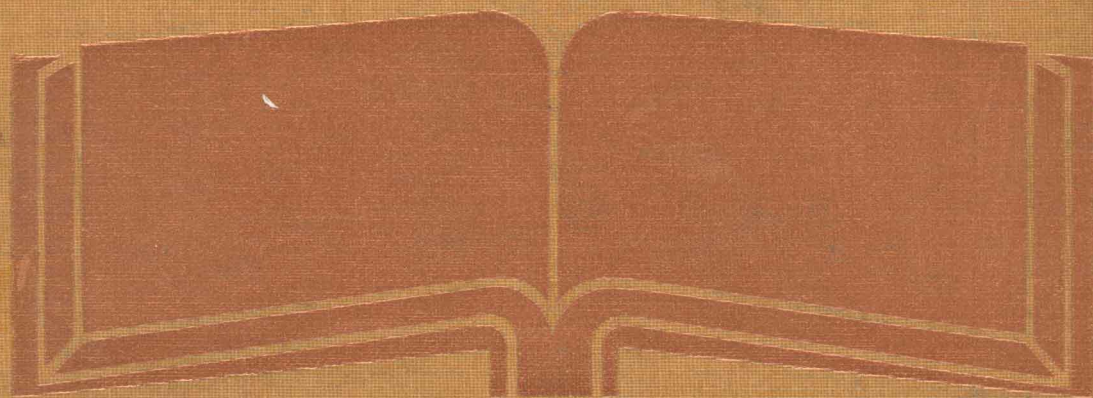


Cost Accounting

**Principles
and
Managerial
Applications**

**Crowningshield
Gorman**

**Third
Edition**



Cost Accounting

PRINCIPLES AND MANAGERIAL APPLICATIONS

THIRD EDITION

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HOUGHTON MIFFLIN COMPANY BOSTON

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Preface

Like the two preceding editions, this third edition of *Cost Accounting: Principles and Managerial Applications* is designed as a basic cost accounting text to provide a good balance between the concepts and procedures applied in the accumulation of cost data and the use of these data by management in performing the functions of planning, decision-making and control. Throughout the book more emphasis has been placed on the use than on the accumulation.

Three major changes have been made in this revision:

- 1 The section on basic principles and procedures has been reduced from fourteen to eleven chapters. This was accomplished without sacrificing essential material by eliminating repetition and rearranging some of the material which is more closely related to managerial use. Responsibility accounting was moved into Part Two; economic order quantity and the learning curve are now in Part Three.
- 2 The section on the use of quantitative methods in planning and control has been expanded from two to seven chapters.
- 3 The text has been updated with appendices on the recently created Cost Accounting Standards Board and computer programming.

The objectives of the changes were to provide a more teachable sequence and to bring the subject matter into line with current practice.

In the interests of flexibility, separation into distinct sections seemed preferable to intermingling basic concepts, managerial applications, and quantitative methods. Accordingly, the text is divided into three parts:

- 1 Part One, concerned mainly with basic principles and techniques, lays a foundation for the discussion of managerial applications which follows. The study of methods of cost accumulation may not be an end in itself but it is the means to an end. Knowledge must precede application. Basic to effective use of cost data is a clear understanding of how costs are determined and what their limitations are. Nor can it be argued that the computer eliminates the need for developing basic principles. The computer must be told exactly

- what to do and can provide correct answers only if given correct instructions.
- 2 Part Two is devoted exclusively to managerial applications of cost information.
 - 3 Part Three is a recognition of the growing importance of mathematical techniques not only in practice but also in the examinations being given by the American Institute of Certified Public Accountants and the Institute of Management Accountants of the National Association of Cost Accountants. A background in some of the more sophisticated techniques has become essential.

Flexibility to meet the requirements of courses differing both in length and content has been a principal aim of this text. It is easily adaptable to a one- or two-semester course for either accounting or non-accounting majors, and the chapters are organized to allow the instructor a wide choice of subject matter and emphasis.

Part One permits either a survey or comprehensive treatment of basic principles. Chapters 1–3 provide an adequate introduction for non-accounting majors. Shorter courses may omit Chapters 4, 5, 9, and 10. Chapter 11 on direct costing is, of course, optional.

Since the chapters in Part Two are independent of each other, the instructor may pick and choose. Chapter 12 is a comprehensive treatment of cost behavior which is not essential to an understanding of the material that follows and may be left out of shorter courses. Chapter 13 is an introduction to cost-volume-profit analysis; Chapter 14 need be used only if more depth is desired.

Inclusion of quantitative methods in an accounting course presents the dilemma of students with widely different backgrounds in mathematics. We have tried to solve the problem by the chapter set-up. Some chapters in Part Three require no more than high school algebra; others demand more advanced training. Linear programming, for example, is split into two chapters. Chapter 21 is a simple graphic presentation that provides an easy introduction; Chapter 22 involves matrix algebra. Chapter 27 on the learning curve is divided into two parts, one a simple graphic approach and the other a solution by mathematics. Again, in Part Three, the instructor may easily make a selection to fit the level of his students.

The present edition contains 317 problems, approximately 40 per cent of which are new. The number of shorter exercises has been increased. Many of the problems, including those in the early chapters, are related to decision-making. In preparing problem material, it was our aim not only to provide a variety both in length and difficulty, but also to prepare the student for the CPA and CMA examinations.

In writing both the text and problems, we have drawn heavily from publications of the National Association of Accountants; permission to use their material is gratefully acknowledged. We are grateful to the Society of Industrial and Cost Accountants of Canada for permission to use problems from *Cost and Management* and to the American Institute of Certified Public Accountants for permission to use material which has appeared on the Uniform CPA Examinations.

A passing note of thanks hardly describes our appreciation for the assistance we have received from instructors who have used the previous editions or have made helpful comments for this revision.

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A note to Betty and Pat: If at times you spoke and were not heard, herein lies the reason. And, Susan, there were times when you were no help at all.

GERALD CROWNINGSHIELD
KENNETH A. GORMAN

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PART ONE

BASIC PRINCIPLES AND PROCEDURES

A survey of basic cost accounting procedures in which the principal emphasis is placed on the accumulation rather than the use of cost data:

Process cost system

Job order cost system

Standard costs

Direct costing

1

The field of cost accounting; basic cost concepts

The accounting department produces nothing; nor does it sell. It is a service department whose principal function is to provide financial information for all parties who are interested in the welfare of an enterprise including the owners, creditors, employees, regulatory agencies, tax collectors, prospective investors, and — above all — those who have been entrusted with planning and controlling its day-to-day operations. The needs of many groups can be satisfied with simple summary statements, such as the income statement and balance sheet. Stockholders of a corporation are content with stewardship reports which keep them informed of what has been accomplished with the capital they have invested; creditors are satisfied with statements which provide indexes of the company's debt-paying ability; tax collectors are mainly concerned with income calculations. Management, however, requires far more data and must have information different from what the conventional statements have to offer. Simple listings of assets and liabilities or statements of profit and loss for periods now gone by do not begin to meet the need. Management's interest lies in the future, not the past. Thus, management is concerned with planning and control and with the fixing of responsibility for failure to meet objectives. It is seeking quantitative data which will be helpful in solving the many problems encountered in manufacturing and selling the company's products. As the servant to many masters, the accounting department must be organized to meet the needs of all.

THE FIELD OF ACCOUNTING

The accountant must accumulate financial data for two widely different objectives:

- 1 *External reporting* to meet the needs of those who have an interest in the enterprise but who are not charged with direct responsibility for its day-to-day operations;
- 2 *Internal reporting* to supply information for those who are actively engaged in managing the undertaking.

The first objective is taken care of by what is generally referred to as financial accounting; the second objective is met by what was once called cost, or industrial, accounting and now, in an expanded form, is termed management accounting.

Financial Accounting

Financial accounting is oriented towards the preparation of financial statements which summarize the results of operations for selected periods of time and show the financial position of the company at particular dates. Custodial in nature, it reports on the resources available (balance sheet) and what has been accomplished with these resources (income statement). Its primary concern is the determination of income and asset valuation to be used in preparing annual reports for stockholders, state and federal tax returns, and statements filed with governmental regulatory agencies. For the most part, financial accounting deals with *external transactions*: sales to and collections from customers; purchases from and payments to creditors; payment of payrolls.

Internal Accounting

Internal accounting is charged with the responsibility of providing all of the quantitative data that management requires in carrying out its functions of planning, control, and decision making.

The function of planning is self-explanatory. It is simply a matter of trying to make the best utilization of available resources, seeking answers to questions on what to make and sell, at what cost, and at what selling price. To the extent that the past can be used to predict the future, the accountant can furnish a wealth of information.

The accountant enters into several phases of the problem of cost control:

- 1 Supplying data useful in planning expenditures;
- 2 Reporting differences between planned and actual performances to draw attention to what went wrong;
- 3 Aiding in fixing responsibility for departures from a plan.

Decision making is largely a matter of choosing between alternative courses of action, and one may ask an endless number of questions. Should one of the products in the line be dropped? Should a new product be introduced? Are some customers unprofitable? Should present equipment be replaced? Although the accountant has no ready and easy answers, cost will be a factor in each instance and accounting data, properly accumulated and applied, will play a large part in the ultimate decision.

Cost Accounting

As the name implies, *cost accounting* is the determination of the cost of something — to manufacture a product; to sell in a given market; to change the present method of operations. Charged with the responsibility of providing cost data for whatever purposes they may be needed, the cost accountant acts in a dual capacity with obligations to both external and internal reporting. In particular, he must:

- 1 Determine product costs that are necessary in the preparation of financial statements; and
- 2 Collect pertinent quantitative information that would be helpful in the solution of particular management problems.

In contrast to financial accounting, cost accounting is chiefly concerned with *internal transactions*, such as receiving and issuing materials, tracing costs to products, and making analyses of distribution costs by product, salesman, territory, and the like. In routine costing, the cost accountant takes from the general records certain recorded data — purchases of materials, factory payrolls, or miscellaneous factory costs — breaks them down, reclassifies, and finally returns the data to financial accounting as inventories or the cost of sales. In special cost studies, the accountant selects data which are pertinent to the problem, adjusts them to fit the particular problem, and then arranges them in a form that can be interpreted by those who are seeking an answer to a question. In part, cost accounting is an adjunct of financial accounting in statement preparation; in part, it is working with management in the planning, control, and decision-making functions.

Management Accounting

Management accounting is a term applied to a fairly recent development in the field of accounting. It is used to describe an expanded role of accounting in the management scheme in which the accountant fully participates as an active member of the management team. The term implies that the accountant is responsible for maintaining a data bank which will include any and all information that management could use. Management accounting is not synonymous with cost accounting since the function of management accounting encompasses more than simply the accumulation of cost data. And while much of the material we shall be studying is management accounting, we shall be principally concerned with the role cost accounting plays in the broader scheme.

Expanding Role of Management Accounting

Historically, management accounting has played a secondary role and data for internal use have usually been little more than by-products of financial reporting. In the past, accountants have been content to limit their function to that of financial historian and have concentrated their efforts on the accumulation of data for external reporting with the result that the potential of accounting data for analytical purposes was not fully exploited. The last two decades, however, have seen a change. Faced with intense competition and caught in a cost-price squeeze, management has been applying more scientific approaches to the solution of its problems. More and more, executives are turning to the fields of mathematics and statistics, seeking to substitute quantitative analysis for hunches and intuition. Trying to keep pace, the accountant has begun, albeit slowly, to broaden his horizons and shift his point of emphasis from asset valuation and income determination to supplying the quantitative data that management demands.

It is to be expected that a more widespread use of computers and high-speed electronic data processing will accelerate this change. In the not too distant future, machines will handle the routine record-keeping and perform the mathematical

computations which have previously been a part of the accounting function. This poses both a threat and an opportunity. The mathematician and the statistician are a serious threat to the accountant's position as chief financial officer if he fails to keep abreast of new developments. On the other hand, there is an opportunity if the accountant is trained in quantitative techniques as well as accounting procedures and is able to put the machines to effective use. With the computer as an ally, the accountant can expand his scope of operations and make accounting what it is meant to be — a service function supplying financial information where it is needed when it is needed.

Different Functions Need Different Concepts

Since the objectives of external and internal reporting differ, it follows that the data must be compiled under different concepts. Since they will be used by outsiders, data for external reporting must be made to conform to the so-called "generally accepted accounting principles" so that they will be acceptable to the auditor who will be asked to certify to their "fairness." Information for internal consumption may be compiled without outside interference and need not conform to any rigid set of rules. Any workable concept or technique whether it be drawn from accounting, economics, mathematics, or statistics can be applied. The data need not be objective, nor conservative, nor verifiable. They can be facts, estimates, approximations, or projections. In short, data for management accounting need pass only one simple test. Do they serve the purpose for which they were intended?

Seldom can costs which have been determined for financial statements be used in planning, control, and decision making, and the tailoring which is necessary to fit financial accounting data to problem solving requires the application of concepts which the auditor, hemmed in by tradition and convention, cannot accept. Financial and management accounting look at a problem in different ways. For example, take the replacement of machinery now in operation in the factory. The financial accountant is faced with such questions as how to handle the difference between an asset's book value and its scrap value, the tax implications of the exchange, and whether to expense or capitalize certain expenditures related to the replacement. The management accountant is more concerned with the future inflows that will result from the change and whether these inflows justify an additional investment in equipment.

To a far greater extent than in financial accounting, the work of the cost accountant is closely related to that of the engineer, the production manager, the sales manager, the industrial economist, the mathematician, the statistician, and the personnel manager. If he is to meet the challenge facing him, the cost accountant must possess some knowledge in each of these areas. Naturally, the greater the depth of his understanding in these related fields, the greater is his usefulness to his organization. If he is to realize the full potential of cost accounting as a management service, the accountant must, in a sense, be a jack-of-all-trades who knows something about everything. True, it is a large order to fill, and not all practicing accountants will agree that accounting does require such an extensive background, but it can mean the difference between relegating the accountant to the subordinate position of a clerk acting as the scorekeeper of a game already played or assigning him a place on the team planning the strategy for tomorrow's action.

Whatever the present position of the established accountant, today's student cannot be content to accept the limited function accountants have typically performed in the past. Accounting is in a period of transition. For proof, we have only to look at the number of public accounting firms that are adding management service divisions, at the increasing emphasis on quantitative methods on CPA exams given over the past several years, or at the creation of the Institute of Management Accounting by the National Association of Accountants to set up and administer the Certificate in Management Accounting program, described below. Taken together, these add up to a growing recognition that management accounting is something more than a branch of financial accounting and that someday it may be granted the long-overdue professional status it deserves.

Recent Developments in Accounting

Two recent developments in accounting merit note: (1) The Cost Accounting Standards Board and (2) The Certificate in Management Accounting (CMA). The work of the Cost Accounting Standards Board is discussed at length in an appendix to Part One on page 302 and needs no further elaboration here. A few excerpts from a brochure issued by the National Association of Accountants will serve to describe the objectives and operation of the CMA program:

More and more people — inside the business world and out — realize the significant changes which have been taking place for years in accounting and in the role of the accountant in business. No longer is he simply a recorder of business history. He now plays a dynamic role in making business decisions, in future planning and in almost every aspect of business operations. This new accountant is called a Management Accountant and he sits with top management because his key responsibility is developing, producing and analyzing information to help management make sound decisions. Many management accountants make their way to top management positions.

In response to the needs of business and at the request of many in the academic community, the National Association of Accountants has established a program to recognize professional competence in this field — a program leading to the Certificate in Management Accounting.

The CMA program requires candidates to pass a series of uniform examinations and meet specific educational and professional standards to qualify for and maintain the Certificate in Management Accounting. NAA has established the Institute of Management Accounting to administer the program, conduct the examinations and grant certificates to those who qualify.

The objectives of the program are threefold: (1) to establish management accounting as a recognized profession by identifying the role of the management accountant and the underlying body of knowledge, and by outlining a course of study by which such knowledge can be acquired; (2) to foster higher educational standards in the field of management accounting; (3) to assist employers, educators and students by establishing objective measurement of an individual's knowledge and competence in the field of management accounting.

The first examination for the CMA certificate was given in December, 1972. Two parts of the five-part examination tested subject matter which we shall be discussing in this text:

- 1 Periodic reporting for internal and external purposes; and
- 2 Decision analysis, including modeling and information systems.

UNDERLYING CONCEPTS

Before embarking on a discussion of cost accounting principles and procedures, it is advisable to lay down a background in basic concepts that will run through our study. As we have divided the field of accounting into two distinct areas, so can we make a split into two widely different concepts:

- 1 The principal interest of financial accounting lies in a proper matching of cost and revenue in the determination of net income.
- 2 With little or no interest in the matching process, management is concerned with how costs will change with a decision.

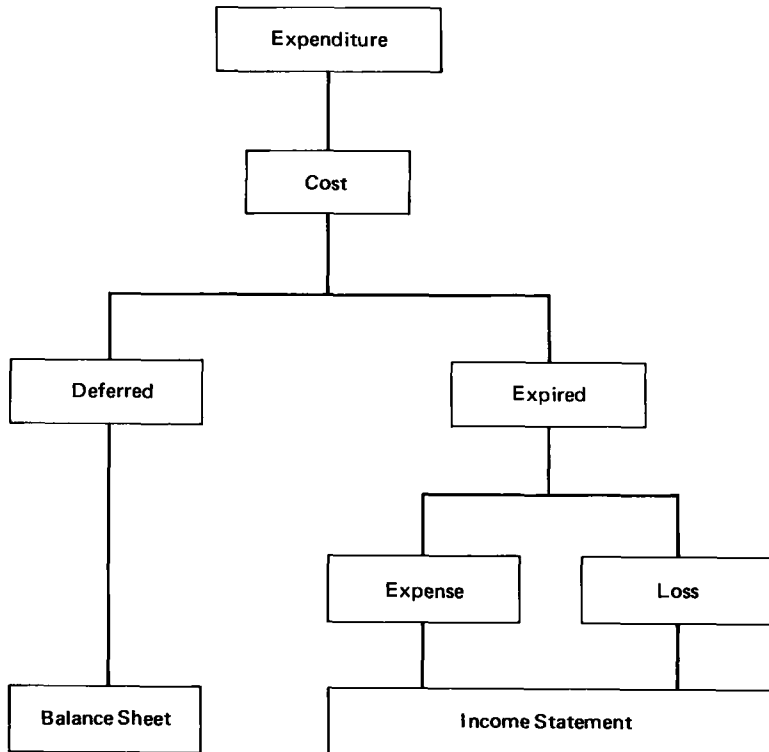
First, let us review the basic cost concepts and then take a brief look at cost behavior.

Concepts of Cost

Cost is a loosely used, often misused, term that defies a simple definition. It is used in so many different ways that perhaps no single definition could be written which would satisfy everyone. In accounting, for example, costs usually arise from completed transactions. In contrast, in economics costs may be values assigned to opportunities foregone — the wages that a single proprietor would earn were he working for someone else, for instance. In accounting, cost is usually measured by an outlay made in the past; it can likewise be expressed as the outlay required for replacement in the present.

For our purposes, *cost* represents an expenditure (a decrease in assets or an increase in liabilities) made to secure an economic benefit, generally resources that promise to produce revenue. The resources may have tangible substance (materials or machinery) or they may take the form of services (wages, rent, power). Whatever their form, it is assumed that the expenditure will be subsequently recovered.

At the time it is made, every expenditure represents a sacrifice made to secure an economic benefit, either one already received (rent for a period which has expired) or one yet to be received (rent for future periods). Until such time as the benefit is received, the expenditure is carried forward as a *deferred cost* — prepaid insurance, inventory of materials, machinery, etc. When the benefit has been received or when it becomes apparent that no benefit will accrue, the cost is said to have *expired* and then it is charged against the revenue of an accounting period, as an *expense* if it has contributed to the production of revenue (a *utilized cost*) or as a *loss* if no benefit, past or future, is ascertainable (a *lost cost*). The movement of expenditures into the financial statements is diagrammed in Exhibit 1.1.

EXHIBIT 1.1**FLOW OF EXPENDITURES INTO
FINANCIAL STATEMENTS****Expense Distinguished from Loss**

In product costing, it is often necessary for the accountant to make a distinction between expense and loss. In some cases, the distinction is clear-cut and no problem arises. No one, for example, would argue that materials destroyed by fire could rightfully be considered as a cost of manufacturing a product. By the same reasoning, salaries paid to employees kept on the payroll during a prolonged strike would be handled as a loss resulting from disrupted operations, not as a normal manufacturing cost.

Not so clear is a host of other cases such as material spoiled through poor workmanship, high prices paid for material because of faulty purchasing, or wages paid to employees for idle time resulting from improper scheduling or machine breakdowns. Under ideal conditions, these costs could be eliminated. But ideal conditions do not prevail. Every plant can expect some defective production; machines do break down unexpectedly. Human beings are imperfect and the losses from their imperfections must be accepted as an inherent part of the cost to operate. There are, however, limits beyond which such losses should not go. The question facing the accountant is deciding when such items as spoilage and idle