Harvard Business School
Case Selections (Reprint)

哈佛商学案例精选集

（英文影印版）

商务基础系列

Business Fundamentals Series

理解成本

Understanding Costs

William J. Bruns, Jr. 小威廉·J·布伦斯 等 *编写*

中国人民大学出版社

Harvard Business School
Core Skills Series

Understanding Costs

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INTRODUCTION

Welcome to the Business Fundamentals series from Harvard Business School Publishing!

The readings in this collection were developed for the MBA and executive programs of Harvard Business School. These programs rely heavily on the case method of instruction, in which students analyze and discuss firsthand accounts of actual management situations. Students also learn the fundamentals of what managers do: how they measure performance, make choices, and organize their activities. At Harvard Business School, the fundamentals are often taught through background notes, which describe business processes, management techniques, and industries.

The collections in this series are not meant to be comprehensive, but to present the fundamentals of business. Each collection contains several notes, and perhaps an article or two, that provide a framework for understanding a particular business topic or function.

Business is not an exact science. Your own business knowledge comes from your own experiences and observations, accumulated over many years of practice. These collections aim to give you a framework for past and future experiences, using many of the same materials taught at Harvard Business School.

The Business Fundamentals collections are designed for both individual study and facilitated training. If you want to use this collection for self-study, we've provided a summary, outline, learning objectives, and questions for each reading to help you get started. If these readings are part of a training program in your company, you will find them to be a rich resource for discussion and group work.

You can search for related materials on our Web site: www.hbsp.harvard.edu. We hope that your learning experience will be a rich one.

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UNDERSTANDING COSTS FOR MANAGEMENT DECISIONS

(W.J. Bruns, Jr. / #9-197-117 / 4 p)

Summary

This note introduces managers to the concept of costs, their uses, and their complexity. Several types of costs are defined, and single-period and multiple-period cost analysis is discussed.

Outline

Types of Cost

Cost Variability

Analyzing Costs in Single Period Decisions

Cost Analysis over Many Periods

Cost as a Criterion for Choice

Learning Objectives

After reading the note and completing the following exercises, managers should be able to:

- Become familiar with they types of costs commonly used in making business decisions.
- Understand the difference between variable and nonvariable costs.
- Perform a cost analysis for each of several decisions they are considering.

Questions to Consider

- What kinds of information do you receive about costs? From what sources do you receive this information?
- How do you use costs when making management decisions?

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Understanding Costs for Management Decisions

"Cost" is a word used in many different ways in management and management decision making. Cost is a measure of something that has been given up (or will be given up) in the process of doing things. The utility and versatility of the concepts of cost are what make the collection, analysis, and presentation of cost information so useful in solving management problems.

Many problems can be "solved" by first measuring and then using "cost" as a central part of the overall criteria or analysis. Sometimes managers want to predict or accomplish an objective in the least expensive manner. At other times they may want to compare cost to revenue to predict or achieve the highest profit or smallest loss. The least costly decision may not be the one ultimately selected because added benefits that can be gained by incurring greater costs may outweigh the greater cost itself.

Costs are often predicted and analyzed before decisions are made and implemented. These anticipated cost data are frequently used to control operations or evaluate the effectiveness of decisions.

Types of Cost

Three types of costs—*current costs, opportunity costs,* and *sunk costs*—are frequently used in management decision making. Each can be used in several ways in cost analysis.

Current costs are measured as activities take place. In measuring current costs, the accountant attempts to determine what has been (or must be) given up in order to either implement a decision or carry out an activity. What is given up can take many forms. Physical effort, raw material, or fees paid in the form of money to others may all be required to implement a decision or produce a product or service. Each of these may represent a current cost of that activity. Management accountants usually measure each component of current cost in terms of a monetary equivalent. This is done to make the process of measuring, accumulating, and storing information both more feasible and more convenient.

Opportunity costs can be thought of as the cost of the second-best alternative. If cost is being incurred in producing product A, then it is not being incurred in producing product B. For example, if material is used in product A, it is not available for product B. In analyzing management options, it may be useful to think of the cost of product A as being what we gave up by not producing product

Professor William J. Bruns prepared this technical note as the basis for class discussion.

B. Every management decision or option has an opportunity cost. Although opportunity costs are not always measured in financial terms and are rarely formally recorded in accounting records, they are important in management decision making and management accounting analyses.

The term "sunk" cost refers to expenditures of time, effort, material, and money that can never be recovered. In contrast to opportunity costs, which are rarely included in accounting records, sunk costs often are. The nature of sunk costs must be clearly understood by managers. Sunk costs are irrelevant in analyzing future courses of action or in making decisions about which future courses of actions would be most advantageous given organizational goals.

The effectiveness with which information about costs can be developed and used depends upon an understanding of definitions and communication of types of "costs." Understanding what has been given up, or what will be given up, or what has been given up that can never be recovered (and, therefore, can be ignored in considering a current problem) is the beginning of effective cost analysis.

Cost Variability

The way in which costs change as activities change is important to determining the relevance of that cost in many decision problems. If the total amount of cost incurred because of a decision is not changed by that decision, that cost is *nonvariable, fixed,* or *nondifferential.* On the other hand, if the alternatives under consideration will result in changes in the amount of cost, that cost is *variable,* or *differential,* or *incremental.*

Good cost analysis almost always begins with an attempt to determine whether—and how much—a cost will vary with alternatives that might be chosen. Sometimes, determining a variable cost is very simple. If each unit of product or service requires a specified amount of material, it is quite easy to both predict and measure the amount of cost that will be associated with the decision to produce a certain quantity of that product. By the same token, if a monthly fee such as rent must be paid in order to utilize a production facility and the facility can be used for any of several quantities of product or service, than the rent is a cost that relates to a period of time rather than the volume of production. The terms *nonvariable cost* or *variable cost* refer to how the total cost changes as the quantity of product or service produced changes.

Whether a cost is variable or nonvariable often depends upon the time horizon of a decision or course of action with which management is faced. If a factory or office is owned or has been rented under a contract, the occupancy costs and/or rent paid for may be nonvariable for the life of the building or contract. On the other hand, if the capacity of the building is insufficient to provide for the quantity of production under consideration and additional space will be required, then additional occupancy costs become variable costs (or *differential costs*) in the analysis. It is not possible to make categorical statements about whether a cost is nonvariable without considering the time period involved.

A final complication in any discussion of cost variability arises because many costs do not fall neatly into one or the other classification—variable or nonvariable. In addition, some costs are nonvariable within ranges of activity. If a decision will move activity beyond that range, however, then the level of cost will change significantly.

Analyzing Costs in Single-Period Decisions

When a management problem or decision involves a relatively short time period, the cost analysis process can be fairly straightforward. Since nonvariable costs will not change in a short period of time (remember that the definition of a nonvariable cost is one that does not change),

attention need be given only to those costs that will change (or the *variable* costs). Once a decision criterion of minimizing costs or maximizing the difference between revenues or benefits and costs has been chosen, most analyses will lead quickly to indicated courses of action. The only serious questions are likely to involve how certain are the measurements and predictions of costs and whether they are truly variable or nonvariable.

In analyzing single-period decision problems, both managers and management accountants frequently use *contribution* analysis. The best decision will produce the most profit or make the highest "contribution" to covering *nonvariable* costs. Contribution analysis seeks to find the difference between the revenue or benefits and the variable costs that will result from a course of action.

For a unit of product or service, *contribution* is measured by the difference between the net selling price and the variable costs of producing a unit of the product or service. For a product line, it is measured by the revenue obtained by a given quantity of product or service delivered and sold to clients, less the total variable cost incurred in producing and delivering that quantity of product or service. Contribution is greater than profit because the nonvariable costs which are not changed as a result of the decision or action taken are excluded from the analysis. Contribution analysis is a simple, yet powerful method of making short-term decisions.

In spite of its power, contribution analysis has many limitations. Conclusions reached by analyzing contribution are dependent on judgments that have been made about cost variability over the time period under consideration. In addition, when contribution analysis is used as an input to decision processes, we necessarily make the assumption that the predicted costs will be those actually incurred. Finally, in many situations costs of various programs and activities interact, and it is difficult to separate these *joint costs*.

Cost Analysis over Many Periods

As soon as a management problem or a cost analysis problem extends beyond a short period of time, a number of additional complications can come into play. Uncertainties about the future increase as the horizon moves away from our current knowledge and experience. The concept of cost itself tends to change, for a current cost is different from one that will be incurred in the future.

Managers and accountants have developed and utilize techniques for analyzing multiperiod decision problems. These techniques are based upon or utilize the concept of *interest*. The concept or *compound interest* relates a financial cost at one point in time to the financial cost at another point in time using a *rate of return*, an *interest rate*, or a *cost of capital* appropriate to either the organization or the particular class of problem(s). While there are several techniques for doing this, two that are particularly popular are called the *net present value method* and the *internal rate of return method.*[1]

In the net present value method of analyzing multiperiod problems, all costs (and benefits) at future times are related to their present value equivalents by using an interest rate equal to either the cost of capital or the expected earnings rate within the organization. The net present value of a future cost can be considered to be the amount that the cost now represents when consideration is given to the return that could be obtained between the present time and the time at which the cost will be incurred. Some students find it useful to think of this amount as the amount that we could pay someone now to take care of the cost in the future—assuming that the person we would pay now could earn a given interest rate on our deposit.

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[1] Students who are not familiar with the use of compound interest in the analysis of multiperiod problems are referred to other references. Compound interest methods are appropriate whenever the planning or decision horizon extends beyond a single period.

The internal rate of return method for analyzing multiple-period problems identifies the interest rate (or the cost of capital) that would make the various costs incurred and benefits received over the life of the project in question equal to each other in present value terms. In comparison to the net present value method, the internal rate of return method assumes that we know the costs to be incurred and the benefits to be received at the various points in time, and that we seek the interest rate that would allow us to treat them as equivalent. Both the net present value method and the internal rate of return method are based upon the same concepts and formulas, but technical differences in their application make them more or less useful in selected problems or to different managers.

Multiple-period problems require that costs be measured in terms of cash or their cash equivalents. Both the present value and internal rate of return methods depend upon the identification of the cash flows that will result from alternative courses of action. If a cost does not consist of cash expenditure or if benefits are not obtained in the form of cash, it is necessary to seek their equivalence in cash before these analytical methods can be applied.

Among the most frequent problems encountered in multiple-period analysis is the proper treatment of *depreciation*. The cash flow that relates to the cost of assets has usually been incurred in an earlier period. Therefore, when analyzing accounting costs in multiple-period cost analysis, it is necessary to "correct" for the effects of depreciation accounting. Depreciation is an allocation of a previous cash flow to an accounting period. But depreciation cannot be ignored. Depreciation often affects other cash flows, such as the determination of taxes due.

Multiple-period cost analysis is usually more complex than single-period analysis. In almost every case where decisions or analyses cover several periods of time, the number of variables to be considered will be greater than they are in short-term decision making.

Cost as a Criterion for Choice

The concept of cost is a powerful one in economic decision making. If cost can be minimized for a given amount of output, or if more product or service can be obtained for the same amount of cost, economic efficiency will be enhanced. It is for this reason that managers in every organization seek an understanding of their costs and their cost of operations.

The process of cost analysis, however, must always proceed with some caution. The cost information utilized must be appropriate to the time period and the decision horizon of the problem at hand. The costs must be those that relate to actions that will be taken or have been taken. Careful analyses of costs that are irrelevant to the decision problem at hand are of little or no use.

Finally, cost analysis—taken by itself—will rarely lead to the discovery of new alternatives. For cost analysis to be effective as part of a total management system, there must be clear thinking about alternatives that could be taken or that might have been taken. This latter process should take place before, during, and after the cost analysis process. The effective manager or management accountant always brings imagination, ingenuity, and perseverance to every situation that requires information about costs.

A BRIEF INTRODUCTION TO COST ACCOUNTING

(W.J. Bruns, Jr. / #9-192-068 / 6 p)

Summary

In this note, Bruns explains the basics of cost accounting and cost management systems. Cost behavior is discussed, and simple definitions of forms used in cost accounting are included.

Outline

Some Uses of Information About Costs

Performance Measurement
Product Costs and the Cost of Services

Cost Behavior

Relation of Costs to Volume

Accounting for Costs

Classifying Costs
Accounting for Direct Costs
Accounting for Indirect Costs

Learning Objectives

After reading the note and completing the following exercise, managers should be able to:

- Understand how cost information is used to measure performance and estimate costs of products and services.
- Become familiar with how direct and indirect costs are accounted for.
- Identify what additional cost information they need in order to more effectively use costs to make decisions.

Questions to Consider

- Are you comfortable with your understanding of your department's cost accounting system?
- How much input do you have in how your unit's cost accounting system is structured?
- Have you ever discussed your unit's costs with a colleague in your firm's finance and accounting department?

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A Brief Introduction to Cost Accounting

Organizations and managers are almost always interested in and concerned about costs. Control of past, present, and future costs is part of every manager's job. In companies that try to earn profits, control of costs directly affects the amount of profit earned. Knowledge of the cost of products or services is indispensable for decisions about pricing or product and service mix. In nonprofit organizations, control of costs influences the level of services that can be provided and the future survival of the organization.

Cost accounting systems can be important sources of information for managers. For this reason, effective managers understand the strengths and limitations of cost accounting systems and actively participate in the evaluation and evolution of cost measurement and management systems. Unlike accounting systems that support the preparation of periodic financial reports, cost accounting systems and reports are not subject to rules or standards such as generally accepted accounting principles. Managers are permitted to exercise as much creativity and ingenuity as they wish in the quest for information on costs. As a result, there is much variety in cost accounting systems used in different companies and sometimes even in different parts of the same organization.

This brief introduction to cost accounting will review the principal uses of cost data, provide some vocabulary for cost accounting, and present several of the questions managers have to answer in designing or using a cost accounting system. Its purpose is to provide the beginner with some vocabulary and ideas to use in learning about and exploring how cost management systems are designed and used by managers. While many of the references are to products and manufacturing environments, the vocabulary and concepts are equally applicable to services.

Some Uses of Information About Costs

Information about costs is used for two purposes in most organizations. Cost accounting systems provide information for evaluating the performance of an organizational unit or its manager. They also provide a means for estimating the costs of units of product or service that the organization may manufacture or provide to others.

Professor William J. Bruns, Jr., prepared this note as the basis for class discussion.

Performance Measurement

Reports on the costs incurred by part of an organization—department or a division, for example—are one means by which efficiency and effectiveness can be evaluated. By comparing *actual costs* to those that were expected—to *standard costs* or *budgeted costs*—the degree to which costs have been controlled can be judged. Deviations from expectations—*variances*—can be identified, evaluated, and discussed by managers. If needed, corrective actions can be taken or expectations can be modified to incorporate previously unexpected efficiencies.

Performance measurement reporting is usually periodic and systematic. Costs are assigned to parts of an organization that are identified as *cost centers*. When managers are held accountable for the costs incurred in a cost center, they are sometimes called *responsibility centers*. Performance reports provide information on the achievement of established objectives, efficiency of operations, and opportunities for cost control or cost reduction. Performance reports are used for both information and performance measurement and evaluation.

Product Costs and the Cost of Services

Inventory cost In manufacturing companies, product costs must be measured to determine the cost of items transferred from work-in-process to finished goods inventory. To satisfy the demands created by the *cost concept* used in financial reporting, a cost accounting system must measure all of the costs of the manufacturing process and assign some part of those costs to each unit of product. The costs of obtaining, maintaining, and managing the manufacturing facility need to be added to the costs of material and productive labor that each unit requires. The former costs are called *indirect costs*, and the latter are called *direct costs*. Generally accepted accounting principles require that inventory cost includes a "fair share" of total manufacturing costs, including indirect costs. In practice, there is considerable variation in how indirect costs are assigned to products.

Profitability analysis Information on costs is indispensable for analyzing the profitability of a product or product line. Product cost information allows managers to evaluate *contribution margin*—the difference between price and variable costs—and *gross margin*—the difference between price and total product costs. Information about sales, marketing, and distribution costs allows managers to evaluate the profitability of a product or product line. Without good information about costs, managers have no way to associate net income with actions or products about which they make decisions and over which they exercise control.

Product mix In companies that offer more than one product or service, information about costs is a key to managing the mix of products or services offered to customers or clients. With cost and profitability information, a manager can direct sales and marketing effort to the most profitable products. Unprofitable products can be eliminated, repriced, or bundled with more profitable products. The importance of product line decisions to future profitability requires confidence that product costs have been accurately determined.

Pricing Although prices are determined by market forces of supply and demand, product differentiation and marketing offer many managers some degree of latitude in setting prices. Product costs and trends in product costs often provide signals to managers that prices should be changed. In particular, a change in the cost of a critical material or component may signal the need to reconsider the prices asked for products.

Cost of service Many products require the seller to provide additional services to customers. In such cases, information about the cost of services is as important to managers as product costs. The same is true for managers of companies or organizations that provide only services. Unless the cost of service is measured, there is no way to know if providing the service is profitable or not and whether changes in pricing or marketing strategy are needed.

Cost Behavior

Basic knowledge about cost behavior is a prerequisite for understanding, using, or designing cost accounting or cost management systems. The level of cost can be a function of either or both the *volume* of activity or *time* when the cost is incurred. Because prices of material, labor, and other resources change as time passes, and because time allows changes in manufacturing methods or service delivery, comparing costs at two points in time can be informative about efficiency. However, understanding the effect of changes in volume on costs is essential to measuring, analyzing, and using information about costs for both performance measurement and product costing.

Relation of Costs to Volume

If a company changes the amount of product or service it provides to customers or clients, its total costs will usually change as well. If more product is manufactured and sold, then we should expect the higher volume to cause costs to increase. However, in many instances, the increase in costs will not be proportional to the increase in product volume. To understand why, the concepts of *variable costs* and *fixed costs* must be understood.

Variable costs A cost which changes in strict proportionality with volume is called a variable cost. That is, if volume increases by 50%, a variable cost will increase in total by 50% as well. Materials used to create a product are a common example of a variable cost item. The total cost of materials to manufacture 20 units is double the cost to manufacture 10 units.

Nonvariable costs A cost that does not vary at all with volume is called a nonvariable, or fixed, cost. Over time the level of a fixed cost may change, but the change is independent of the volume of activity. Building rent is usually a nonvariable cost. The rent paid is independent of the number of units of product or service produced in the building or the number of customers served. Nonvariable costs can often be changed by management decisions, but they do not change simply because the volume of activity changes.

Semivariable costs Many costs include a combination of variable costs and nonvariable costs. The total amount of these costs varies in the same direction as volume, but less than proportionately with changes in volume. Sometimes semivariable costs can be separated into a fixed portion and a variable portion by isolating elements of the cost. The total cost of driving an automobile is semivariable with respect to the number of miles driven, but the cost of gasoline, oil, tires, and maintenance may be variable, whereas insurance and registration fees are probably fixed.

Chunky costs Often costs are assumed to be variable when they actually are incurred in chunks. Such costs, also known as *step-function costs*, are fixed for a range of volume of production but change in a chunk when volume drops below or exceeds the limits of the *relevant range* of volume. The costs of stockroom employees are often chunky. As volume of inventory or products increases, one stockroom employee may be able to handle material and finished goods until the volume level