GLOBAL EDITION

HORNGREN'S

COST ACCOUNTING

A MANAGERIAL EMPHASIS

17E

SRIKANT M. DATAR • MADHAV V. RAJAN

Horngren's Cost Accounting

A MANAGERIAL EMPHASIS

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Preface

New to This Edition

Increased Focus on Merchandising and Service Sectors

In keeping with the shifts in the world economy, this edition makes great use of merchandising and service sector examples, with corresponding de-emphasis of traditional manufacturing settings. For example, Chapter 10 illustrates linear cost functions in the context of payments for cloud computing services. Chapter 11 describes revenue management using big-data analytics at a company investing in loans. Chapter 21 highlights inventory management in retail organizations and uses an example based on a seller of sunglasses. Chapter 22 incorporates a running example that looks at capital budgeting in the context of a transportation company. Several Concepts in Action boxes focus on the merchandising and service sectors, including achieving cost leadership at Costco (Chapter 1), reducing fixed costs at Lyft (Chapter 2), using activity-based costing to reduce the costs of health care delivery at the Mayo Clinic (Chapter 5), developing Internet-based budgeting at P.F. Chang's (Chapter 6), and analyzing operating income performance at Buffalo Wild Wings (Chapter 13).

Greater Emphasis on Sustainability

This edition places significant emphasis on sustainability as one of the critical managerial challenges of the coming decades. Many managers are promoting the development and implementation of strategies to achieve long-term financial, social, and environmental performance as key imperatives. We highlight this in Chapter 1 and return to the theme in several subsequent chapters. Chapter 13 discusses the benefits to companies from measuring social and environmental performance and how such measures can be incorporated in a balanced scorecard. Chapter 24 provides several examples of companies that mandate disclosures and evaluate managers on environmental and social metrics. A variety of chapters, including Chapters 2, 6, 10, 14, and 22, contain material that stress themes of recognizing and accounting for environmental costs; energy independence; setting stretch targets to motivate greater carbon reductions; using cost analysis, carbon tax, and cap-and-trade auctions to reduce environmental footprints; and constructing "green" homes in a cost-effective manner.

Focus on Innovation

We discuss the role of accounting concepts and systems in fostering and supporting innovation and entrepreneurial activities in firms. In particular, we discuss the challenges posed by recognizing R&D costs as period expenses even though the benefits of innovation accrue in later periods. In Chapter 6, we describe how companies budget for innovation expenses and develop measures to monitor success of the innovation efforts delinked from operational performance in the current period. Chapter 12 presents the importance of nonfinancial measures when making decisions about innovation. Chapter 14 stresses that innovation starts with understanding customer needs while Chapter 20 discusses process innovations for improving quality.

New Cutting-Edge Topics

The pace of change in organizations continues to be rapid. The 17th edition of *Cost Accounting* reflects changes occurring in the role of cost accounting in organizations.

- We have added new material and a new Chapter 11 to explain recent trends in big data and data analytics to manage revenues and predict costs. Companies are increasingly looking for management accountants who can interface with data scientists.
- We introduce sustainability strategies and the methods companies use to implement sustainability and business goals.

- We describe ideas based on academic research regarding the weights to be placed on performance measures in a balanced scorecard. We also have a section on methods to evaluate strategy maps such as the strength of links, differentiators, focal points, and trigger points.
- We provide details on the transfer pricing strategies used by multinational technology firms such as Apple and Google to minimize income taxes.
- We discuss current trends in the regulation of executive compensation.
- We describe the evolution of enterprise resource planning systems and newer simplified costing systems that practice lean accounting.

Solving Learning and Teaching Challenges

Studying cost accounting is one of the best business investments a student can make. Why? Because success in any organization—from the smallest corner store to the largest multinational corporation—requires the use of cost accounting concepts and practices. Cost accounting provides key data to managers for planning and controlling, as well as costing, products, services, and even customers. This book focuses on how cost accounting helps managers make better decisions, as cost accountants increasingly are becoming integral members of their company's decision-making teams. In order to emphasize this prominence in decision making, we use the "different costs for different purposes" theme throughout this book. By focusing on basic concepts, analyses, uses, and procedures instead of procedures alone, we recognize cost accounting as a managerial tool for business strategy and implementation.

We also prepare students for the rewards and challenges they will face in the professional cost accounting world of today and tomorrow. For example, we emphasize both the development of technical skills such as Excel and big-data analytics to leverage available information technology and the values and behaviors that make cost accountants effective in the workplace.

Opening Vignettes

Each chapter opens with a vignette on a real company situation. The vignettes engage the reader in a business situation or dilemma, illustrating why and how the concepts in the chapter are relevant in business. For example, Chapter 2 describes how teen apparel chain Aéropostale was driven into bankruptcy by the relatively high proportion of fixed costs in its operations. Chapter 5 explains the use of activity-based costing by IBM to evaluate the true cost of data breaches. Chapter 9 highlights Under Armor's use of a new internal company system to better manage its inventory and supply chain with efficiency and precision to reduce inventory costs. Chapter 15 shows how Starbucks changed its rewards program to better align rewards with customer spending. Chapter 19 shows the impact on Tesla of the rework costs associated with a drastic ramp-up of production to meet unprecedented customer demand. Chapter 24 describes the misalignment between performance measurement and pay at General Electric.

Concepts in Action Boxes

Found in every chapter, these boxes cover real-world cost accounting issues across a variety of industries, including defense contracting, entertainment, manufacturing, retailing, and sports. New examples include the following:

- Cost Leadership at Costco: Rock-Bottom Prices and Sky-High Profits (Chapter 1)
- Can Cost–Volume–Profit Analysis Help Whole Foods Escape the "Whole Paycheck" Trap? (Chapter 3)
- P.F. Chang's and Internet-Based Budgeting (Chapter 6)
- Can ESPN Avoid the Cord-Cutting "Death Spiral"? (Chapter 9)
- Zara Uses Target Pricing to Become the World's Largest Fashion Retailer (Chapter 14)
- Big Data Joint-Products and Byproducts Create New Business Opportunities (Chapter 17)
- Facebook Works to Overcome Mobile Data Bottlenecks (Chapter 20)

Streamlined Presentation

We continue to try to simplify and streamline our presentation of various topics to make it as easy as possible for students to learn the concepts, tools, and frameworks introduced in different chapters. We have introduced a new chapter, Chapter 11, on data analytics to help management accountants use big data to manage both revenue and costs. This chapter follows Chapter 10 on predicting cost behavior. We received positive feedback for the reorganization of Chapters 12 through 16 in the 16th edition and have maintained that order in the 17th edition as Chapters 13 through 17. Chapter 13 on the balanced scorecard and strategic profitability analysis follows Chapter 12 on decision making and relevant information for operational decisions. Chapter 14 is the first of four chapters on cost allocation. We introduce the purposes of cost allocation in Chapter 14 and discuss cost allocation for long-run product costing and pricing. Continuing the same example, Chapter 15 discusses cost allocation for customer costing. Chapter 16 builds on the Chapter 4 example to discuss cost allocation for support departments. Chapter 17 discusses joint cost allocation.

Other examples of streamlined presentations can be found in the following chapters:

- Chapter 2, in the discussion of fundamental cost concepts and the managerial framework for decision making.
- Chapter 6, where the appendix ties the cash budget to the chapter example.
- Chapter 8, which has a comprehensive chart that lays out all of the variances described in Chapters 7 and 8.
- Chapter 9, which uses a single two-period example to illustrate the impact of various inventory-costing methods and denominator level choices.

Try It! Examples

Found throughout each chapter, Try It! interactive questions give students the opportunity to apply the concept they just learned.

Becker Multiple-Choice Questions

Sample problems, assignable in MyLab Accounting, provide an introduction to the CPA Exam format and an opportunity for early practice with CPA exam-style questions.

Hallmark Features of *Cost Accounting*

- Exceptionally strong emphasis on managerial uses of cost information
- Clarity and understandability of the text
- Excellent balance in integrating modern topics with traditional coverage
- Emphasis on human behavior aspects
- Extensive use of real-world examples
- Ability to teach chapters in different sequences
- Excellent quantity, quality, and range of assignment material

The first 13 chapters provide the essence of a one-term (quarter or semester) course. There is ample text and assignment material in the book's 24 chapters for a two-term course. This book can be used immediately after the student has had an introductory course in financial accounting. Alternatively, this book can build on an introductory course in managerial accounting.

Deciding on the sequence of chapters in a textbook is a challenge. Because every instructor has a unique way of organizing his or her course, we utilize a modular, flexible organization that permits a course to be custom tailored. *This organization facilitates diverse approaches to teaching and learning.*

As an example of the book's flexibility, consider our treatment of process costing. Process costing is described in Chapters 17 and 18. Instructors interested in filling out a student's perspective of costing systems can move directly from job-order costing described in Chapter 4 to Chapter 17 without interruption in the flow of material. Other instructors may want their students to delve into activity-based costing and budgeting and more decision-oriented topics early in the course. These instructors may prefer to postpone discussion of process costing.

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We would also like to thank the dedicated and hard-working supplement author team and Integra. The book is much better because of the efforts of these colleagues.

In shaping this edition and past editions we would like to thank all the reviewers and colleagues who have worked closely with us and the editorial team. We extend special thanks to those who contributed to the development of Chapter 11, which is new to this edition: Mark Awada, Pascal Bizzaro, Caitlin Bowler, Rachel Caruso, Mahendra Gujarathi, Paul Hamilton, John Harris, Donna McGovern, Tatiana Sandino, and V.G. Narayanan.

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Srikant M. Datar
Madhav V. Rajan

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In memory of Charles T. Horngren 1926–2011

Chuck Horngren revolutionized cost and management accounting. He loved new ideas and introduced many new concepts. He had the unique gift of explaining these concepts in simple and creative ways. He epitomized excellence and never tired of details, whether it was finding exactly the right word or working and reworking assignment materials.

He combined his great intellect with genuine humility and warmth and a human touch that inspired others to do their best. He taught us many lessons about life through his amazing discipline, his ability to make everyone feel welcome, and his love of family.

It was a great privilege, pleasure, and honor to have known Chuck Horngren. Few individuals will have the enormous influence that Chuck had on the accounting profession. Fewer still will be able to do it with the class and style that was his hallmark. He was unique, special, and amazing in many, many ways and, at once, a role model, teacher, mentor, and friend. He is deeply missed.

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Harvard University

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University of Chicago

To Our Families

Swati, Radhika, Gayatri, Sidharth (SD)

Gayathri, Sanjana, Anupama (MVR)

The Manager and Management Accounting

1

All businesses are concerned about revenues and costs.

Managers at companies small and large must understand how revenues and costs behave or risk losing control of the performance of their firms. Managers use cost accounting information to make decisions about research and development, production planning, budgeting, pricing, and the products or services to offer customers. Sometimes these decisions involve tradeoffs. The following article shows how understanding costs and pricing helps companies like Coca-Cola increase profits even as the quantity of products sold decreases.

LEARNING OBJECTIVES

1. Distinguish financial accounting from management accounting
2. Understand how management accountants help firms make strategic decisions
3. Describe the set of business functions in the value chain and identify the dimensions of performance that customers are expecting of companies
4. Explain the five-step decision-making process and its role in management accounting
5. Describe three guidelines management accountants follow in supporting managers
6. Understand how management accounting fits into an organization's structure
7. Understand what professional ethics mean to management accountants

FOR COCA-COLA, SMALLER SIZES MEAN BIGGER PROFITS[1]

Can selling less of something be more profitable than selling more of it? As consumers become more health conscious, they are buying less soda. "Don't want to drink too much?" Get a smaller can. "Don't want so many calories?" Buy a smaller can. "Don't want so much sugar?" Just drink a smaller can. In 2017, while overall sales of soda in the United States declined in terms of volume, industry revenue was higher. How, you ask? Soda companies are charging more for less!

Coca-Cola has been the market leader in selling smaller sizes of soda to consumers. Sales of 7.5-ounce minicans and other smaller packages now account for 10% of Coca-Cola sales by volume. Meanwhile, sales of larger bottles and cans continue to fall. The price per ounce of Coca-Cola sold in smaller cans is higher than the price per ounce of Coca-Cola sold in bulk. The resulting higher profits from the sales of these smaller sizes of soda make up for the decrease in total volume of soda sold. If these trends toward buying smaller cans continue, Coca-Cola will be selling less soda, but making more money, for years to come.

By studying cost accounting, you will learn how successful managers and accountants run their businesses and prepare yourself for leadership roles in the firms you work for. Many large companies, including Nike and the Pittsburgh Steelers, have senior executives with accounting backgrounds.

urbanbuzz/Alamy Stock Photo

[1] *Sources:* Mike Esterl, "Smaller Sizes Add Pop to Soda Sales," *The Wall Street Journal*, January 27, 2016 (http://www.wsj.com/articles/smaller-sizes-add-pop-to-soda-sales-1453890601); John Kell, "Bottled Water Continues to Take the Fizz Out of Diet Soda," *Fortune*, April 19, 2017 (http://fortune.com/2017/04/19/coca-cola-pepsi-dr-pepper-soda-water/); Cara Lombardo, "Coca-Cola Betting Big on Smaller Packages," *The Wall Street Journal*, February 16, 2018 (https://www.wsj.com/articles/coca-cola-betting-big-on-smaller-packages-1518801270).

Financial Accounting, Management Accounting, and Cost Accounting

LEARNING OBJECTIVE 1

Distinguish financial accounting

. . . reporting on past performance to external users

from management accounting

. . . helping managers make decisions

As many of you have already learned in your financial accounting class, accounting systems are used to record economic events and transactions, such as sales and materials purchases, and process the data into information helpful to managers, sales representatives, production supervisors, and others. Processing any economic transaction means collecting, categorizing, summarizing, and analyzing. For example, costs are collected by category, such as materials, labor, and shipping. These costs are then summarized to determine a firm's total costs by month, quarter, or year. Accountants analyze the results and together with managers evaluate, say, how costs have changed relative to revenues from one period to the next. Accounting systems also provide the information found in a firm's income statement, balance sheet, statement of cash flow, and performance reports, such as the cost of serving customers or running an advertising campaign. Managers use this information to make decisions about the activities, businesses, or functional areas they oversee. For example, a report that shows an increase in sales of laptops and iPads at an Apple store may prompt Apple to hire more salespeople at that location. Understanding accounting information is essential for managers to do their jobs.

Individual managers often require the information in an accounting system to be presented or reported differently. Consider, for example, sales order information. A sales manager at Porsche may be interested in the total dollar amount of sales to determine the commissions paid to salespeople. A distribution manager at Porsche may be interested in the sales order quantities by geographic region and by customer-requested delivery dates to ensure vehicles get delivered to customers on time. A manufacturing manager at Porsche may be interested in the quantities of various products and their desired delivery dates so that he or she can develop an effective production schedule.

To simultaneously serve the needs of all three managers, Porsche creates a database, sometimes called a data warehouse or infobarn, consisting of small, detailed bits of information that can be used for multiple purposes. For instance, the sales order database will contain detailed information about a product, its selling price, quantity ordered, and delivery details (place and date) for each sales order. The database stores information in a way that allows different managers to access the information they need. Many companies are building their own enterprise resource planning (ERP) systems. An ERP system is a single database that collects data and feeds them into applications that support a company's business activities, such as purchasing, production, distribution, and sales.

In recent years, managers have begun to use data analytic techniques to gain insights into the data they collect. This is popularly referred to as big data, machine learning, and artificial intelligence. The most common application of machine learning and artificial intelligence is in making predictions. For example, using historical purchase data and other characteristics of a customer, a company like Netflix predicts which movie a particular customer might like and recommends that movie to the customer. Netflix then obtains feedback on whether the customer liked the movie or not and incorporates this feedback into the model, improving and refining it. In this sense the machine learns from its correct and incorrect predictions and is seen as acting intelligently. The vast quantities and variety of data have led to the development of many new prediction techniques. We introduce one such popular technique in Chapter 11 and discuss the role of the management accountant in a data-rich world.

Financial accounting and management accounting have different goals. As you know, **financial accounting** focuses on reporting financial information to external parties such as investors, government agencies, banks, and suppliers based on Generally Accepted Accounting Principles (GAAP). The most important way financial accounting information affects managers' decisions and actions is through compensation, which is often, in part, based on numbers in financial statements.

Management accounting is the process of measuring, analyzing, and reporting financial and nonfinancial information that helps managers make decisions to fulfill the goals of an organization. Managers use management accounting information to

1. develop, communicate, and implement strategies;
2. coordinate design, operations, and marketing decisions and evaluate a company's performance.

EXHIBIT 1-1 Major Differences Between Management and Financial Accounting

	Management Accounting	Financial Accounting
Purpose of information	Help managers make decisions to fulfill an organization's goals	Communicate an organization's financial position to investors, banks, regulators, and other outside parties
Primary users	Managers of the organization	External users such as investors, banks, regulators, and suppliers
Focus and emphasis	Future-oriented (budget for 2020 prepared in 2019)	Past-oriented (reports on 2019 performance prepared in 2020)
Rules of measurement and reporting	Internal measures and reports do not have to follow GAAP but are based on cost-benefit analyses	Financial statements must be prepared in accordance with GAAP and be certified by external, independent auditors
Time span and type of reports	Varies from hourly information to 15 to 20 years, with financial and nonfinancial reports on products, departments, territories, and strategies	Annual and quarterly financial reports, primarily on the company as a whole
Behavioral implications	Designed to influence the behavior of managers and other employees	Primarily reports economic events but also influences behavior because manager's compensation is often based on reported financial results

Management accounting information and reports do not have to follow set principles or rules. The key questions are always (1) how will this information help managers do their jobs better, and (2) do the benefits of producing this information exceed the costs?

Exhibit 1-1 summarizes the major differences between management accounting and financial accounting. Note, however, that reports such as balance sheets, income statements, and statements of cash flows are common to both management accounting and financial accounting.

Cost accounting provides information for both management accounting and financial accounting professionals. **Cost accounting** is the process of measuring, analyzing, and reporting financial and nonfinancial information related to the costs of acquiring or using resources in an organization. For example, calculating the cost of a product is a cost accounting function that meets both the financial accountant's inventory-valuation needs and the management accountant's decision-making needs (such as deciding how to price products and choosing which products to promote). However, today most accounting professionals take the perspective that cost information is part of the management accounting information collected to make management decisions. Thus, the distinction between management accounting and cost accounting is not so clear-cut, and we often use these terms interchangeably in the text.

Businesspeople frequently use the term *cost management*. Unfortunately, the term does not have an exact definition. In this text, we use **cost management** to describe the activities managers undertake to use resources in a way that increases a product's value to customers and achieves an organization's goals. Throughout the text, other than in a manufacturing context, we use the term *product* broadly to also include services. In other words, cost management is not only about reducing costs. Cost management also includes making decisions to incur additional costs—for example, to improve customer satisfaction and quality and to develop new products—with the goal of enhancing revenues and profits. Whether or not to enter new markets, implement new organizational processes, and change product designs are also cost-management decisions. Information from accounting systems helps managers to manage costs, but the information and the accounting systems themselves are not cost management.

How is financial accounting different from management accounting?

Strategic Decisions and the Management Accountant

LEARNING OBJECTIVE 2

Understand how management accountants help firms make strategic decisions

. . . they provide information about the sources of competitive advantage

A company's **strategy** specifies how the organization matches its own capabilities with the opportunities in the marketplace. In other words, strategy describes the integrated set of choices an organization makes to create value for its customers while distinguishing itself from its competitors. Businesses follow one of two broad strategies. Some companies, such as Southwest Airlines and Vanguard (the mutual fund company), follow a cost leadership strategy. They profit and grow by providing quality products or services at low prices and by judiciously managing their operations, marketing, customer service, and administration costs. Southwest Airlines, for example, only operates Boeing 737 aircrafts to reduce costs of repairs, maintenance, and spare parts and offers no seat assignments at boarding to reduce the costs of ground staff. Other companies such as Apple and the pharmaceutical giant Johnson & Johnson follow a product differentiation strategy. They generate profits and growth by offering differentiated or unique products or services that appeal to their customers and are often priced higher than the less-popular products or services of their competitors.

Deciding between these strategies is a critical part of what managers do. Management accountants work closely with managers in various departments to formulate strategies by providing information about the sources of competitive advantage, such as (1) the company's cost, productivity, or efficiency advantage relative to competitors or (2) the premium prices a company can charge over its costs from distinctive product or service features. **Strategic cost management** describes cost management that specifically focuses on strategic issues.

Management accounting information helps managers formulate strategy by answering questions such as the following:

- *Who are our most important customers, and what critical capability do we have to be competitive and deliver value to our customers?* After Amazon.com's success selling books online, management accountants at Barnes & Noble outlined the costs and benefits of several alternative approaches for enhancing the company's information technology infrastructure and developing the capability to sell books online. A similar cost–benefit analysis led Toyota to build flexible computer-integrated manufacturing plants that enable it to use the same equipment efficiently to produce a variety of cars in response to changing customer tastes.
- *What is the bargaining power of our customers?* Kellogg Company, for example, uses the reputation of its brand to reduce the bargaining power of its customers and charge higher prices for its cereals.
- *What is the bargaining power of our suppliers?* Management accountants at Dell Computers consider the significant bargaining power of Intel, its supplier of microprocessors, and Microsoft, its supplier of operating system software, when considering how much it must pay to acquire these products.
- *What substitute products exist in the marketplace, and how do they differ from our product in terms of features, price, cost, and quality?* Hewlett-Packard, for example, designs, costs, and prices new printers after comparing the functionality and quality of its printers to other printers available in the marketplace.
- *Will adequate cash be available to fund the strategy, or will additional funds need to be raised?* Procter & Gamble, for example, issued new debt and equity to fund its strategic acquisition of Gillette, a maker of shaving products.

DECISION POINT

How do management accountants support strategic decisions?

The best-designed strategies and the best-developed capabilities are useless unless they are effectively executed. In the next section, we describe how management accountants help managers take actions that create value for their customers.

LEARNING OBJECTIVE 3

Describe the set of business functions in the value chain and identify the dimensions of performance that customers are expecting of companies

. . . R&D, design, production, marketing, distribution, and customer service supported by administration to achieve cost and efficiency, quality, time, and innovation

Value-Chain and Supply-Chain Analysis and Key Success Factors

Customers demand much more than just a fair price; they expect quality products (goods or services) delivered in a timely way. The entire customer experience determines the value a customer derives from a product. In this section, we explore how companies create this value.

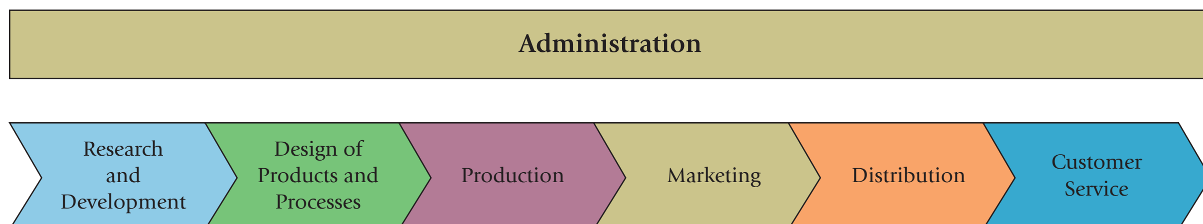
Value-Chain Analysis

The **value chain** is the sequence of business functions by which a product (including a service) is made progressively more useful to customers. Exhibit 1-2 shows six primary business functions: research and development, design of products and processes, production, marketing, distribution, and customer service. We illustrate these business functions with Sony Corporation's television division.

1. **Research and development (R&D)**—generating and experimenting with ideas related to new products, services, or processes. At Sony, this function includes research on alternative television signal transmission and on the picture quality of different shapes and thicknesses of television screens.
2. **Design of products and processes**—detailed planning, engineering, and testing of products and processes. Design at Sony includes deciding on the component parts in a television set and determining the effect alternative product designs will have on the set's quality and manufacturing costs. Some representations of the value chain collectively refer to the first two steps as technology development.[2]
3. **Production**—procuring, transporting, and storing ("inbound logistics") and coordinating and assembling ("operations") resources to produce a product or deliver a service. The production of a Sony television set includes the procurement and assembly of the electronic parts, the screen and the packaging used for shipping.
4. **Marketing (including sales)**—promoting and selling products or services to customers or prospective customers. Sony markets its televisions at tradeshows, via advertisements in newspapers and magazines, on the Internet, and through its sales force.
5. **Distribution**—processing orders and shipping products or delivering services to customers ("outbound logistics"). Distribution for Sony includes shipping to retail outlets, catalog vendors, direct sales via the Internet, and other channels through which customers purchase new televisions.
6. **Customer service**—providing after-sales service to customers. Sony provides customer service on its televisions in the form of customer-help telephone lines, support on the Internet, and warranty repair work.

In addition to the six primary business functions, Exhibit 1-2 shows an administration function, which includes accounting and finance, human resource management, and information technology and supports the six primary business functions. When discussing the value chain in subsequent chapters of this text, we include the administration function within the primary functions. For example, included in the marketing function is the function of analyzing, reporting, and accounting for resources spent in different marketing channels, whereas the production function includes the human resource management function of training frontline workers. Each of these business functions is essential to companies satisfying their customers and keeping them satisfied (and loyal) over time.

EXHIBIT 1-2 Different Parts of the Value Chain



[2] M. Porter, *Competitive Advantage* (New York: Free Press, 1998).

To implement their corporate strategies, companies such as Sony and Procter & Gamble use **customer relationship management (CRM)**, a strategy that integrates people and technology in all business functions to deepen relationships with customers, partners, and distributors. CRM initiatives use technology to coordinate all customer-facing activities (such as marketing, sales calls, distribution, and after-sales support) and the design and production activities necessary to get products and services to customers.

Different companies create value in different ways. As a result, at different times and in different industries, one or more of the value-chain functions are more critical than others. For example, a company such as the biotech and pharmaceutical company Roche emphasizes R&D and the design of products and processes. In contrast, the Italian apparel company, Gucci, focuses on marketing, distribution, and customer service to build its brand.

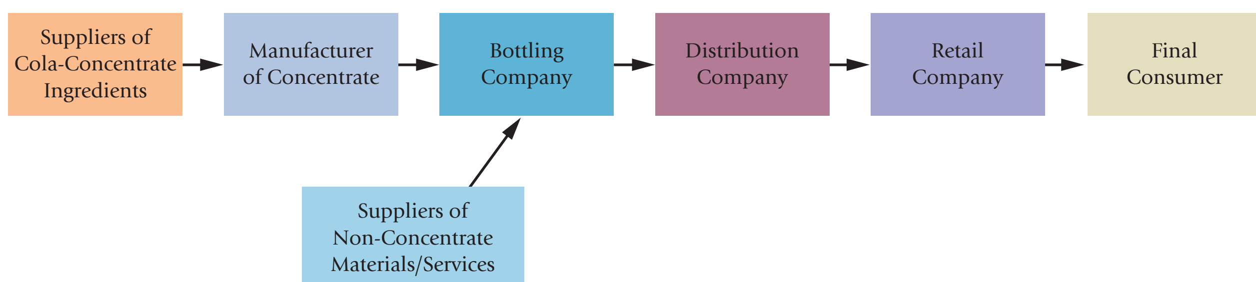
Exhibit 1-2 depicts the usual order in which different business-function activities physically occur. Do not, however, interpret Exhibit 1-2 to mean that managers should proceed sequentially through the value chain when planning and managing their activities. Companies gain (in terms of cost, quality, and the speed with which new products are developed) if two or more of the individual business functions of the value chain work concurrently as a team. For example, a company's production, marketing, distribution, and customer service personnel can often reduce a company's total costs by providing input for design decisions.

Managers track costs incurred in each value-chain category. Their goal is to reduce costs to improve efficiency or to spend more money to generate even greater revenues. Management accounting information helps managers make cost–benefit tradeoffs. For example, is it cheaper to buy products from a vendor or produce them in-house? How does investing resources in design and manufacturing increase revenues or reduce costs of marketing and customer service?

Supply-Chain Analysis

The parts of the value chain associated with producing and delivering a product or service—production and distribution—are referred to as the *supply chain*. The **supply chain** describes the flow of goods, services, and information from the initial sources of materials and services to the delivery of products to consumers, regardless of whether those activities occur in one organization or in multiple organizations. Consider Coca-Cola and Pepsi: Many companies play a role in bringing these products to consumers as the supply chain in Exhibit 1-3 shows. Cost management requires integrating and coordinating activities across all companies in the supply chain to improve performance and reduce costs. For example, to reduce materials-handling costs, both Coca-Cola and Pepsi require their suppliers (such as plastic and aluminum companies and sugar refiners) to frequently deliver small quantities of materials directly to their production floors. Similarly, to reduce inventory levels in the supply chain, Walmart requires its suppliers, such as Coca-Cola, to directly manage its inventory of products to ensure the right quantities are in its stores at all times.

EXHIBIT 1-3 Supply Chain for a Cola Bottling Company



Key Success Factors

Customers want companies to use the value chain and supply chain to deliver ever-improving levels of performance when it comes to several (or even all) of the following:

- **Cost and efficiency**—Companies face continuous pressure to reduce the cost of the products they sell. To calculate and manage the cost of products, managers must first understand the activities (such as setting up machines or distributing products) that cause costs to arise as well as monitor the marketplace to determine the prices customers are willing to pay for the products. Management accounting information helps managers calculate a target cost for a product by subtracting from the "target price" the operating income per unit of product that the company wants to earn. To achieve the target cost, managers eliminate some activities (such as rework) and reduce the costs of performing other activities in all value-chain functions—from initial R&D to customer service (see Concepts in Action: Cost Leadership at Costco: Rock-Bottom Prices and Sky-High Profits). Many U.S. companies have cut costs by outsourcing some of their business functions. Nike, for example, has moved its manufacturing operations to China and Mexico, and Microsoft and IBM are increasingly doing their software development in Spain, Eastern Europe, and India.
- **Quality**—Customers expect high levels of quality. **Total quality management (TQM)** is an integrative philosophy of management for continuously improving the quality of products and processes. Managers who implement TQM believe that every person in the value chain is responsible for delivering products and services that exceed customers' expectations. Using TQM, companies, for example, Toyota, design products to meet customer needs and wants, to make these products with zero (or very few) defects and waste, and to minimize inventories. Managers use management accounting information to evaluate the costs and revenue benefits of TQM initiatives.
- **Time**—Time has many dimensions. Two of the most important dimensions are new-product development time and customer-response time. New-product development time is the time it takes for companies to create new products and bring them to market. The increasing pace of technological innovation has led to shorter product life cycles and more rapid introduction of new products. To make new-product development decisions, managers need to understand the costs and benefits of bringing products to market faster.

  Customer-response time describes the speed at which an organization responds to customer requests. To increase customer satisfaction, organizations need to meet promised delivery dates and reduce delivery times. Bottlenecks are the primary cause of delays. Bottlenecks occur when the work to be performed on a machine or computer exceeds its available capacity. To deliver a product or service quickly, managers need to have adequate capacity. eBay invests in server capacity to create quality experiences for the online auction giant's customers. Management accounting information helps managers quantify the costs and benefits of adding capacity.
- **Innovation**—A constant flow of innovative products or services is the basis for a company's ongoing success. Many companies innovate in their strategies, business models, the services they provide, and the way they market, sell, and distribute their products. Managers at companies such as Novartis, the Swiss pharmaceutical giant, rely on management accounting information to evaluate the costs and benefits of alternative R&D and investment decisions.
- **Sustainability**—Companies are increasingly applying the key success factors of cost and efficiency, quality, time, and innovation to promote **sustainability**—the development and implementation of strategies to achieve long-term financial, social, and environmental goals. The sustainability efforts of the Japanese copier company Ricoh include energy conservation, resource conservation, product recycling, and pollution prevention. By designing products that can be recycled easily, Ricoh simultaneously improves sustainability and the cost and quality of its products.

CONCEPTS IN ACTION

Cost Leadership at Costco: Rock-Bottom Prices and Sky-High Profits[3]

MIHAI ANDRITOIU/Alamy Stock Photo

For decades, Costco has made sky-high profits by selling bulk products at rock-bottom prices. How, you ask? By being laser focused on its cost leadership strategy.

Costco is the world's largest seller of choice and prime beef, organic foods, and rotisserie chicken, and it sells more nuts than Planters. Its private label, Kirkland Signature, which sells everything from beverages to apparel, generates more revenue each year than Coca-Cola. Remarkably, it does all this while refusing to mark up its products by more than 14% (15% for its private-label products). Costco can offer its bulk items at such low prices by judiciously managing its costs.

Costco is a lean company. The warehouse retailer's spending on overhead—selling, general, and administrative costs—is only 10% of revenues, compared with about 20% at Walmart. The company doesn't advertise, has a spartan store environment, and offers a limited selection—only 3,700 products compared with 140,000 at a Walmart superstore and half a billion at Amazon. This allows Costco to drive hard bargains with its suppliers. And Costco's distribution system fills 95% of its freight capacity, an unheard of number in the retail business.

This winning combination of bulk products at low prices delights more than 80 million members around the globe each year. Costco is the third-largest retailer in the world, behind Walmart and Amazon, with $138 billion sales in fiscal 2018.

[3] *Sources:* Neal Babler, "The Magic in the Warehouse," *Fortune*, December 15, 2016 (http://fortune.com/costco-wholesale-shopping/); Uptal M. Dholakia, "When Cost-Plus Pricing Is a Good Idea," *Harvard Business Review* online, July 12, 2018 (https://hbr.org/2018/07/when-cost-plus-pricing-is-a-good-idea).

The interest in sustainability appears to be intensifying among companies. General Electric, Poland Springs (a bottled-water manufacturer), and Hewlett-Packard are among the many companies incorporating sustainability into their decision making. Sustainability is important to these companies for several reasons:

- Many investors care about sustainability. These investors make investment decisions based on a company's financial, social, and environmental performance and raise questions about sustainability at shareholder meetings.
- Companies are finding that sustainability goals attract and inspire employees.
- Customers prefer the products of companies with good sustainability records and boycott companies with poor sustainability records.
- Society and activist nongovernmental organizations, in particular, monitor the sustainability performance of firms and take legal action against those that violate environmental laws. Countries such as China and India are now either requiring or encouraging companies to develop and report on their sustainability initiatives.

DECISION POINT

How do companies add value, and what are the dimensions of performance that customers expect of companies?

Management accountants help managers track the key success factors of their firms and their competitors. Competitive information serves as a *benchmark* managers use to continuously improve operations. Examples of continuous improvement include Southwest Airlines increasing the number of its flights that arrive on time, eBay improving the access its customers have to online auctions, and Lowe's continuously reducing the cost of its home-improvement products. Sometimes, more fundamental changes and innovations in operations, such as redesigning a manufacturing process to reduce costs, may be necessary. To successfully implement their strategies, firms have to do more than analyze their value chains and supply chains and execute key success factors. They also need good decision-making processes.

Decision Making, Planning, and Control: The Five-Step Decision-Making Process

LEARNING OBJECTIVE 4

Explain the five-step decision-making process

. . . identify the problem and uncertainties; obtain information; make predictions about the future; make decisions by choosing among alternatives; implement the decision, evaluate performance, and learn

and its role in management accounting

. . . planning and control of operations and activities

We illustrate a five-step decision-making process using the example of the *Daily News*, a newspaper in Boulder, Colorado. Subsequent chapters of this text describe how managers use this five-step decision-making process to make many different types of decisions.

The *Daily News* differentiates itself from its competitors by using (1) highly respected journalists who write well-researched news articles; (2) color to enhance attractiveness to readers and advertisers; and (3) a Web site that delivers up-to-the-minute news, interviews, and analyses. The newspaper has the following resources to deliver on this strategy: an automated, computer-integrated, state-of-the-art printing facility; a Web-based information technology infrastructure; and a distribution network that is one of the best in the newspaper industry.

To keep up with steadily increasing production costs, Naomi Crawford, manager of the *Daily News*, needs to increase the company's revenues in 2020. As she ponders what she should do in early 2020, Naomi works through the five-step decision-making process.

1. **Identify the problem and uncertainties.** Naomi has two main choices:

   a. increase the selling price of the newspaper or
   b. increase the rate per page charged to advertisers.

   These decisions would take effect in March 2020. The key uncertainty is the effect any increase in prices or advertising rates will have on demand. A decrease in demand could offset the price or rate increases and lead to lower rather than higher revenues.

2. **Obtain information.** Gathering information before making a decision helps managers gain a better understanding of uncertainties. Naomi asks her marketing manager to talk to some representative readers to gauge their reaction to an increase in the newspaper's selling price. She asks her advertising sales manager to talk to current and potential advertisers to assess demand for advertising. She also reviews the effect that past increases in the price of the newspaper had on readership. Ramon Sandoval, management accountant at the *Daily News*, presents information about the effect of past increases or decreases in advertising rates on advertising revenues. He also collects and analyzes information on advertising rates competing newspapers and other media outlets charge.

3. **Make predictions about the future.** Based on this information, Naomi makes predictions about the future. She concludes that increasing prices would upset readers and decrease readership. She has a different view about advertising rates. She expects a marketwide increase in advertising rates and believes that increasing rates will have little effect on the number of advertising pages sold.

   Making predictions requires judgment. Naomi looks for biases in her thinking. Has she correctly judged reader sentiment or is the negative publicity of a price increase overly influencing her decision making? How sure is she that competitors will increase their advertising rates? Is her thinking in this respect biased by how competitors have responded in the past? Have circumstances changed? How confident is she that her sales representatives can convince advertisers to pay higher rates? She retests her assumptions and reviews her thinking. She feels comfortable with her predictions and judgments.

4. **Make decisions by choosing among alternatives.** A company's strategy serves as a vital guidepost for individuals making decisions in different parts of the organization. Consistent strategies provide a common purpose for these disparate decisions. Only if these decisions can be aligned with its strategy will an organization achieve its goals. Without this alignment, the company's decisions will be uncoordinated, pull the organization in different directions, and produce inconsistent results.

   Consistent with a product differentiation strategy, Naomi decides to increase advertising rates by 4% to $5,200 per page in March 2020 but not increase the selling price of the newspaper. She is confident that the *Daily News*'s distinctive style and Web presence

will increase readership, creating value for advertisers. She communicates the new advertising rate schedule to the sales department. Ramon estimates advertising revenues of $4,160,000 ($5,200 per page × 800 pages predicted to be sold in March 2020).

Steps 1 through 4 are collectively referred to as *planning*. **Planning** consists of selecting an organization's goals and strategies, predicting results under alternative ways of achieving goals, deciding how to attain the desired goals, and communicating the goals and how to achieve them to the entire organization. Management accountants serve as business partners in planning activities because they understand the key success factors and what creates value.

The most important planning tool when implementing strategy is a *budget*. A **budget** is the quantitative expression of a proposed plan of action by management and is an aid to coordinating what needs to be done to execute that plan. For March 2020, the budgeted advertising revenue of the *Daily News* equals $4,160,000. The full budget for March 2020 includes budgeted circulation revenue and the production, distribution, and customer-service costs to achieve the company's sales goals; the anticipated cash flows; and the potential financing needs. Because multiple departments help prepare the budget, personnel throughout the organization have to coordinate and communicate with one another as well as with the company's suppliers and customers.

5. **Implement the decision, evaluate performance, and learn.** Managers at the *Daily News* take action to implement and achieve the March 2020 budget. Management accountants collect information on how the company's actual performance compares to planned or budgeted performance (also referred to as scorekeeping). The information on actual results is different from the *predecision* planning information Naomi and her staff collected in Step 2 to better understand uncertainties, to make predictions, and to make a decision. Comparing actual performance to budgeted performance is the *control* or *postdecision* role of information. **Control** comprises taking actions that implement the planning decisions, evaluating past performance, and providing feedback and learning to help future decision making.

   Measuring actual performance informs managers how well they and their subunits are doing. Linking rewards to performance helps motivate managers. These rewards are both intrinsic (recognition for a job well done) and extrinsic (salary, bonuses, and promotions linked to performance). We discuss this in more detail in a later chapter (Chapter 23). A budget serves as much as a control tool as a planning tool. Why? Because a budget is a benchmark against which actual performance can be compared.

Consider performance evaluation at the *Daily News*. During March 2020, the newspaper sold advertising, issued invoices, and received payments. The accounting system recorded these invoices and receipts. Exhibit 1-4 shows the *Daily News*'s advertising revenues for March 2020. This performance report indicates that 760 pages of advertising (40 pages fewer than the budgeted 800 pages) were sold. The average rate per page was $5,080, compared with the budgeted $5,200 rate, yielding actual advertising revenues of $3,860,800. The actual advertising revenues were $299,200 less than the budgeted $4,160,000. Observe how

EXHIBIT 1-4 Performance Report of Advertising Revenues at the *Daily News* for March 2020

	Actual Result (1)	Budgeted Amount (2)	Difference: (Actual Result − Budgeted Amount) (3) = (1) − (2)	Difference as a Percentage of Budgeted Amount (4) = (3) ÷ (2)
Advertising pages sold	760 pages	800 pages	40 pages Unfavorable	5.0% Unfavorable
Average rate per page	$5,080	$5,200	$120 Unfavorable	2.3% Unfavorable
Advertising revenues	$3,860,800	$4,160,000	$299,200 Unfavorable	7.2% Unfavorable

managers use both financial and nonfinancial information, such as pages of advertising, to evaluate performance.

The performance report in Exhibit 1-4 spurs investigation and **learning**, which involves examining past performance (the control function) and systematically exploring alternative ways to make better-informed decisions and plans in the future. Learning can lead to changes in goals, strategies, the ways decision alternatives are identified, and the range of information collected when making predictions and sometimes can lead to changes in managers.

The performance report in Exhibit 1-4 would prompt the management accountant to raise several questions directing the attention of managers to problems and opportunities. Is the strategy of differentiating the *Daily News* from other newspapers attracting more readers? Did the marketing and sales department make sufficient efforts to convince advertisers that, even at the higher rate of $5,200 per page, advertising in the *Daily News* was a good buy? Why was the actual average rate per page ($5,080) less than the budgeted rate ($5,200)? Did some sales representatives offer discounted rates? Did economic conditions cause the decline in advertising revenues? Are revenues falling because editorial and production standards have declined? Are more readers getting their news online?

Answers to these questions could prompt the newspaper's publisher to take subsequent actions, including, for example, adding sales personnel, making changes in editorial policy, expanding its presence online and on mobile devices, getting readers to pay for online content, and selling digital advertising. Good implementation requires the marketing, editorial, and production departments to work together and coordinate their actions.

The management accountant could go further by identifying the specific advertisers that cut back or stopped advertising after the rate increase went into effect. Managers could then decide when and how sales representatives should follow up with these advertisers.

Planning and control activities must be flexible enough so that managers can seize opportunities unforeseen at the time the plan was formulated. In no case should control mean that managers cling to a plan when unfolding events (such as a sensational news story) indicate that actions not encompassed by that plan (such as spending more money to cover the story) would offer better results for the company (from higher newspaper sales).

DECISION POINT

How do managers make decisions to implement strategy?

The left side of Exhibit 1-5 provides an overview of the decision-making processes at the *Daily News*. The right side of the exhibit highlights how the management accounting system aids in decision making.

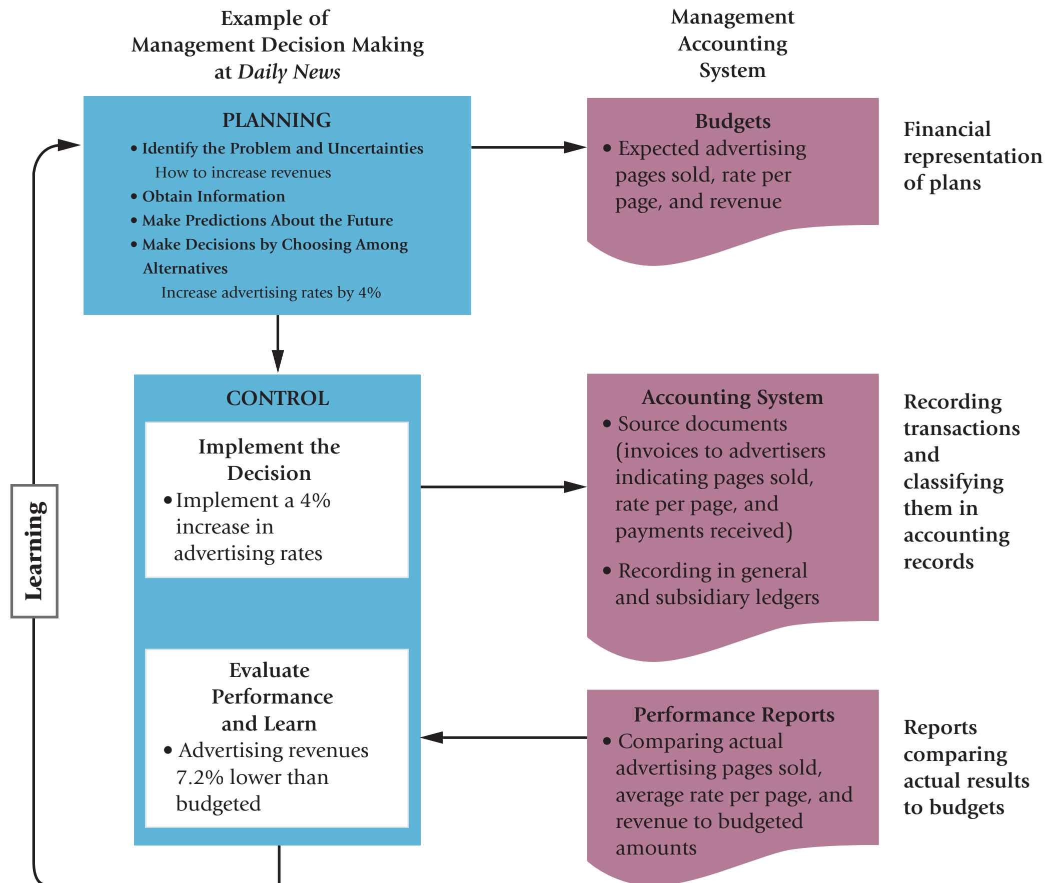
Planning and control activities get more challenging for innovation and sustainability. Consider the problem of how the *Daily News* must innovate as more of its readers migrate to the Web to get their news and apply the five-step process. In Step 1, the uncertainties are much greater. Will there be demand for a newspaper? Will customers look to the *Daily News* to get their information or to other sources? In Step 2, obtaining information is more difficult because there is little history that managers can comfortably rely on. Instead, managers will have to make connections across disparate data, run experiments, engage with diverse experts, and speculate to understand how the world might evolve. In Step 3, making predictions about the future will require developing different scenarios and models. In Step 4, managers must make decisions recognizing that conditions might change in unanticipated ways requiring them to be flexible and adaptable. In Step 5, the learning component is critical. How have the uncertainties evolved and what do managers need to do to respond to these changing circumstances?

Planning and control for sustainability is equally challenging. What should the *Daily News* do about energy consumption in its printing presses, recycling of newsprint, and pollution prevention? Among the uncertainties managers face is whether customers will reward the *Daily News* for these actions by being more loyal and whether investors will react favorably to managers spending resources on sustainability. Information to gauge customer and investor sentiment is not easy to obtain. Predicting how sustainability efforts might pay off in the long run is far from certain. Even as managers make decisions, the sustainability landscape will doubtlessly change with respect to environmental regulations and societal expectations, requiring managers to learn and adapt.

Do these challenges of implementing planning and control systems for innovation and sustainability mean that these systems should not be used for these initiatives? No. Many companies value these systems to manage innovation and sustainability. But, in keeping with the challenges described earlier, companies such as Johnson & Johnson use these systems

EXHIBIT 1-5

How Accounting Aids Decision Making, Planning, and Control at the *Daily News*



in a different way—to obtain information around key strategic uncertainties, to implement plans while being mindful that circumstances might change, and to evaluate performance in order to learn.

Key Management Accounting Guidelines

LEARNING OBJECTIVE 5

Describe three guidelines management accountants follow in supporting managers

. . . employing a cost–benefit approach, recognizing behavioral as well as technical considerations, and calculating different costs for different purposes

Three guidelines help management accountants add value to strategic and operational decision making in companies: (1) employ a cost–benefit approach, (2) give full recognition to behavioral and technical considerations, and (3) use different costs for different purposes.

Cost–Benefit Approach

Managers continually face resource-allocation decisions, such as whether to purchase a new software package or hire a new employee. They use a **cost–benefit approach** when making these decisions. Managers spend resources if the expected benefits to the company exceed the expected costs. Managers rely on management accounting information to quantify expected benefits and expected costs (although all benefits and costs are not easy to quantify).

Consider the installation of a consulting company's first budgeting system. Previously, the company used historical recordkeeping and little formal planning. A major benefit of installing a budgeting system is that it compels managers to plan ahead, compare actual to budgeted information, learn, and take corrective action. Although the system leads to better decisions and consequently better company performance, the exact benefits are not easy to measure. On the cost side, some costs, such as investments in software and training, are easier to quantify. Others, such as the time spent by managers on the budgeting