if redesigned, would then automatically provide the breakdown the HeatCo executives needed. The only facts on Mr. Park's list which Mrs. Sampson could not provide were the breakdown of service hours between billable, panel, and warranty work, although total Service Department payroll was easily taken from the payroll book.

Parts used and travel expenses incurred were reported to Mrs. Sampson for each customer call by the servicemen. Mrs. Sampson maintained a perpetual parts inventory record, based on material usage cards which were made out by all men drawing parts and which indicated the job for which the material or parts were being drawn. Travel and expense reports indicated which customers were visited as part of the information required. Similarly, special parts purchase order requests gave the name of the intended customer. As a matter of routine, Mrs. Sampson had been keeping a record of parts used and expenses incurred for each service customer, both billable and warranty. She told Mr. Park that she had thought these records might be useful at some later time but that no one had ever asked to see them as yet.

Mrs. Sampson kept a list of all warranty customers, including the warranty dates. She stated that she billed for all service to customers not on the warranty list except when Mr. Ives told her not to do so. She reported that from time to time he would tell her not to charge a customer for certain service work—this was usually either for relatively minor work on a large installation, or for a major installation customer, or on an installation where the warranty had barely run out. Mrs. Sampson stated that Mr. Ives kept track of all service requests.

Mrs. Sampson showed Mr. Park the price list which she used to invoice service customers. It listed a rate per hour for labor, a standard mark-up to be used on all parts, and a rate per mile for all travel in-

curred by servicemen. The information concerning labor came from Mr. Fisher who told her how many hours were spent on each "billable service" job when it was completed. She said that when she invoiced a service customer, she listed each of these items separately. Mr. Ives had given her these prices several years previously.

Mr. Park also talked with Mr. Fisher, the service supervisor. Mr. Park learned that he was compiling, on a regular basis, the last piece of information needed for a determination of service costs. In a pocket notebook, Mr. Fisher maintained a record of the time spent by each of his servicemen. He explained that this diary was used to plan the work of his men, to keep track of their work for pay purposes, and to maintain the records necessary to provide Mrs. Sampson with the labor hours spent on service to billable customers. Mr. Fisher stated that he met regularly with Mrs. Sampson to tell her of the hours spent by his men performing service work for each customer and that she kept him informed as to whether they were warranty, free service, or billable customers. Mr. Fisher showed this diary to Mr. Park, and the latter noted that it was detailed enough to provide the information required for his present assignment. With Mr. Fisher's assistance, he made a summary of these data for the 1960-61 fiscal year. (See Exhibit 4, page 124.)

At this stage Mr. Park felt that it would be a relatively simple matter to set up procedures to segregate direct costs for the service department. He drafted the following notes for eventual inclusion in HeatCo's accounting procedures.

Accounting Procedures for Direct Costs

1. Present account numbers will be maintained. However, suffixes will be used to indicate departmental allocation, as follows:

.1 —Contract Installation
.2 —Service Department
.21—Warranty
.22—Free Service
.23—Billable
.24—Panel Work

2. Direct expenses will be accumulated by *customer* from source data. All source data presently include customer identification. "Customers" will include work done on contract installation and panel work (each being regarded as a customer with that name). These "customer" records are quite separate from accounts receivable records.

Exhibit 4

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Analysis of Service Department Hours, 1960/61 Fiscal Year

Month	Working Days	Working Hours	Billed Hours	Warranty Hours	Free Service Hours	Panel Hours	Total Hours Worked	Difference	Miscellaneous*	Vacation Hours	Net Difference
Nov. 1960	22	880	320	301	48	—	669	211	176	—	35
Dec.	20	800	410	363	17	—	790	10	160	—	(150)
Jan. 1961	21	840	298	287	33	—	618	222	168	—	54
Feb.	20	800	259	199	9	—	467	333	160	—	173
Mar.	23	920	209	156	25	138	528	392	184	—	208
April	20	800	164	86	18	81	349	451	160	180	111
May	21	840	44	147	50	86	327	513	168	180	165
June	22	880	94	103	14	111	322	558	176	—	382
July	20	800	244	151	65	50	510	290	160	—	130
Aug.	23	920	226	316	11	83	636	284	184	—	100
Sept.	20	800	188	379	41	—	608	192	160	—	32
Oct.	22	880	275	593	32	—	900	(20)	176	—	(196)
Totals	254	10,160	2,731	3,081	363	549	6,724	3,436	2,032	360	1,044
		100%	26%	30%	4%	6%	66%	34%	20%	4%	10%

* Miscellaneous time included a variety of tasks ranging from assisting in the office to filling in on an installation job where help was needed. Mr. Fisher stated that usually Mr. White or Mr. Ives would come to him asking if he could "spare a man for awhile" to help somewhere else in the company. He did not keep track of this time accurately, and so estimated it at the equivalent of one full-time employee.

3. Periodically when customers are billed, "customer-direct-expense" records will be summarized and the expense totals debited to the departmental classification of each functional account, according to the status of each "customer" from time to time, i.e., warranty service, free service, or billable service. Intracompany cost transfers for panel work and installation work will be recognized at the same time. These customer direct expense records will of course contain all the information needed to complete actual billings.

4. Specific procedures for each expense type follow.

(a) *Payroll:* Mr. Fisher, the service supervisor, should formalize and combine his current practice of keeping time records and notifying Mrs. Sampson of hours spent on each customer. This will be accomplished by his preparing a weekly report listing customers vertically and employees horizontally, and accounting for all hours spent. "Customers" will include installation and panel work. There will be a subtotal in the vertical listing, beneath which will appear headings for "office work," "vacation," "other (specified)," and "not accounted for." This report will be used as the basis for allocating payroll cost by employee, including as expense accounts the four non-customer accounts previously noted.

(b) *Parts:* Material usage cards and special purchase orders all contain customer identifications, and can be used to post to the customer records. A periodic summary of material usage cards will be used to obtain a total credit to material and parts inventory.

(c) *Travel and expense* reports all contain customer identification, and can be used to post to the customer records. Postings should include actual expenses incurred (reimbursed) and the total mileage per customer, on which the charge to the customer is based. The expense posting is for memorandum purposes only, since expenses are not billed to customers for actual reimbursement. However, an allocation of reimbursed expenses is needed by department, hence this item's inclusion within this procedure.

Mr. Park noted that most of the procedures he had written out were simply formalization of work already being done by either Mr. Fisher or Mrs. Sampson, and were only "new" in that they involved proper coordination and systematic recording.

Mr. Park next turned to a consideration of overhead expenses (expenses other than direct expenses). Reviewing the chart of accounts with Mrs. Sampson, he compiled a guide to be used for allocation

Exhibit 5

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Basis for Departmental Overhead Allocation

Account No.	Account	Basis for Allocation	Department and Sub Code		
			Contract	Service*	Administrative
		(X-Allocate to Dept. Indicated)	[.1]	[.2]	[.3]
600	Postage and parcel post	Virtually all adm.—ignore possible departmental portion			X
601	Stationery and printing	Virtually all adm.—DO—			X
602	Office supplies	Virtually all adm.—DO—			X
603	Telephone & answering service	Service dept. direct line cost is minor; treat all as adm.			X
604	Union insurance and pension fund	(2¼% of unionized payroll)	X	X	
605	Federal and state income taxes	Ignore—based upon income			
608	Uniforms	Service		X	
609	Blue prints and diagrams	Contract	X		
610	Contract labor	Contract	X		
613	Contract bonds	Contract	X		
614	Servicemen's equipment & tools	Service		X	
615	Traveling expenses—service	(Treated as direct expense)			
616	Traveling expenses—executive	Contract	X		
617	Vehicle expense (trucks)	1961 mileage	10.0%	90.0%	
618	Customer entertainment & promotion	Contract	X		
619	Repairs and maintenance	Square footage of building	16.0%	66.0%	18.0%
620	Depreciation	Based upon estimated dep. 1961-62	48.8%	37.2%	14.0%
621	Rent	Square footage of building	16.0%	66.0%	18.0%

Account No.	Account	Basis for Allocation	Department and Sub Code		
		(X-Allocate to Dept. Indicated)	Contract [.1]	Service* [.2]	Administrative [.3]
622	Salaries—office	All administrative			X
623	Insurance	Based upon 1960-61 expense	30.0%	68.0%	2.0%
624	Life insurance	Contract	X		
625	Utilities	Divided evenly	33.3%	33.4%	33.3%
626	Taxes—payroll	Based upon 1960-61 taxable payroll	46.0%	38.0%	16.0%
627	Taxes—other	Actual 1960-61 expense ratio	28.1%	50.0%	21.9%
628	Professional fees	All administrative			X
629	Dues and subscriptions	All administrative			X
630	Donations	All administrative			X
633	Miscellaneous expense	Virtually all adm.—ignore possible dept. portion			
634	Bad debts	Service		X	
636	Bonuses	Actual bonuses paid during 1960-61	65.0%	31.0%	4.0%
637	Discounts allowed	Contract	X		
638	Commissions paid	Contract	X		
640	Executive salary	Contract	X		
641	Profit sharing expense	Based upon participants' salaries in 1960-61	54.0%	36.0%	10.0%
642	Advertising	Contract	X		
646	Salaries—contracts	Contract	X		
643	Employees benefits—(Group ins.)	(2% of unionized payroll)	X	X	
645	Servicemen's expendable tools	Service		X	
647	Traveling expenses—contracts	Contract	X		
631	Interest expense	Administrative			X
632	Bank service charges	Administrative			X

* Service department overhead expenses to be charged to the department as such.

purposes, based on what Mrs. Sampson told him about each type of expense. Before submitting it to Mr. Brooks he discussed it with Mr. Ives and made one or two minor changes at his suggestion. The schedule showing allocations is shown in Exhibit 5 on pages 126-127. In making this schedule Mr. Park did not attempt to subdivide Service Department overhead into the four sub-classifications used for direct expenses. He felt that no empirical basis existed for making such an allocation since the expenses were incurred for the benefit of the department as a whole. While some basis for allocation could certainly be found, he did not feel that this would serve any useful purpose.

Mr. Park's final inquiries concerned the recognition of revenue. He found that the notes he had previously made on Accounting Procedures in Use (Exhibit 3, page 119) amounted to a complete description. The total price of completed contracts was taken into income as contract sales. Service and Repair and Parts revenue were the totals billed to customers (service and repair also including mileage charges for travel). Commissions and Miscellaneous were self-explanatory. Mr. Park also found that only minimal additional work would be required to set up additional allocation columns in the Sales Book to record the makeup of each invoice. He noted the following as the breakdown that should be recorded:

Contract Sales:	Installation revenue Warranty allowance
Service and Repair:	Labor charges Travel charges
Parts Commissions Miscellaneous	no breakdown necessary.

Review with Mr. Brooks

The day after he had completed the investigation described above, Mr. Park met with Mr. Brooks to report on what he had found out and to present his notes on suggested procedures and allocations.

Mr. Brooks was quite satisfied with what Mr. Park had done. He pointed out, however, that the work completed to date was strictly of a theoretical nature. This was appropriate, because it was obvious that before costs and revenues could be separated, procedures had to be determined for that purpose. The next step, he said, was to test the procedures and at the same time complete the next portion of the

assignment. He asked Mr. Park if he felt that it would be feasible for him to prepare a post facto analysis on the company's transactions since November 1, 1961 (the start of its current fiscal year). The idea would be to produce figures for the months of November and December, for which records would be complete, and for January, where he would work with partly complete data and partly current data. Mr. Park pointed out that by the time he could get started back at HeatCo, January would be about two-thirds over, and suggested that his assignment include February on a current basis as well. Mr. Brooks accepted the suggestion but said that since Mr. Park's results would only be completed in six weeks time, he felt he should make an interim report to Messrs. White and Ives. Within a week Mr. Brooks had contacted Mr. White and had visited at HeatCo's offices with him and Mr. Ives. The visit was short, with Brooks reporting that his assistant had developed procedures for separating costs and revenues, and proposed to test his procedures by preparing four-month income statements through February 28. Ives remarked that this period would show less than proportionate revenue, particularly for installations, but agreed that the experiment would be worthwhile because it would give HeatCo the historical data needed to place the whole of the 1962 fiscal year's results on a consistent basis, assuming that Fuller & Co.'s recommendations were accepted for future reporting.

Park's Analysis of November 1961-February 1962

As Park began his analysis of the period commencing November 1, he realized that the question of warranty service income would be troublesome. Since very few installations had been made after November 1, there was very little revenue entered under the "warranty allowance" column he had set up in the Sales Book. On the other hand, his first attempt to analyze payroll costs indicated that warranty service work was continuing at the normal level. As he thought about it, it became obvious to him that recognizing warranty service income on a completed contract basis was illogical. The warranty allowance on a contract was intended to cover warranty service over the period of the warranty, usually six months from date of installation. Taking full allowance into income could only be defended if the dollar value of warranty allowances each month was approximately constant, and then only if proper deferrals were calculated at appropriate intervals. Park discussed this with Mr. Brooks and Mr. James, and the latter informed him that, in the past, warranty allowances had been ap-

proximately constant on an *annual* basis, and had been taken into income each year as accrued on completed contracts; however, at Fuller & Co.'s insistence, HeatCo had set up a $10,000 reserve for Warranty Service some years previously in order to defer the "unearned" portion of the allowances on current warranties. This reserve had never been changed, because each year since its creation (as well as in the first year) Mr. White had insisted that $10,000 was more than adequate as a deferral. There had never been any attempt to verify the adequacy of the reserve because of Mr. White's insistence that it was adequate and his disinclination to make annual changes in it.

Messrs. Brooks and Park agreed that warranty allowances (that is, the expected cost of warranty service) ought to be prorated over the period of each warranty, and so Mr. Park made a schedule showing all warranties current at 10/31/61 and all allowances on completed contracts since that date. The amount of the allowance was spread out over the appropriate number of months. This required close to 30 allocation columns, and obviously would require an additional column each month. Mr. Park therefore devised a series of worksheets that provided 12 monthly columns to a page, and used a column reference list on which was stated the contract number, date of completion, and total warranty allowance. The monthly allowance was first entered in the month the warranty commenced, and was continued horizontally to the right and over onto the same line on succeeding pages until the last month was reached. Although it took Mr. Park a few hours to set up the worksheets, he found that keeping them up to date and totalling the warranty for each month were both speedy operations. When Mr. Park totalled the extensions for warranties in force as of 10/31/61, he found that the unexpired dollar value was $9,842. This meant that the reserve was $158 in excess on that date; this amount properly belonged in equity, after adjusting for income tax. Mr. Park summarized his calculations on warranty income for the 4-month period as follows:

	11/61	12/61	1/62	2/62
Unearned income, beginning of month	$9,842	$9,667	$9,578	$9,416
Add-warranty allowances on completed contracts	840	920	798	748
Less-earned income for month	(1,015)	(1,009)	(960)	(941)
Unearned income, end of month	$9,667	$9,578	$9,416	$9,223

The total warranty allowance income for the 4 months as shown above was $3,925. This was almost 20 per cent more than the $3,306 total of allowances on contracts completed during that period.

By the end of January Mr. Park had completed his analysis of November and December, and was finding it no problem to keep current with January, which he finished during the first week of February. During February he called regularly at HeatCo for about half a day twice a week, which was sufficient time for him to keep his work current. By March 3, therefore, he had completed the income statement for the 4 months to February 28. The latter is shown in Exhibit 6 (page 137), with supporting detail in Exhibit 7 (page 138).

Reviewing the four-month statement it seemed to Mr. Park that a closer look at two apparent loss areas in the Service Department would be worth while. These were "time unaccounted for" and "travel expenses." He spent approximately a day in investigating these items. His conclusions are contained in his draft report, which follows below.

Report to HeatCo

After completing the four-month income statement and subsequent additional investigation, Mr. Park drafted the following report to HeatCo for Mr. Brooks' approval.

(Fuller & Co. letterhead)

March 00, 1962

Mr. Joseph White, President
Industrial Heating Equipment Co., Inc.
Cleveland, Ohio

Dear Mr. White:

We have completed the study of revenues and costs in your Service Department which we were engaged to carry out in January. This report will summarize the work we performed, and our findings. We would be happy to discuss these with you at your convenience. Furthermore, our Mr. Park is ready to install the proposed new system at once, if it meets with your approval. He will instruct Mrs. Sampson in its operation and be ready to assist her, if required, in preparing monthly financial statements.

At the start of the engagement we determined that HeatCo's existing procedures contain all the information required to separate the revenue and costs of the different elements of the Service

Department. As you know, however, the books of account did not provide the means of keeping this information separate. We therefore have prepared procedures to make this possible. These procedures encompass two main steps: (i) provide a sufficiently detailed framework of ledger accounts, and (ii) provide a formalized means of collecting the data required in the form required on a regular basis. Under (i) within the Service Department we propose to set up separate ledger sections for warranty service, free service, billable service and panel work, each section containing accounts that record revenue and expenses for the direct items "parts, labor and travel." We have also investigated HeatCo's overhead expenses. Some of these expenses can fairly be allocated between the sales and service department; in some cases, portions of the expenses, or complete items, are clearly unallocable in that they represent the cost of administering the company as a whole. It is *not* possible to allocate overhead expenses to subdivisions of the Service Department. Under (ii) we have set up procedures whereby records that are presently maintained on labor hours, materials and parts used, and travel expenses, are used to channel expense data in the required detail to the new ledger accounts. In addition, we propose that the detail on customer invoices be shown in the Sales Book in columns provided for that purpose, so as to provide the required breakdown for revenue items.

The structure and methods briefly described above were next used to carry out the other portion of our assignment, namely to determine actual revenue and expenses for the Service Department. As you know, this exercise was performed for the four month period through February 28, of which February was carried out on a current basis to test the system as it would be used by you. No obstacles were found in the system's operation, and the February figures were complete by March 3. The figures for the four months are contained in the appendix to this report (see Exhibits 6 and 7). You will observe that the structure of the main report, The Income Statement, is such that it clearly indicates variable revenue, expense and profit or loss, item by item, within each subdivision of the Service Department. (For completeness we also included figures for the Sales Department and for Administrative Overhead, many of which were actually computed at the same time and in the same operation as figures for the Service Department.) We have a number of comments on the Income Statement.

(1) *Sales Department.* The item "sales" represents the dollar value of completed installations, less the warranty allowance contained in each, which has been dealt with in the Service Department (discussed below). No "income" is shown against labor and travel expense; the latter are deducted from the so-called gross profit, which is sales less cost of goods sold (i.e., less material cost of installation).

(2) *Warranty Service.* The only revenue item here is shown under "labor," and represents the pro rata warranty allowance on all warranties presently in existence. This treatment differs from your previous policy of taking warranty allowances into contract sales income when contracts were completed, and maintaining a deferral of $10,000 representing unexpired warranties. We computed the actual unexpired warranty value at 10/31/1961 and found it to be $9,842. This figure was obtained from worksheets we set up for proposed future use in allocating warranty allowances pro rata over the time periods involved. It is your practice in many cases to offer more actual warranty service than the cost allowance would indicate. Given that this is a competitive necessity, we recommend including the true full prospective warranty cost in warranty service income and showing the difference between this full cost and the actual dollar allowance in the bid, as an expense ("warranty price concession," perhaps) in the sales department income statement. This would unquestionably provide more meaningful financial results than are available at present. The warranty service is showing a direct loss at least in part because the sales department is underestimating the cost of fulfilling the warranty in preparing its original bid on the contract. The service department is not responsible for this loss, although in effect it is being charged to them.

(3) *Billable Service.* It was the suspicion that prices on billable service were too low which prompted you to engage us to perform this study. However, the Billable Service Income Statement shows a substantial contribution to overhead and markups over cost of approximately 58% on parts and 19% on labor. This does not imply that prices are too low or too high; billable service is the major portion of the Service Department, and the department as a whole shows a net loss after overhead. Although Billable Service shows a profit on travel, there may be hidden losses here; see further comments in paragraph 6 below.

(4) *Total Service Department.* The total service department shows a net loss after overhead of $4,828 for the 4 months. Of this, perhaps $2,300 (approximately) is accounted for by inadequate revenue on warranty service (i.e., this amount was credited to the sales department instead of warranty service). This leaves a deficit of some $2,500. Reference to the schedule of Overhead Expenses [Exhibit 7] will show that the service department is charged almost $1,900 for "time unaccounted for" (see paragraph 5 below). This therefore could be said to be the bulk of the $2,500, leaving only $600 unexplained; at least part of this could be travel expenses (see paragraph 6 below) or perhaps general inefficiency that is impossible to measure without cost standards. However, your expectation is undoubtedly that the service department should make a profit, so that the shortfall is $600, plus whatever minimum profit expectations you have, plus $1,900

which, while explained, is still a cost. It is conceivable that price increases on billable service could make good part or all of this loss. This analysis does not and cannot indicate the extent to which prices should be raised, but it does indicate the magnitude of correction desired.

(5) *Time Unaccounted For, and Office Use of Service Labor.* These items, $1,900 and $2,400, have been charged respectively to service overhead and administration overhead. Both represent part of the payroll cost of the service department labor force. Approximately 20% of the hours worked by the service department labor force are devoted to miscellaneous tasks in the office. This is the equivalent, more or less, of one full-time employee; in effect, the service department is overstaffed by one man and the office understaffed by one. We recommend that you consider hiring an additional clerk for the office, and discharging one of the five service department employees, *unless* his continued availablity is desired as a policy matter.

In addition to this office work, however, approximately 15% of the service department's total hours were not accounted for by the department's time records (Mr. Fisher's diary). We discussed this in some depth with Mr. Fisher and the men in the service department. Mr. Fisher's estimates that 80% of the time not accounted for (i.e., about $1,500 worth) is travel time. About ⅔ of this is on billable service work (because the average service job is of less magnitude in billable work than in warranty work, so that travel time is proportionately higher). Thus billable service labor cost should be increased by $1,000 to approximately $3,700, by adopting a "portal to portal" billing policy. We recommend that such a policy be adopted.

(6) *Travel Charges.* Travel expenses are recovered through "per mile" charges on billable service (and possibly through allocation of part of the warranty allowance, as suggested in paragraph (2) above). In the case of billable service, there appears to be a small profit ($1,334 charged, and $998 paid out). This is illusory, however. Reference to the schedule of overhead expenses will show that a total of $2,400 is allocated to the service department for truck operating expenses and depreciation. No means presently exists of allocating this among the subdivisions of the service department, although records of total service mileage travelled are available. (However, some mileage travelled is undertaken in employees own automobiles, for which they are reimbursed, and some of the truck mileage is for travel not connected with any specific job.) Despite these uncertainties, however, the magnitude of the figures suggests that HeatCo. is incurring a loss on travel mileage. Further study of travel expenses seems to be indicated; this subject is referred to again, below.

(7) *Panel Work and Free Service.* Both of these portions of the service department have only actual costs assigned to them.

These actual costs are then shown (in the Sales Department and the Service Department, respectively) as the cost of performing these particular functions. Service department reporting might be simpler, and more meaningful, if work done under these headings were actually billed at regular or agreed rates. The Sales department would then show, as a cost, the full price of panel work as if it had been done by an outside contractor (and this will help the sales department in deciding whether or not to subcontract panel work). In addition, the Service Department will show (as an overhead expense) the full cost of free work, while showing all work other than warranty work as regular billed work on the upper portion of its income statement. It is true that some of the cost and income figures will be "inflated" by the nominal profit that the (billable) service department charges on internal work, but the "inflated" figures do have meaning as a true economic representation of costs and revenues. (The same proposition could also be applied to warranty service work, but here the concept becomes less clear, because the availability of services of the service department is an inseparable part of the "product" of the sales department. The alternative of subcontracting warranty service, while it does exist in theory, is not available in practice, as a matter of basic policy. This does not mean that warranty service should not be billed internally at full rates, but makes it less meaningful, since one of the premises when a bid is made is that $X amount [cost] of service will be provided.)

Possibilities for Further Work

As has been pointed out in various places above, the completion of this project has indicated a number of instances where further study would be of value to you. We would be pleased to make a proposal to carry out this work for you. The work we have in mind is summarized below, for your convenience.

(a) Determine proportions of warranty allowance applicable to parts, labor and travel.

(b) Set up procedures to recognize full prospective warranty cost and treat as an expense the "warranty price concession."

(c) Determine standard costs for service work; set up procedures to report against standards and to keep standards up to date. (Note: Some standards in any event will have to be computed for item (b), although they can be estimated and be less detailed than full work cost standards.)

(d) Improve service department timekeeping procedures and accounting for time spent.

(e) Investigate incidence of travel expense and determine what rates should be charged to recover costs.

We would like to acknowledge the helpful assistance we received at all times from HeatCo's employees, particularly Mrs. Sampson and Mr. Fisher whom we called on repeatedly for information. We, of course, take full responsibility for the analysis and conclusions herein presented.

Very truly yours,

FULLER & CO.
by Joseph Brooks

Management Services Department

Exhibit 6

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Statement of Income

For Period Nov. 1, 1961 to Feb. 28, 1962

	SALES DEPT.		SERVICE DEPARTMENT									Combined Total	
			Warranty		Free		Billable		Total				
	Item	Profit (Loss)	Item	Profit (Loss)	Item	Profit (Loss)	Item	Profit (Loss)	Item	Profit (Loss)	Admin. Overhead	Item	Profit (Loss)
Sales – Materials & Parts	45,447						7,946		7,946			53,393	
Cost of Goods Sold													
Outside Purchases	34,629												
Panel Labor	573												
Total Costs	35,202		234		122		4,988		5,344			40,546	
Profit on Material & Parts		10,245		(234)		(122)		2,958		2,602			12,847
Labor – Charges	–		3,925		–		7,830		11,755			11,755	
– Payroll Cost	5,550		5,322		489		2,688		8,499			14,049	
Profit on Labor		(5,550)		(1,397)		(489)		5,142		3,256			(2,294)
Travel – Mileage Charges	–		–		–		1,334		1,334			1,334	
– Expenses Reimbursed	2,925		655		27		316		998			3,923	
Profit on Travel		(2,925)		(655)		(27)		1,018		336			(2,589)
Commissions		3,983											3,983
Total Contribution to Overhead and Profit		5,753		(2,286)		(638)		9,118		6,194			11,947
Departmental Overhead See Schedule (Exhibit 7)		(28,888)								(11,022)	(12,108)		(52,018)
Net Profit/(Loss) After Overhead		(23,135)								(4,828)	(12,108)		(40,071)

Exhibit 7

INDUSTRIAL HEATING EQUIPMENT COMPANY, INC.

Schedule of Departmental Overhead Expenses

For Period Nov. 1, 1961 to Feb. 28, 1962

	Sales Dept.	Service Dept.	Admin.
Salaries and wages—engineers	$10,615		
Salaries and wages—office			$3,843
Salaries and wages—executive	8,000		
Salaries and wages—office use of service labor			2,407
Bonuses	2,340	$ 1,116	144
Profit-sharing expense	3,024	2,016	560
Payroll taxes	781	645	271
Employees' benefits	111	256	
Commissions paid			
Union insurance and pension fund	125	288	
Blue prints and diagrams	68		
Contract labor	187		
Contract bonds	(68)		
Customer entertainment and promotion	1,082		
Repairs and maintenance—building	38	155	42
Rent	336	1,386	378
Insurance	96	218	6
Life insurance	240		
Utilities	55	55	55
Other taxes	54	96	42
Group insurance	94	63	
Expendable tools		246	
Uniforms		113	
Depreciation shop equipment & office furniture		72	336
Advertising	363		
Postage and parcel post			239
Stationery and printing			357
Office supplies			233
Telephone and answering service			1,783
Professional fees			771
Dues and subscriptions			28
Donations			300
Truck operating expenses	176	1,579	
Depreciation (trucks)	547	821	
Depreciation (auto)	624		
Miscellaneous expenses			313
Time unaccounted for		1,897	
Totals	$28,888	$11,022	$12,108