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The Pricing Decision: Balancing the Cost-Based and Market-Based Approaches in Different Industries

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The Pricing Decision: Balancing the Cost- Based and Market-Based Approaches in Different Industries

by Shawn M. Kain and Kenneth Rosenzweig, Ph.D., CPA, CMA

The objectives of this paper are to discuss cost estimating and pricing issues in four different industries, to analyze methods and strategies that are used in the costing and pricing of products in those industries, and to make general comparisons about costing and pricing techniques.

Importance of Cost Estimating

Accurate projection of costs is essential to the survival of any firm because cost estimates often determine whether a project will be authorized to begin or continue, the amount of resources that will be allocated to a particular product or product line, the prices of products, and the firm's and product line's profitability.

Many management accounting experts have discussed the importance of useful product costing systems. They emphasize that analysts can more accurately estimate costs if they have systems that identify casual factors or cost "drivers." Robin Cooper and Robert S. Kaplan write that, "If the cost system does not correctly attribute the additional costs to the products that cause them, then the firm might end up competing in segments where the scope-related costs exceed the benefits from larger scale production."¹ Kaplan and Cooper researched data from several companies and found that a significant problem with product costing systems is that costs, particularly fixed costs, are allocated on the basis of a measure such as direct labor hours, which may not be a factor that actually causes

these costs. Instead, they suggest the idea of transaction costing, in which costs are assigned to units that cause the transaction to occur. Product costing systems often play an important role in the pricing of products. We will now present some basic pricing concepts to link the costing and pricing processes together.

Pricing Theories and Concepts

The word "price" means different things to different people. Many business students think of the equation, "price equals cost plus profit," while other people relate price to the quality of a product. Regardless of what perspective people have on the issue of price, it is an area that requires in-depth analysis by decision makers.

Michael H. Morris and Roger J. Calantone explain that some major reasons why companies reduce prices are to attract new customers, increase usage rates among existing customers, discourage customers from switching to competitors, and to help sell other product lines.² However, the authors point out that these price cuts often occur unnecessarily, "alienating middlemen, confusing customers, and inviting aggressive responses from competitors."

Morris and Calantone present four components of effective pricing, the first of which is objectives. They state that objectives should be quantifiable and measurable in order to be useful. Examples include achieving a target return on investment (ROI), increasing market share, encouraging sales growth, maximizing profit, generating volume, and discouraging competitors.

The second component, strategy, deals with "comprehensive statements regarding how price will be used to accomplish the objectives." The pricing strategies are usually long-term and consist of one of two types: cost-based or market-based.

In a cost-based pricing strategy, a formula is developed in which costs are allocated to units of production with a mark-up rate added. The cost-based strategy is more popular because it is "easy to implement and manage." One type of cost-based pricing strategy is mark-up pricing, in which the rate of return is multiplied by the capital invested in the product, and the result is divided by estimated sales. This amount is then added to the variable and fixed costs per unit to arrive at a price.

Market-based pricing focuses on demand and competition. Firms using this strategy want price to reflect perceived value and image, and they examine price from a customer perspective. Examples of this strategy include floor pricing, in which prices just cover costs; penetration pricing, in which the firm prices low relative to the average prices of major competitors; price leadership, whereby a leading firm makes conserva-

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“Grass roots or detailed estimating involves obtaining estimates of tasks required, labor hours, factors, specifications, plans, and various rates from several functional areas for incorporation into the total cost estimate.”

tive pricing decisions, with other firms following.

The third pricing component, structure, concerns such issues as how the various aspects of each product or service will be priced, how prices will vary among customers and products, and what the timing and conditions of payment will be. Price discrimination, volume discounts, and other issues are analyzed.

The fourth component concerns price levels and related tactics. Considerations with this component include the determination of acceptable ranges of prices, decisions regarding the charging of “odd prices” (for example, \$99 instead of \$100), amounts and types of discounts, and taxes. The important point with this component is that customers must perceive stability and consistency with any price changes. Common price level tactics include rebates, two-for-one discounts, and trade-in policies.

The authors stress that these four components must work together and the pricing issue must be taken into account with other functions and activities of the company. In the prior sections, we have discussed the importance of accurate product costing systems and how they impact cost estimating and pricing, as well as some general pricing concepts. Next, we will present specific costing and pricing issues, strategies, and methods in the following industries: defense, paper, computers, and automobiles.

The Defense Industry

Defense contractors, particularly those that produce aircraft or weapon systems for one of the armed services, face a major challenge when they estimate costs. These weapon systems are often very complex and unique, so the use of established quantitative estimating techniques is combined with a certain amount of estimator judgment. Although these contractors must consider the issues of “cost drivers” in their costing systems, they must also deal with government regulations and guidelines.

Roger W. Mateer writes that defense contractors must maintain an estimating system that complies with guidelines such as the Truth-in-Negotiations Act, “which requires certification by contractors that all cost or pricing data submitted with a proposal are current, accurate, and complete.”³ In order to survive, he added, these contractors must make an extra effort to understand the regulations and penalties for noncompliance.

Mateer suggests that contractors can maintain a compliant estimating system that is adequate enough to support the negotiation of “fair and reasonable” prices by ensuring that the appropriate functional departments are involved in costing the proposal; by increasing employee awareness of estimating techniques; by updating the cost or pricing data when changes are known; and by internally reviewing all cost pro-

posals.

Given the difficult tasks of maintaining the estimating system and complying with various guidelines, what methods do contractors use when they estimate the costs for such complex items as weapon systems? Three common methods used are parametric estimating, analogy estimating, and grass roots estimating.



Accurate costing systems are needed to monitor the costs of complex weapon systems, such as this F-16 fighter aircraft.

Parametric estimating primarily involves the use of statistical techniques to estimate costs. An example is a linear regression equation, in which cost is treated as a dependent variable and is estimated on the basis of some hypothesized determinant of cost, such as the weight of the airplane. Another example is the “factor” approach, in which the cost of one item is estimated as a percent of another element’s cost. Parametrics are often used in the early portions of a particular phase of the weapon system’s life cycle. Because they require the use of much historical data, contractors must have adequate, detailed product costing systems for their use to be effective.

“Analogy” estimating provides a relatively quick approach when a similar weapon system’s actual costs are available. With this approach, the older system’s costs are adjusted to account for technological features of the new system and other complexity measures. Like parametric estimating, this method requires an adequate costing system and close interaction between cost and technical experts to determine if systems are “analogous.”

Grass roots or detailed estimating involves obtaining estimates of tasks required, labor hours, factors, specifications, plans, and various rates from several functional areas for incorporation into the total cost estimate. *The Air Force Systems Command (AFSC) Cost Estimating Handbook* explains that contractors using this approach are able to bring detailed tooling plans, make or buy plans, and other items into the estimating process.⁴ This technique usually results in a more precise estimate than the others, but it is also time consuming.

In the defense industry, contract pricing includes cost and price analysis, as well as the use of accounting evaluations, technical evaluations,

“... two main things can go wrong with an estimate of printer costs: either the price is too high, in which case the firm loses the job to a competitor; or the estimate is too low, and the printer does not recover all costs of the job.”

and system analysis techniques. The objective of defense contract pricing is “to establish and administer an arrangement that pays a fair and reasonable price upon delivery of a product or service.”⁵

There are two basic types of contract pricing arrangements in defense: fixed price and cost-reimbursement. With a fixed price contract, the contractor assumes responsibility for costs incurred. If the final cost is less than the fixed price, the contractor can obtain substantial profit; however, if costs exceed this price, the contractor takes the risk and must cover the costs. Fixed price contracts are used more often as the program nears production or as the weapon system requirement becomes more well defined. This type of contract is also used with sealed bids, where no discussions take place between the government and the contractor prior to contract award.

Cost reimbursement contracts, in contrast, are often used in the earlier, developmental stages of a program when there is more uncertainty about the requirement and technical complexity of the system or program. Studies, research efforts, and development contracts are often of this type. The government assumes more risk with a cost reimbursable contract, and in some instances, total cost risk.

In the defense industry, cost-based or cost-plus pricing is very common. As explained in *Armed Services Price Manual* (ASPM), it is “based on the concept that specifications determine cost and that profit is payment for doing the work at that cost.” Regulated monopolies like utilities and pipelines also use this approach. Cost-plus theory assumes that price is a direct function of cost, and a fair price takes this into account.

However, buyers at Wright-Patterson Air Force Base indicate that contractors often use market-based strategies when they sell the government items such as computers and supplies that are also sold in the commercial market. Also, with sealed bidding, the government performs no cost analysis, so contractors may use a market-based pricing approach in this type of solicitation. Sealed bidding usually involves many sellers, so competition sets the price.

It is important to note, however, that cost analysis is only one factor, although a very important one, in determining prices of defense contracts. As in other industries several factors, such as past prices paid, judgment, technical capabilities, and associated risks are considered. The ASPM states that one technique for evaluating profit, the weighted guidelines method, is designed to encourage contractors to take on more difficult tasks, make cost-effective capital investments, use non-government resources, and accept cost responsibility.

Our discussion of the defense industry costing and pricing process shows that there are sig-

nificant guidelines for contractors to follow, and the procedures to estimate the cost of a weapon system and price it often require a great deal of analysis. To facilitate this process, contractors must maintain adequate product costing systems that identify cost drivers. This, in turn, should help to establish fair and reasonable prices, although cost is not the only determinant of price. Next, we discuss costing and pricing issues in three other industries, beginning with paper-related products.

Printing and Paper-Related Industries

John William Henson, III states that two main things can go wrong with an estimate of printer costs: either the price is too high, in which case the firm loses the job to a competitor; or the estimate is too low, and the printer does not recover all costs of the job.⁶ These errors often occur because of miscommunications between the sales staff and the customer or between the sales staff and the estimating staff.

According to Henson, the salespeople, not the customers, are responsible for obtaining appropriate technical information and giving it to the estimator. Salespeople also need to follow up frequently with the customers and ensure that their requirements have not changed.

Estimators, in turn, need to listen to salespeople and help them to understand the project's complexity. Estimators can accomplish this by analyzing the individual parts of the project and offering more cost effective alternatives that will satisfy the customer's needs.

Henson favors a cost-based approach to pricing in the printer market and emphasizes that price should not be based on the competition. “Instead, it should reflect the value of the job based on costs and need of work at a given time and place.”

Henson's support of cost-based pricing in the printer industry contrasts with the policies of firms in another paper-related industry, business forms. One pricing analyst indicates that although his firm's accounting department does an extensive job of tracking both variable and fixed costs, variable costs alone determine how low a price can be set. The analyst adds that there is much excess capacity in the printing and business forms industries, and it is not always feasible to set a price that recoups all fixed costs. His firm's pricing policy is to price at a point where it estimates the competition will price, covering variable costs plus some fixed costs. A pricing analyst from another business forms company also indicates that price is often based on the point where competing firms are expected to price, and cost only provides a “bottom line” for determining price.

Analysts from both firms indicate that such

"If it is economically feasible to compete in a particular market, prices can be set high or low depending on the firm's position relative to competitors in terms of past prices and the performance of those competitors."

things as the amount and type of paper required to do a job, the efficiency of machines, labor hours and rates required to accomplish a task, and packaging are all considered in the costing process. Labor rates are often based on industry and company historical data. In addition, certain fixed costs such as insurance and depreciation are important. The ability to obtain this data, therefore, requires an adequate costing system.

Although cost does not appear to be the prime factor in determining prices in this industry, these companies need useful costing systems for discovering the "bottom line" on prices. In comparison to the defense industry, it appears that the business forms industry's cost estimating approach is analogous to the defense industry's "grass roots" or "detailed" estimating technique because of the accumulation of labor hours and other functional data required. Pricing strategies differ in that the defense industry uses more cost-based pricing rather than market-based approaches.

In summary, market-based pricing approaches are primarily used in the business forms industry and many other paper-related industries. However, accurate product costing systems are still important to these industries because costs determine the lowest price that can be charged. For those paper-related businesses that set prices based on cost, which is a practice that Henson supports, a reliable costing system may also help the firms to avoid overpricing products.

Computers and Computer Services

Computer companies and departments incur a variety of costs that are unique to computer products. Roger K. Doost explains that, "A typical computer organization has a number of one-time costs up to the point of installation and running of a system and a number of recurring costs for periodic operation of the system."⁷ Nonrecurring costs include system design, system installation and system hardware and software costs. Recurring costs include data preparation and conversion, data transmission, system operation, database and file maintenance, and several others.

As noted earlier, Kaplan and Cooper emphasize the importance of linking costing systems to cost "drivers," thus avoiding arbitrary cost allocations. Because there are many different costs to track with this product, a costing system that provides this linkage is important. Doost stated that the most important objectives in computer cost allocation and pricing are to equitably allocate the computer resource to its most worthwhile use; to motivate management and personnel to provide efficient, high quality

service to users; to establish objective bases for evaluating management performance; and to encourage user interest and participation in the development and implementation of the information system.

According to Doost, computer services can be priced either on the basis of market or cost. The problem with market-based approaches is the difficulty of obtaining pricing information on similar kinds of services. Cost-based pricing, on the other hand, is subject to the problems associated with cost allocation and unit cost determination.

Three types of allocation bases may be used: a single factor base, multiple factor base, or unit pricing. With a single factor approach, a potential problem is that relevant factors may not be considered, leading to a less optimal cost allocation. The multiple factor approach helps to correct this problem because the cost and time associated with each major component are considered. The third approach, unit pricing, involves the use of a formula that is based on an experience factor and considers the time elapsed for each activity in the determination of price. According to Doost, the unit pricing method also results in "a fairly consistent and equitable charge for computer services." Regardless of the allocation method used, he adds, the costing system should hold the appropriate people accountable for volume and spending variances.

An example of a computer service that holds its customers accountable for "use" is the DIALOG information system.⁸ DIALOG implemented a one-minute minimum pricing policy for information searches such as quick log-ons to check rates, addresses, and library-type information. Search times are rounded up to the next minute, so a 15 second search is charged as one minute. Other information services also have their own methods for charging time, such as rounding to the nearest second, 1000th of an hour, tenth of a minute, and other methods. The purpose of this strategy is to discourage abuses of these services and hold users accountable for their time.

These pricing approaches differ somewhat from a company that sells a variety of other computer products. A pricing analyst for a computer products firm indicates that his company sets prices in the same way as those in the business forms industry. The firm uses cost to determine a starting point for prices and then estimates where the competition will price. If it is economically feasible to compete in a particular market, prices can be set high or low depending on the firm's position relative to competitors in terms of past prices and the performance of those competitors. Cost, again, just serves as a "lower bound" on price.

In summary, cost is a consideration in the setting of prices in the computer and computer service industries, but product usage and

“...consumers generally have an idea of how much they can spend on a car and adjust their budgets accordingly, regardless of list price decreases.”

market conditions seem to play a larger role.

The Automobile Industry

Products in the automotive industry are very price sensitive. With new models of cars constantly being marketed, automotive salespeople must carefully analyze price before a new car goes on the market.

George Leaming discusses General Motors' (GM) penetration pricing policy of its Saturn car, as follows.⁹ The Saturn starting price is about \$1,000 less than expected. This pricing policy could be dangerous, Leaming explains, particularly if it generates a price war between the major auto manufacturers.

He outlines a three step process for evaluating the price of a product. The first step involves estimating demand, including the number of units that will be bought and at what price in a given market during a given time period. In the Saturn case, GM believes that demand will be price elastic, and it is adopting an increased market share strategy.

The second step involves determining costs. Leaming stresses that the estimates should “involve realistic assessments of variable costs, allocatable fixed costs, and non-allocatable fixed costs on a total volume basis for each of the phases of the product's life and for each of the potential volumes of sales that are likely at various prices.” He adds that pricing problems occur when auto firms make decisions on the basis of per unit estimates that include allocation of non-allocatable fixed costs.

The third step is a comparison of revenues at different price levels with costs at those levels to determine profits. The appropriate price level and pricing tactic depends on the nature of the market, competition, and product, and it is important for the price to reinforce the proper

product image.

Liz Pinto discusses an example of how image is a factor in the determination of automobile prices.¹⁰ Pinto explains the popularity of the Acura NSX and why this Japanese exotic car sells at such a high price in the United States. Consumers perceive the NSX to be a status symbol because many celebrities are buying the car, and the consumers want to identify with these celebrities. This represents a market-based approach to pricing because consumers are setting the price on the basis of how they perceive the value of the car.

However, some consumers think that prices of other cars are too high and should be lowered, as noted by Ray Windecker, a former research and analysis manager of public affairs at Ford Motor Company.¹¹ Windecker explains that several people asked him about the effects of reducing new-car list prices by ten percent. Windecker states that most manufacturers do not even earn ten percent on sales, so a reduction in price by this amount would only result in elimination of rebates and incentives. Windecker adds that any savings resulting from the differential between the price reduction and the elimination of rebates and incentives would be used by the consumers for model upgrades and purchases of options.

Windecker bases this conclusion on several statistics relating to consumer savings rates and patterns. He reasons that consumers generally have an idea of how much they can spend on a car and adjust their budgets accordingly, regardless of list price decreases.

In summary, market-based pricing is a common strategy in the auto industry. The image that the marketer creates for the car has a significant impact on price. However, accurate product costing is still relevant because auto firms must know how low they can price without endangering profits.

Comparisons and Conclusions

In this paper, we have reviewed costing and pricing concepts in four industries. We find that useful cost estimating systems are essential for cost control and the determination of prices in all four industries. Although the defense industry probably has a wider use of cost-based pricing than the other three industries, companies in industries that use market-based pricing still need accurate costing systems in order to determine how low prices can be set before profits start to suffer.

Kaplan, Cooper and other management accounting experts discuss the importance of having product costing systems that link actual costs to those measures (drivers) responsible for their incurrence. Analysis of these relationships then



Jim Morrow, Communications Director, shows Prof. Rosenzweig the driverless trains that are used to automatically move parts to the various assembly operations within the General Motors Truck and Bus Moraine Assembly Plant near Dayton, Ohio.

"Regarding actual cost estimating techniques, it appears that defense contractors rely more on statistical methods than the other industries."

helps the firm to determine why cost growth occurs and what corrective action can be taken. It also assists analysts in preparation of future cost estimates and ultimately serves as a vehicle for setting prices. Defense contractors are required by certain regulations and guidelines to maintain these systems, but even in the absence of such regulations, it just makes good business sense to do so. The paper, computer, and automotive industries also benefit from having adequate product costing systems, as do other industries.

Regarding actual cost estimating techniques, it appears that defense contractors rely more on statistical methods than the other industries. This is perhaps due to the complex nature of weapon systems and the availability of industry data. The other industries appear to estimate in a manner similar to the defense industry's detailed or grass roots estimating method.

Regardless of the estimating method used, the issue of arbitrary cost allocation affects costing in all industries. Allocation of non-allocatable fixed costs, in particular, reduces the quality of cost estimates because costs are not linked to actual cost "drivers."

Exceptions to the defense industry's heavy reliance on cost-based pricing occur in the cases of sealed bidding and the selling of items that are commonly sold on the commercial market. The use of cost-based pricing in defense is most visible with cost-reimbursable contracts, in which the contract price is based mostly, if not completely, on cost. Contractors should not abuse this type of contract, however, because a history of significant cost overruns may affect future contract awards. Therefore, these contractors must still be attentive to



Ron McAdams, Director of the University of Dayton's Computing Center, explains the University's computer cost charging system to Prof. Rosenzweig.

pricing tactics and the four components of effective pricing presented by Morris and Calantone, regardless of the contract type selected.

Firms in the paper, computer, and automotive industries do not face the stringent costing and pricing regulations of defense contractors, but careful cost and price analyses are important to these industries, even with the use of market-based pricing. Market-based pricing relies on the economics of supply and demand, but firms that use this pricing approach must make sure that they do not reduce profits by charging too low of a price or drive consumers to competitors by charging too high of a price.

FOOTNOTES

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