



# MANAGERIAL ACCOUNTING

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6th Edition





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# MANAGERIAL ACCOUNTING



SIXTH EDITION

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Kent State University

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#### Library of Congress Cataloging-in-Publication Data

Names: Braun, Karen Wilken, author. | Tietz, Wendy M., author.

Title: Managerial accounting / Karen Wilken Braun, PhD, CPA, CGMA, Case Western Reserve University, Wendy M. Tietz, PhD, CPA, CGMA, CMA, Kent State University.

Description: Sixth edition. | New York, NY : Pearson Education. [2021] | Includes index. | Summary: “A managerial accounting text for college students, made to attract student attention and lay the groundwork for understanding of accounting”— Provided by publisher.

Identifiers: LCCN 2019020471 (print) | LCCN 2019981612 (ebook) | ISBN 9780135863916 | ISBN 9780135863879 | ISBN 9780135864180 (epub)

Subjects: LCSH: Managerial accounting.

Classification: LCC HF5657.4 .B36 2021 (print) | LCC HF5657.4 (ebook) | DDC 658.15/11—dc23

LC record available at <https://lcn.loc.gov/2019020471>

LC ebook record available at <https://lcn.loc.gov/2019981612>

ScoutAutomatedPrintCode



ISBN 10: 0-13-586391-0  
ISBN 13: 978-0-13-586391-6

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# Solving Learning and Teaching Challenges

## Technology Makes It Simple

These features give students step-by-step directions on how to use Microsoft Excel 365 to perform an accounting task with more efficiency. Examples include: scatterplots, regression analysis, capital budgeting, CVP graphs, budgeting, and sensitivity analysis.

**Technology Makes It Simple** Excel 365

### Creating Scatterplots

1. In an Excel spreadsheet, type in your data as pictured in Exhibit 6-12. Put the volume data in one column and the associated cost data in the next column to the right.
2. Select all of the volume and cost data with the cursor (do not include the text headings).
3. Click the **Insert** tab on the ribbon. From the chart options, choose **Scatter** as the chart type. Next, click the plain scatterplot (without any lines). You'll see the scatterplot on your screen. If you want to make the scatterplot larger, choose **Move Chart Location** from the ribbon and select **New Sheet** and **OK**. Make sure the volume data is on the x-axis and the cost data is on the y-axis.
4. To add titles for the chart and each axis, click on the **Quick Layout** tab on the ribbon and choose the first layout pictured. Customize the chart and axis titles to reflect your data set. You may also delete the legend, if desired, by right-clicking on the legend and choosing **delete**.
5. If the data consist of large numbers, the graph may not automatically start at the origin. If you want to see the origin on the graph, right-click on any of the numbers on the x- or y-axis and choose **Format Axis**. Then insert "0" (zero) as the minimum bound.

## Try It!

Sarah Haymeyer, CPA, pays her new staff accountant, Hannah, a salary equivalent to \$25 per hour, while Sarah receives a salary equivalent to \$40 per hour. The firm's predetermined indirect cost allocation rate for the year is \$12 per hour. Haymeyer bills for the firm's services at 30% over cost. Assume Sarah works 5 hours and Hannah works 10 hours preparing a tax return for Michele Meckfessel.

1. What is the total cost of preparing Meckfessel's tax return?
2. How much will Sarah bill Meckfessel for the tax work?

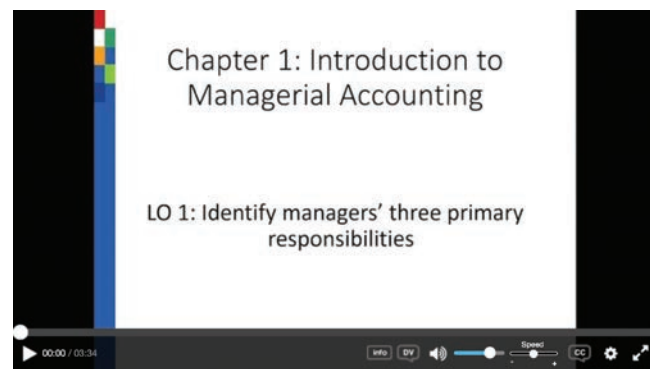
Please see page 210 for solutions.

## Try It! Interactive Questions

Found throughout the chapter, Try It! interactive questions give students the opportunity to apply the concept they just learned with solutions provided at the end of the chapter. Video solutions are also available in MyLab Accounting, featuring the author walking through the Try It! problems on a white board.

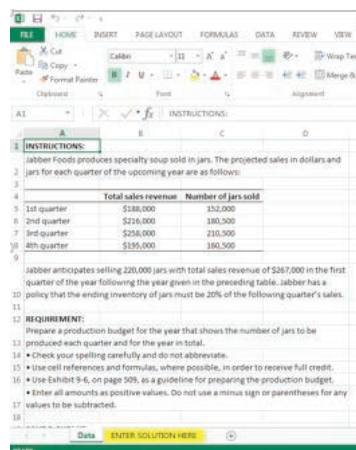
## Learning Objective Videos

Each learning objective in the text has a corresponding short (3- to 5- minute), author-created video that summarizes the content of the text. These videos were created with flexibility in mind: students can use them to preview the text before reading, summarize the text after reading, or review concepts in preparation for exams. The videos are housed in the multimedia library in MyLab Accounting and are also assignable.

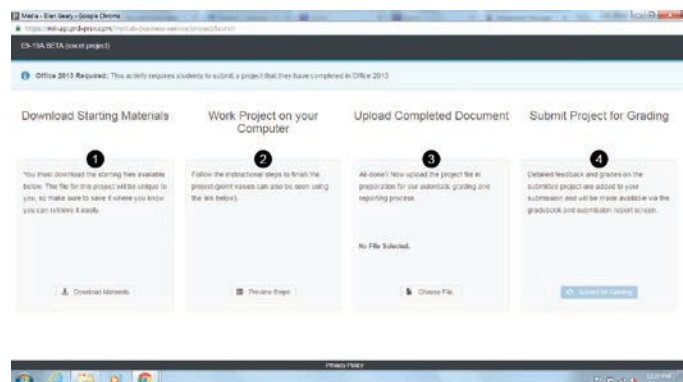


## Excel in MyLab Accounting

- Students will download and complete problem in Microsoft Excel.
- Students receive personalized, detailed feedback upon submitting their completed spreadsheets.
- Questions will be auto-graded and reported to the grade book.



	A	B	C
1	<b>INSTRUCTIONS:</b>		
2	Jabber Foods produces specialty soup sold in jars. The projected sales in dollars and jars for each quarter of the upcoming year are as follows:		
3		Total sales revenue	Number of jars sold
4	1st quarter	\$180,000	150,000
5	2nd quarter	\$216,000	180,000
6	3rd quarter	\$256,000	210,000
7	4th quarter	\$195,000	160,000
8	Jabber anticipates selling 220,000 jars with total sales revenue of \$267,000 in the first quarter of the year following the year given in the preceding table. Jabber has a		
9	policy that the ending inventory of jars must be 30% of the following quarter's sales.		
10			
11	<b>REQUIREMENT:</b>		
12	Prepare a production budget for the year that shows the number of jars to be		
13	produced each quarter and for the year in total.		
14	• Check your spelling carefully and do not abbreviate.		
15	• Use cell references and formulas, where possible, in order to receive full credit.		
16	• Use Exhibit 9-6, on page 509, as a guideline for preparing the production budget.		
17	• Enter all amounts as positive values. Do not use a minus sign or parentheses for any		
18	values to be subtracted.		



Office 2013 Required: This activity requires students to submit a project that they have completed in Office 2013.

**Download Starting Materials**  
1 You must download the starting files available below. The file for this project will be unique to you, so make sure to save it where you know you can retrieve it easily.  
Download Materials

**Work Project on your Computer**  
2 Follow the instructional steps to finish the project (your values can also be seen using the link below).  
Previous Steps

**Upload Completed Document**  
3 All done? Now upload the project file as preparation for our automatic grading and reporting process.  
No File Selected.  
Choose File

**Submit Project for Grading**  
4 Detailed feedback and grades on the submitted project are added to your submission and will be made available via the gradebook and submission report screen.  
Submit for Grading



## Sustainability

Within every chapter is a section on how sustainability relates to the main chapter topic.

Also included is a quick reference on which end-of-chapter problems correspond to the sustainability concept.

### Sustainability and Cost Behavior

Many companies adopting sustainable business practices experience changes in the way their costs behave. For example, most banks, credit card companies, and utilities now promote the use of paperless e-banking and e-billing as a preferable alternative to sending traditional paper statements and bills through the mail. Why? Because e-banking and e-billing drives down a company's variable costs since they don't have to spend money on the paper, envelopes, printing, and postage associated with sending out paper statements. Likewise, when a customer pays electronically rather than sending in a check, the company doesn't incur the variable cost associated with opening the mail, recording the payment to the customer's account, and processing the bank deposit. All of this is accomplished electronically by the company's software.

On the other hand, the company must incur additional fixed costs to develop and operate secure online banking and billing websites. However, we know that the variable cost savings is greater than the increase in fixed costs because many companies are either (1) offering customer incentives to switch to e-billing or (2) charging customers an additional fee for receiving paper-based bills and statements in the mail. Whether using the carrot or the stick approach, companies are shifting consumer behavior as a means to decrease total costs.

The environmental consequences of e-billing and e-banking are tremendous if you consider the entire production and delivery cycle of the bills and statements, all of the way from logging the trees in the forest to delivery of the bill at the customer's doorstep. Not only are fewer trees cut down, but also less energy is consumed in transportation of the timber, processing of the paper, distribution of the paper, delivery of the statements via the U.S. Postal Service, and final disposal of the paper at landfills or recycling centers. In addition, less waste water is generated and fewer greenhouse gas emissions are produced. The downside, from a triple-bottom-line perspective, is the loss of jobs in associated industries, such as the U.S. Postal Service.

Cost Behavior 369

See Exercises E6-26A and E6-49B

We have just described the most typical cost behaviors. In the next part of the chapter, we will discuss methods managers use for determining how their costs behave.

### SUSTAINABILITY

#### E2-388 Value chain and sustainability efforts (Learning Objective 2)

Each of the scenarios to follow describes some cost item for organizations in the recycled carpet industry. For each scenario, identify which function of the value chain that cost would represent (R&D, Design, Purchasing/Producing, Marketing, Distributing, or Customer Service). Note: The companies and products used in this exercise are real companies with a strong sustainable practices commitment.

- Fluo<sup>®</sup>, a company that produces residential carpet tiles made from recycled carpet, has an R&D forum and recycling Program. Homeowners can arrange to have old tiles picked up and shipped back to the plant for recycling. The cost of operating this R&D program would fall into which function in the value chain?
- Los Angeles Fiber Company (LAF) received the EPA/CARE award to recognize Los Angeles Fiber Company's sustainability efforts. Since 2000, LAF has recycled more than 444 million pounds of post-consumer carpet. Its carpet brand, Ralliance Carpet, is made entirely from post-consumer carpet fiber. The cost of promoting the company's products and its sustainability efforts would fall into which function in the value chain?
- Ford Motor Company purchases cylinder head covers made from a nylon resin containing 100% recycled carpet in its Mustang. The cost of the cylinder head covers would fall into which function in the value chain?
- Aleximstar Carpets offsets the carbon emissions from its carpet distribution process by investing in renewable energy projects such as wind, power, and hydropower plants. This carbon offset is verified independently by the Voluntary Carbon Standard. The cost of these carbon offsets would fall into which function in the value chain?
- Shaw Industries is a flooring manufacturer. It has created Cradle to Cradle Silver Certified carpet, which is carpet that can be recycled back into new carpet again and again at the end of its useful life, or it can go back into the soil. The costs to develop the production process for the Cradle to Cradle Silver Certified carpet would fall into which function in the value chain?
- FibreBlock<sup>®</sup> Flooring is manufactured using the waste generated from the manufacture of commercial nylon carpet. The cost of the research into how to create Fibre Block<sup>®</sup> Flooring would fall into which function in the value chain?

#### E2-398 Classify and calculate a manufacturer's costs (Learning Objective 4)

An airline manufacturer incurred the following costs last month (in thousands of dollars):

a. Airplane seats	\$ 300
b. Production supervisors' salaries	\$ 110
c. Depreciation on forklifts in factory	\$ 90
d. Machine lubricants	\$ 30
e. Factory janitors' wages	\$ 50
f. Assembly workers' health insurance	\$ 630
g. Property tax on corporate marketing offices	\$ 20
h. Plant utilities	\$ 140
i. Cost of warranty repairs	\$ 230
j. Machine operators' health insurance	\$ 40
k. Depreciation on administrative offices	\$ 100
l. Cost of designing new plant layout	\$ 160
m. Jet engines	\$ 1,400

**Requirements**

- Assuming the cost object is an airplane, classify each cost as one of the following: direct material (DM), direct labor (DL), indirect labor (IL), indirect materials (IM), other manufacturing overhead (other MCH), or period cost. What is the total for each type of cost?
- Calculate total manufacturing overhead costs.
- Calculate total product costs.
- Calculate total prime costs.
- Calculate total conversion costs.
- Calculate total period costs.

## 1515



Source: 2018 Southwest Airlines One Report, Southwest Airlines Co. 2018 10-K filing <https://www.sec.gov/edgar/data/1005675/000100567518000001/swa201810k.htm>

### Sustainability

#### Learning Objectives

- 1 Describe sustainability and how it can create business value
- 2 Describe sustainability reporting and the leading reporting frameworks
- 3 Describe EMA systems and their uses and challenges
- 4 Analyze sustainability performance using data analytics tools

**Southwest Airlines** is renowned for having a positive corporate culture that embraces employees as the heart of its operations. Unlike other major airlines, after 9/11 and the economic crisis of 2008, Southwest refused to lay off employees. The result? Southwest has been listed for 24 consecutive years on Forbes's list of the "World's Most Admired Companies," including being ranked eighth highest on the list in 2018. It has also made Forbes's "Best Employer" list and Corporate Responsibility magazine's "Best Corporate Citizens" list. How does Southwest do it? The company embraces the triple bottom line: people, planet, and profit. Not only does Southwest treat its employees well, returning over \$544 million to employees in 2018 as part of its profit-sharing plan, but it also treats customers well by offering two free checked bags, no change fees, and frequent-flyer points that can be used to book any flight at any time. From an environmental perspective, Southwest has been able to increase its jet fuel efficiency by nearly 23% since 2005, and the company has increased recycling efforts, not only with in-flight and corporate waste but even with its used airplane seats and billboards. How have all of these measures affected the company's profitability? Southwest has had 46 consecutive years of profit, which is unheard of in the airline industry, especially during the turbulent periods following 9/11 and the latest economic crisis.

## Sustainability Chapter

This chapter provides a deeper dive into how sustainability can generate business value. It also includes sections on sustainability reporting, including the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), and Integrated Reporting (IR).



EXHIBIT 6-15 Output of Microsoft Excel Regression Analysis

	A	B	C	D	E	F	G	H	I	
1	SUMMARY OUTPUT									
2	Regression Statistics									
3	Multiple R		0.973273							
4	R Square		0.947298							
5	Adjusted R Square		0.941986							
6	Standard Error		8003.744							
7	Observations		12							
8	ANOVA									
9		df	SS	MS	F	Significance F				
10	Regression	1	116500745.12	1.17E+10	179.811083	1.02696E-07				
11	Residual	10	648827986.2	64882798.62						
12	Total	11	1229872030.0							
13										
14										
15										
16		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
17	Intercept	14538.05	11888.3624	1.221863	0.248783701	41049.25	-11973.16	41049.25	-11973.16	
18	X Variable 1	7.845706	0.585320146	13.42019	1.02696E-07	6.5446807	9.146831	6.5446807	9.146831	

1. Intercept coefficient (this refers to the vertical intercept) = 14,538.05  
2. X Variable 1 coefficient (this refers to the slope) = 7.85 (rounded)  
3. The R-squared value (the goodness-of-fit statistic) = 0.947 (rounded)

Let's look at each piece of information, starting with the highlighted information at the bottom of the output:

1. The Intercept coefficient is the vertical intercept of the mixed cost line. It represents the fixed cost component of the mixed cost. Regression analysis tells us that the fixed component of the monthly utility bill is \$14,538. Why is this different from the \$8,000 fixed cost we found using the high-low method? It's because regression analysis considers every data point, not just the high- and low-volume data points, when forming the best fitting line.

2. The "X Variable 1 coefficient" is the slope of the mixed cost line. It represents the variable cost per guest. Regression analysis tells us that the hotel spends an extra \$7.85 on utilities for every guest it serves. This is slightly lower than the \$8 per guest amount we found using the high-low method.

Using the regression output, we can write the monthly utilities cost equation as follows:

$$y = \$7.85x + \$14,538$$

where

$y$  = total monthly utilities cost  
 $x$  = number of guests

3. Now, let's look at the R-squared value highlighted near the top of Exhibit 6-15. The R-squared value is often referred to as a "goodness-of-fit" statistic because it tells

## Why is this important?

Found throughout the chapter, this feature connects accounting with the business environment so that students can better understand the business significance of managerial accounting.

**Why is this important?**  
"Regression analysis gives managers the most representative cost equations, allowing them to make the most accurate cost projections. It is also very easy to perform using Excel."

## Decision Guidelines

Found at the midpoint and end of each chapter, this feature uses a business decision context to summarize key terms, concepts, and formulas from the chapter in question-and-answer format.

530 CHAPTER 8

### Decision Guidelines

**Relevant Information for Business Decisions**

Nike's managers consider both quantitative and qualitative factors as they make pricing and special order decisions. Here are key guidelines that Nike's managers follow in making their decisions.

Decision	Guidelines*
What information is relevant to a short-term special business decision?	Relevant information has two characteristics: 1. It pertains to the future. 2. It differs between alternatives.
What are two key guidelines in making short-term special business decisions?	1. Focus on relevant data. 2. Use a contribution margin approach that separates variable costs from fixed costs.
What are two pitfalls to avoid in making business decisions?	1. Avoid including sunk costs. 2. Avoid adding the absorption cost per unit since it includes both fixed and variable components.
How does a company's commitment to sustainability affect decision making?	Companies that are committed to sustainability will judge every decision through the lens of the triple bottom line, assessing the impact of the decision not only on company profit, but also on its consequences for people and the planet.
What should Nike consider in setting its regular product prices?	Nike considers the following: 1. The profit stockholders expect. 2. The price customers are willing to pay. 3. Whether it is a price setter or a price taker.
Which approach should Nike take to pricing?	Nike has differentiated its products through advertising and branding. Thus, Nike tends to be a price setter. Nike's managers can emphasize a cost-plus approach to pricing: $\text{Total cost} + \text{Desired profit} = \text{Cost-plus price}$
Which approach should a nonbranded T-shirt manufacturer take to pricing?	When a company offers generic products that have no brand recognition, the company is a price taker. Since managers have no control over pricing, they will emphasize a target costing approach to pricing: $\text{Revenue or market price} - \text{Less: Desired profit} = \text{Target total cost}$
Should Nike accept a large special order from a customer at a price that is lower than the normal sales price?	If the revenue from the order exceeds the incremental variable and fixed costs of filling the order, then accepting the order will increase operating income.

Activity-Based Costing, Lean Operations, and the Costs of Quality 227

### STOP & THINK

Do the journal entries used to record job costing differ if a manufacturer uses a refined cost allocation system (departmental overhead rates or ABC) rather than a single, plantwide overhead rate?

**Answer:** The journal entries used for a refined costing system are essentially the same as those described in Chapter 3 for a traditional job costing system. The only difference is that the company will typically use several MOH accounts (one for each department or activity cost pool) rather than one MOH account. By using several MOH accounts, the manufacturer obtains more detailed information on each cost pool. This information may help managers make better estimates when calculating allocation rates the next year.

### How Do Managers Use the Refined Cost Information to Improve Operations?

We've just seen how companies can increase the accuracy of their product costing systems by using departmental allocation rates or ABC. Now let's consider how managers use this improved cost information to run their companies more effectively and efficiently.

#### Activity-Based Management (ABM)

**Activity-based management (ABM)** refers to using activity-based cost information to make decisions that increase profits while satisfying customers' needs. Companies can use ABC information for pricing and product mix decisions, for identifying opportunities to cut costs, and for routine planning and control decisions.

#### Pricing and Product Mix Decisions

Earlier in the chapter, our ABC example showed managers that ellipticals cost less to make and treadmills cost more to make than indicated by the original plantwide cost allocation system. As a result, managers may decide to change pricing on these products. For example, the company may be able to reduce its price on ellipticals to become more price-competitive. Or the company may decide to capitalize on the extra profitability of the product by raising the price where it is best increasing demand by placing more advertisements for ellipticals. On the other hand, managers will want to reevaluate the price charged for treadmills. The price must be high enough to cover the cost of producing and selling the treadmills while still being low enough to compete with other companies and earn Nike Fitness a reasonable profit.

After implementing ABC, companies often realize they are overcosting their high-volume products and undercosting their low-volume products. Plantwide overhead rates based on volume-sensitive allocation bases (such as direct labor hours) end up allocating more cost to high-volume products and less cost to low-volume products. However, ABC recognizes that not all indirect costs are driven by the number of units produced. This is why not all costs are unit-level costs. Rather, many costs are incurred at the batch level or product level, where they can be spread over the number of batches or product lines. As shown in Exhibit 4-21, ABC tends to increase the unit cost of low-volume products (that have fewer units over which to spread batch-level and product-level costs), and decrease the unit cost of high-volume products.

As a result of using ABC, some companies have found that they were actually losing money on some of their products while earning much more profit than they had realized on other products by shifting the mix of products offered away from the less profitable and toward the more profitable. Companies are able to generate a higher operating income.

#### Cutting Costs

Most companies adopt ABC to get more accurate product costs for pricing and product mix decisions, but they often enjoy even greater benefits by using ABM to pinpoint opportunities to cut costs. For example, the ABC data calculated in Exhibit 4-15 showed

## Stop & Think

Found at various points within each chapter, this feature includes a question-and-answer snapshot asking students to critically examine a concept they just learned.



END OF CHAPTER

Learning Objectives

- 1 Distinguish between job costing and process costing
- 2 Understand the flow of production and how direct materials and direct labor are traced to jobs
- 3 Compute a predetermined manufacturing overhead rate and use it to allocate MOH to jobs
- 4 Determine the cost of a job and use it to make business decisions
- 5 Compute and dispose of overallocated or underallocated manufacturing overhead
- 6 Prepare journal entries for a manufacturer's job costing system
- 7 Use job costing at a service firm as a basis for billing clients
- 8 Analyze job cost and profitability data using data analytics tools

Accounting Vocabulary

**Bill of Materials** (p. 137) A list of all of the raw materials needed to manufacture a job.

**Billing Rate** (p. 149) The labor rate charged to the customer, which includes both cost and profit components.

**Cost Driver** (p. 148) The primary factor that causes a cost.

**Cost-Plus Pricing** (p. 148) A pricing approach in which the company adds a desired level of profit to the product's cost.

**Invoice** (p. 138) Bill from a supplier.

**Job Cost Record** (p. 138) A written or electronic document that lists the direct materials, direct labor, and manufacturing overhead costs assigned to each individual job.

**Job Costing** (p. 136) A system for assigning costs to product units or services that differ in the amount of materials, labor, and overhead required. Typically used by manufacturers that produce unique or custom-ordered products in small batches; also used by professional service firms.

**Labor Time Record** (p. 142) A written or electronic document that identifies the employee, the amount of time spent on a particular job, and the labor cost charged to a job.

**Mass Customization** (p. 135) Large-scale production of customized product that allows manufacturers to meet a variety of customer desires while at the same time achieving the efficiencies of mass production that drive down unit costs.

**Materials Requisition** (p. 141) A written or electronic document requesting that specific materials be transferred from the raw materials inventory department to the production floor.

**Overallocated Manufacturing Overhead** (p. 155) The amount of manufacturing overhead allocated to jobs is more than the amount of manufacturing overhead costs actually incurred, results in jobs being overcosted.

**PdL** (p. 148) Statement isolates revenue items from raw materials inventory that are needed by production.

**Pivot Table** (p. 171) An Excel tool that summarizes and cross-tabulates data according to specified attributes in the data set.

**Predetermined Manufacturing Overhead Rate** (p. 145) The rate used to allocate manufacturing overhead to individual jobs, calculated before the year begins as follows: total estimated manufacturing overhead costs divided by total estimated amount of allocation base.

**Process Costing** (p. 139) A system for assigning costs to a large number of identical units that typically pass through a series of uniform production steps. Costs are averaged over the units produced such that each unit bears the same unit cost.

**Production Schedule** (p. 136) A written or electronic document indicating the quantity and type of inventory that will be manufactured during a specified time frame.

**Purchase Order** (p. 138) A written or electronic document authorizing the purchase of specific raw materials from a specific supplier.

**Raw Materials Record** (p. 137) A written or electronic document listing the number and cost of all units used and received and the balance currently in stock; a separate record is maintained for each type of raw material kept in stock.

**Receiving Report** (p. 138) A written or electronic document listing the quantity and type of raw materials received in an incoming shipment; the report is typically a duplicate of the purchase order without the quantity pre-listed on the form.

**Stock Inventory** (p. 136) Products normally kept on hand in order to quickly fill customer orders.

**Subsidiary Ledger** (p. 149) Supporting detail for a general ledger account.

**Underallocated Manufacturing Overhead** (p. 155) The amount of manufacturing overhead allocated to jobs is less than the amount of manufacturing overhead costs actually incurred; the results in jobs being undercosted.

CHAPTER 3

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## End-of-Chapter Problems

End-of-chapter items are structured to allow students to progress from simple to more rigorous as they move from item to item.

## Serial Case

A serial (continuing) case that focuses on one real world company has been added to the end-of-chapter material. The serial case consists of several small cases, one per chapter. These cases are meant to inspire critical thinking and to connect the content with real life by following one company through all of the chapters in managerial accounting.

822 CHAPTER 11

Serial Case

**C11-45 Calculate labor variances in a hotel** [Learning Objective 3]

This case is a continuation of the Caesar's Entertainment Corporation serial case that began in Chapter 1. The components of the Caesar's serial case can be completed in any order.

Housekeeping is a significant cost in running a hotel; housekeeping includes daily cleaning of occupied guest rooms and guest bathrooms. Before its renovation, the Roman Tower, formerly known as the Julius Tower, had 547 rooms. What follows is a table of selected hypothetical data regarding housekeeping costs in the Roman Tower for the past year:

Data table for Roman Tower housekeeping usage*	
STANDARD DATA—Roman Tower	
Standard hours per hotel room-cleaning	0.25
Total standard housekeeping hours—Roman Tower	36,399.25
Standard average housekeeper wage rate per hour	\$ 14.50
Budgeted number of rooms to be cleaned	147,375
ACTUAL DATA—Roman Tower	
Actual hours per hotel room-cleaning	0.30
Total actual housekeeping hours—Roman Tower	43,676.10
Actual average housekeeper wage rate per hour	\$ 13.50
Actual number of rooms cleaned	145,597

CHAPTER 11

Requirements

- Calculate the Labor Rate Variance (LRV) for the Roman Tower housekeeping.  
First:  $LRV = \text{Actual Hours} \times (\text{Actual Rate} - \text{Standard Rate})$ . Answer the following questions about the LRV:
  - Is the LRV favorable or unfavorable? How do you know?
  - What are some possible reasons for this labor rate variance?
- Calculate the Labor Efficiency Variance (LEV) for the Roman Tower housekeeping in 2015. First:  $LEV = \text{Standard Rate} \times (\text{Actual Hours} - \text{Standard Hours})$ . Answer the following questions about the LEV:
  - Is the LEV favorable or unfavorable? How do you know?
  - What are some possible reasons for this labor efficiency variance?

\* All of these Roman Tower housekeeping assumptions are hypothetical and provided for educational use only.

586 CHAPTER 9

CRITICAL THINKING

Discussion & Analysis

**A9-47 Discussion Questions**

- A beverage company is considering whether to discontinue its line of grape soda. What factors will affect the company's decision? What is a qualitative factor? Which of the factors you listed are qualitative?
- What factors would be relevant to a restaurant that is considering whether to make its own dinner rolls or to purchase dinner rolls from a local bakery?
- How would outsourcing change a company's cost structure? How might this change in cost structure help or harm a company's competitive position?
- What is an opportunity cost? List possible opportunity costs associated with a make-or-buy decision.
- What undesirable result can arise from allocating common fixed costs to product lines?
- Why would a manager be justified in ignoring fixed costs when making a decision about a special order? When would fixed costs be relevant when making a decision about a special order?
- What is the difference between segment margin and contribution margin? When would each be useful?
- Do joint costs affect a sell as is or process further decision? Why or why not?
- How can "make-or-buy" concepts be applied to decisions at a service organization? What types of make-or-buy decisions might a service organization face?
- Oscar Company builds outdoor furniture using a variety of woods and plastics. What is a constraint? List at least four possible constraints at Oscar Company.
- Do a web search on the terms carbon offset and carbon footprint. What is a carbon footprint? What is a carbon offset? Why would carbon offsets be of interest to a company? What are some companies that offer (sell) carbon offsets?
- A computer manufacturer is considering outsourcing its technical support call center to India. Its current technical support call center is located in Dallas, Ohio. The current call center is one of the top employers in Dallas and employs about 10% of the town's population in Dallas. The town has experienced high unemployment rates in the past two decades, and often the call employees are the sole breadwinners in their households. If the technical support call center were to be moved to India, the company would be able to pay about 50% less per hour than it currently pays in Dallas, Ohio. From a triple-bottom-line perspective (people, planet, and profit), what factors are relevant to the company's decision to outsource its technical support call center? Be sure to discuss both quantitative and qualitative factors.

Application & Analysis

Mini Cases

**A9-48 Outsourcing Decision at a Real Company**

Go to the New York Times website (www.nytimes.com) and search for the term *outsourcing*. Find an article about a company making a decision to outsource a part of its business operations.

**Basic Discussion Questions**

- Describe the company that is making the decision to outsource. What area of the business is the company looking to outsource, or did it already outsource?
- Why did the company decide to outsource (or is considering outsourcing)?
- List the revenues and costs that might be impacted by this outsourcing decision. The article will not list many, if any, of these revenues and costs; you should make reasonable guesses about what revenues and/or costs would be associated with the business operation being outsourced.

REAL LIFE

## Critical Thinking

Problems are included to provide students with the opportunity for applied critical thinking. These problems include ethical topics, mini cases, and decision-making cases in real companies.

- Ethics Mini Cases based on the IMA Statement of Professional Practice are highlighted with an icon.

ETHICS

- Real Life Mini Cases focusing on a real company and the decisions presented in business are highlighted with an icon.

REAL LIFE



### Directed Reading Guides

Directed reading guides, which have been prepared by the authors, help students take thorough notes while reading the text and glean the most important information from each chapter. Each chapter's reading guide follows the text, paragraph-by-paragraph, asking students to answer questions and fill in the blanks, thereby keeping students actively engaged while preparing for class.

### Accounting in the Headlines Blog

Accounting in the Headlines ([www.accountingintheheadlines.com](http://www.accountingintheheadlines.com)) is a blog written by Wendy Tietz. New stories are added to the blog each month. The blog contains short stories about real-life companies and current events that can be used in the accounting classroom to illustrate introductory accounting concepts. The blog posts contain stories and discussion questions, making the blog a turnkey solution for instructors wanting to use real-life examples in their classes. All content is intended to be brief and fit easily into the typical introductory accounting class. In addition to the content found on the blog site, multiple-choice questions related to each blog post can be found in MyLab Accounting.

## WHAT'S NEW TO THE SIXTH EDITION

*Both students and instructors will benefit from new content in the sixth edition.*

- **NEW CONTENT ON DATA ANALYTICS!** Data Analytics is becoming critically important in business—specifically in accounting. In an increasingly competitive environment, having the ability to harness information to make sound business decisions is becoming crucial. In the last learning objective of every chapter, students are introduced to data analytics in the context of a business decision relating to the chapter content. Each data analytics section focuses on both 1) knowledge and insight, and 2) a Microsoft Excel skill that could be used to analyze the data.
- Each chapter has corresponding data analytics homework questions that mimic the business decision used in the text. The homework ranges in difficulty from simply understanding the concepts (Quick Check), to interpreting the data analytics output (Exercises), to performing the data analytics (Problems). This range of homework material provides ample opportunity for students to improve critical thinking and Excel skills in the realm of data analytics.
- Data analytics content is provided in the last learning objective in each chapter, giving professors maximum flexibility for covering the material as they see fit:

#### Chapter 1

LO 6: Describe foundational concepts in data analytics – Overview of data analytics: Benefits, process, types of data, types of analytics, and reasons for data visualization.



LO 7: Describe fundamental Excel features and perform basic Excel operations – Overview of how to identify, navigate and use basic Excel features. Excel skills: Identify components of a workbook and navigate through large data sets, select cells and ranges, reference cells and ranges, carry out arithmetic operations, access functions and dialog boxes.

- Chapter 2** LO 8: Analyze revenue, cost and inventory data using data analytics tools – Analyze *individual* data records in large data sets to determine oldest inventory, largest sales orders in specific locations, and so forth. Excel skills: Create, sort and filter Excel tables.
- Chapter 3** LO 8: Analyze job costs and profitability data using data analytics tools – Aggregate and analyze *summarized* job cost data by attributes, such as finding average cost by product and plant. Excel skill: Pivot tables.
- Chapter 4** LO 6: Analyze activity cost pools and cost drivers using data analytics tools: Find correlation between variables to choose the best allocation base for activity cost pools. Excel skill: CORREL function (correlation).
- Chapter 5** LO 6: Analyze process costing information using data analytic tools: Analyze individual data records and aggregated data to find the most profitable individual orders and the most profitable packaging options and customers for a mass-produced product. Excel skills: Create and sort Excel tables and pivot tables.
- Chapter 6** LO 7: Analyze cost behavior and make predictions using data analytic tools: Use regression to build predictive cost models for an airline that is contemplating adding a new route. Excel skills: Linear regression, multiple regression, R-squared, adjusted R-squared, scatter chart, trendline, regression equation.
- Chapter 7** LO 6: Analyze cost, volume, and profit using data analytics tools: Calculate operating income under several combinations of price and volume simultaneously; visually highlight those combinations that meet management's profit goals. Excel skills: What-if-Analysis data tables; conditional formatting.

- Chapter 8** LO 8: Analyze business decisions using data analytics tools: Determine profitability of a special order by locating cost records and comparing with the requested special-order prices. Excel skill: VLookup.
- Chapter 9** LO 5: Analyze data for budgeting using data analytics tools: Build predictive sales models using simple linear regression. Excel skills: Use Forecast Forward to forecast trendline at higher volumes; use FORECAST, RSQ, SLOPE and INTERCEPT functions.
- Chapter 10** LO 7: Analyze financial performance using data analytics tools: Calculate variances and label them as favorable or unfavorable on a performance report. Excel skills: IF function, ABS functions.
- Chapter 11** LO 7: Analyze manufacturing variances using data analytics tools: Use management by exception to find variances exceeding management's investigation criteria. Excel skills: IFS function, filtering, conditional formatting.
- Chapter 12** LO 6: Analyze capital investments using data analytics tools: Perform sensitivity analysis on the IRR of a potential investment using three different cash flow scenarios (best, most likely, and worse-case scenarios). Excel skill: IRR function.
- Chapter 13** LO 4: Analyze financial data for the statement of cash flows using data analytics tools: Aggregate general ledger accounts into comparative balance sheet line items in order to prepare the operating section of the statement of cash flows. Excel skills: Pivot table with slicer.
- Chapter 14** LO 5: Analyze financial trends using data analytics tools: Compute gross profit percentage on different distribution channels and visualize trends in sales revenue and gross profit for each channel. Excel skills: Sparklines and line charts.
- Chapter 15** LO 4: Analyze sustainability performance using data analytics tools: Prepare and analyze column charts on the company's waste-to-landfill as part of a sustainability dashboard. Excel skill: Column charts.
- **NEW DATA ANALYTICS PROJECTS!** Offer students hands-on practice in mining, analyzing, and reporting on data. Each project contains a list of requirements, a data set from a real company, a tutorial video, and instructions for using software such as Excel, Power BI, or Tableau. Using these tools, students learn how to extract and examine key information about a company related to its products, operations, and consumer buying habits. With this experience and knowledge, students are able to make smarter business decisions and are better prepared for the workforce. Additional data analytics teaching materials can be accessed by visiting the "Accounting Is Analytics" blog (<https://accountingisanalytics.com>) written by Wendy Tietz, Jennifer Cainas, and Tracie Miller-Nobles.

**New and updated content within the end-of-chapter material**

<b>Quick Checks</b>	Updated quick checks in each chapter. These questions are conceptual in nature. New data analytics question in every chapter.
<b>Short Exercises</b>	Short exercises have been updated, where applicable, to remain current. In addition, a new real-world short exercise is included in every chapter.
<b>Exercises</b>	Exercises have been updated, where applicable, to remain current. New data analytics exercises that require students to <i>interpret</i> the output of the data analytics illustrated in the chapter.
<b>Problems</b>	Problems have been updated, where applicable, to remain current. New data analytics problems that require students to <i>perform</i> the data analytics illustrated in the chapter.
<b>Ethics Mini Cases</b>	Updated case at the end of each chapter based on the IMA Statement of Professional Practice.
<b>Real Life Mini Cases</b>	Updated case at the end of each chapter focusing on a real company situation.
<b>Serial Case</b>	The serial case has been updated. This serial case focuses on the same real world company and continues throughout the entire text in the end of chapter materials.

## ABOUT THE AUTHORS

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Professor Braun has two daughters who are both recent college graduates. In her free time, she enjoys biking, gardening, hiking, skiing, and spending time with family and friends.

To my children, Rachel and Hannah, who are the joy of my life,  
and to my students, who inspire me daily.

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To my husband, Russ, who steadfastly and enthusiastically supports every new project.

Wendy M. Tietz





# ACKNOWLEDGMENTS



We'd like to extend a special thank-you to our reviewers who took the time to help us develop teaching and learning tools for Managerial Accounting courses to come. We value and appreciate their commitment, dedication, and passion for their students and the classroom:

## Managerial Accounting, 6e, and prior editions

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& Technical College; *Pamela Hopcroft*, Florida State College at Jacksonville; *Audrey S. Hunter*, Broward College; *Frank Ilett*, Boise State University; *Christopher Jacobsen*, University of Massachusetts Dartmouth; *Ron Jastrzebski*, Penn State University–Berks; *Catherine Jeppson*, California State University, Northridge; *Janet Jones*, University of Minnesota–Duluth; *Nancy Jones*, California State University–Chico; *Mark T. Judd*, University of San Diego; *David Juriga*, St. Louis Community College; *Thomas Kam*, Hawaii Pacific University; *Ken Koerber*, Bucks County Community College; *Emil Koren*, Saint Leo University; *Ron Lazer*, University of Houston–Bauer College; *Pamela Legner*, College of DuPage; *Elliott Levy*, Bentley University; *Harold T. Little*, Western Kentucky University; *William Lloyd*, Lock Haven University; *D. Jordan Lowe*, Arizona State University, West Campus; *Lois S. Mahoney*, Eastern Michigan University; *Diane Marker*, University of Toledo; *Linda Marquis*, Northern Kentucky University; *Lizbeth Matz*, University of Pittsburgh at Bradford; *David Mautz*, University of North Carolina–Wilmington; *Florence McGovern*, Bergen Community College; *Noel McKeon*, Florida State College at Jacksonville; *Kate McNeil*, Johnson County Community College; *Mallory McWilliams*, San Jose State University; *Robert Meyer*, Parkland College; *Michael Newman*, University of Houston; *Kitty O'Donnell*, Onondaga Community College; *Mehmet Ozbilgin*, Baruch College, City University of New York; *Abbie Gail Parham*, Georgia Southern University; *Glenn Pate*, Palm Beach Community College; *Paige Paulsen*, Salt Lake Community College; *Deborah Pavelka*, Roosevelt University; *Sheldon Peng*, Washburn University; *Tamara Phelan*, Northern Illinois University; *Letitia Pleis*, Metropolitan State College of Denver; *Cindy Powell*, Southern Nazarene University; *Will Quilliam*, Florida Southern College; *Rama Ramamurthy*, Georgetown University; *Paulette A. Ratliff-Miller*, Grand Valley State University; *Donald Reynolds*, Calvin College; *Christina M. Ritsema*, University of Northern Colorado; *Doug Roberts*, Appalachian State University; *Amal Said*, University of Toledo; *Anwar Salimi*, California State Polytechnic University; *Kathryn Savage*, Northern Arizona University; *Christine Schalow*, California State University–San Bernardino; *Tony Scott*, Norwalk Community College; *Lloyd Seaton*, University of Northern Colorado; *David Skougstad*, Metropolitan State College of Denver; *John Stancil*, Florida Southern College; *Jenny Staskey*, Northern Arizona University; *Dennis Stovall*, Grand Valley State University; *Olin Scott Stovall*, Abilene Christian University; *Gloria Stuart*, Georgia Southern University; *Iris Stuart*, California State University, Fullerton; *Gracelyn V. Stuart-Tuggle*, Palm Beach State College, Boca Raton; *Jan Sweeney*, Baruch College, City University of New York; *Pavani Tallapally*, Slippery Rock University; *Lloyd Tanlu*, University of Washington; *Diane Tanner*, University of North Florida; *Linda Hayden Tarrago*, Hillsborough Community College; *Steven Thoede*, Texas State University; *Geoffrey Tickell*, Indiana University of Pennsylvania; *Don Tripper*, SUNY Oneonta; *Igor Vaysman*, Baruch College; *John Virchick*, Chapman University; *Terri Walsh*, Seminole State; *Andy Williams*, Edmonds Community College; *Jeff Wong*, University of Nevada Reno; *Michael Yampuler*, University of Houston (Main Campus); *Jeff Jiewei Yu*, Southern Methodist University; *Judith Zander*, Grossmont College; *James Zeigler*, Bowling Green State University



# **MANAGERIAL ACCOUNTING**



Pickture/Alamy Stock Photo

Sources: Starbucks 2019 10-K filing [www.starbucks.com/about-us/company-information/starbucks-company-timeline](http://www.starbucks.com/about-us/company-information/starbucks-company-timeline); [starbucks.com/responsibility](http://starbucks.com/responsibility).

# Introduction to Managerial Accounting

## Learning Objectives

- 1 Identify managers' three primary responsibilities
- 2 Distinguish financial accounting from managerial accounting
- 3 Describe the roles and skills required of management accountants within the organization
- 4 Describe the role of the Institute of Management Accountants (IMA) and apply its ethical standards
- 5 Discuss the business trends and regulations affecting management accounting
- 6 Describe foundational concepts in data analytics
- 7 Describe fundamental Excel features and perform basic Excel operations

**Starbucks Corporation**, which began operations in 1971 as a sole coffee bean shop in Seattle's well-known Pike Street Market, now has over 31,200 company-owned and licensed stores in 81 markets around the world. The company's success can be attributed to innovative thinking, carefully disciplined expansion, and a focus on corporate responsibility. The company believes that its commitment to ethically sourced coffee, contributions to local communities, and superior employee benefits to part-time as well as full-time employees contribute to the company's objective of being one of the most recognized and respected brands in the world. Management accounting plays a role in implementing the company's strategy. Without information on the costs and benefits of different beverages, programs, distribution channels, and geographic areas, Starbucks would not be able to make responsible yet profitable decisions. Starbucks uses management accounting to make operating decisions that focus on corporate responsibility while also keeping the company financially strong.

As the Starbucks story shows, managers use accounting information for much more than preparing annual financial statements. They use managerial accounting information to guide their actions and decisions. For Starbucks, these decisions might include opening new stores, adding new products, or even providing new employee benefits, such as Starbucks's tuition reimbursement plan. Management accounting information helps management decide whether any or all of these actions will help accomplish the company's ultimate goals. In this chapter, we'll introduce managerial accounting, describe how it differs from financial accounting, and discuss the skills and ethics management accountants need. We will also discuss the regulatory and business environment in which today's managers and management accountants operate.

## What Is Managerial Accounting?

Managerial accounting, also referred to as management accounting, focuses on the financial insight needed for an organization to achieve success. In the words of the Institute of Management Accountants,

***Management accounting** is a profession that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization's strategy.<sup>1</sup>*

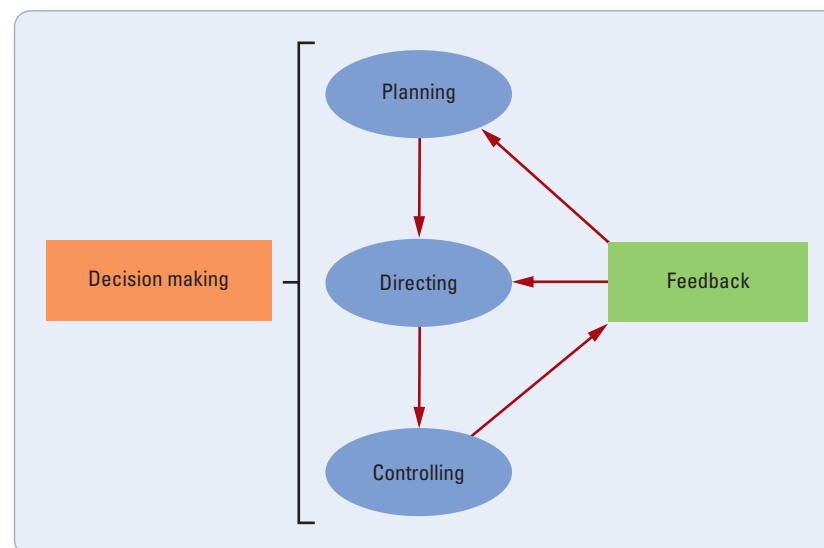
As you will see throughout the book, managerial accounting is very different from financial accounting. Financial accounting focuses on providing stockholders and creditors with the information they need to make investment and lending decisions. This information takes the form of financial statements: the balance sheet, income statement, statement of shareholders' equity, and statement of cash flows. On the other hand, managerial accounting focuses on identifying, interpreting, analyzing, and implementing the financial information internal management needs to run the company efficiently, effectively, and profitably. This information takes many forms depending on management's needs.

To understand the kind of information managers need, let's first look at their primary responsibilities.

## Managers' Three Primary Responsibilities

Managerial accounting helps managers fulfill their three primary responsibilities, as shown in Exhibit 1-1: planning, directing, and controlling. Integrated throughout these responsibilities is **decision making** (identifying alternative courses of action and choosing among them).

**EXHIBIT 1-1** Managers' Three Primary Responsibilities



**1** Identify managers' three primary responsibilities

<sup>1</sup> Statement on Management Accounting, "Definition of Management Accounting," Institute of Management Accountants, 2008.

- **Planning** involves setting goals and objectives for the company and determining how to achieve them. For example, one of Starbucks's goals is to generate more sales. One strategy to achieve this goal is to open more retail locations. For example, the company opened 1,270 new company-operated stores in fiscal 2019, roughly half in the United States and half in China and the Asia-Pacific.<sup>2</sup> Another strategy is to develop new products and new distribution channels (such as selling coffee through grocery stores and warehouse clubs). Managerial accounting translates these plans into **budgets**—the quantitative expression of a plan. Management analyzes the budgets before proceeding to determine whether its expansion plans make financial sense.
- **Directing** means overseeing the company's day-to-day operations. Management uses sales and costs information by store, region, and distribution channel, to run daily business operations. For example, Starbucks managers use sales data to determine which beverages on the menu and products in the stores are generating the most sales. They use that information to adjust product offerings, marketing strategies, and retail expansion decisions.
- **Controlling** means evaluating the results of business operations against the plan and making adjustments to keep the company pressing toward its goals. Starbucks uses performance reports to compare each store's actual performance against the budget and then based on that feedback take corrective actions if needed. If actual costs are higher than planned, or actual sales are lower than planned, then management may revise its plans or adjust operations.

Management is continually making decisions while it plans, directs, and controls operations. Starbucks management must decide where to open new stores, which stores to refurbish, what prices to set for beverages and other products in the store, and so forth. Managerial accounting provides the financial insight needed to help make these decisions.

## A Road Map: How Managerial Accounting Fits In

This book will show you how managerial accounting helps managers fulfill their responsibilities. The rest of the text is organized around the following themes:

1. **Managerial Accounting Building Blocks** Chapter 1 helps you understand more about the management accounting profession and today's business environment. Chapter 2 teaches you some of the language that is commonly used in managerial accounting. Just as musicians must know the notes to the musical scale, management accountants *and* managers must have a common understanding of these terms to communicate effectively with one another.
2. **Determining Unit Cost (Product Costing)** To run a business profitably, managers must be able to identify the costs associated with manufacturing its products or delivering its services. For example, Starbucks's managers need to know the cost of producing each beverage on the menu as well as the cost of operating each retail location. Managers must have this information so that they can set prices high enough to cover costs and generate an adequate profit. Chapters 3, 4, and 5 show you how businesses determine these costs. Chapter 4 also shows how managers can effectively control costs by eliminating wasteful activities and focusing on quality.
3. **Making Decisions** Before Harold Schultz opened the first Starbucks coffee house, he must have thought about the volume of sales needed just to break even—that is, just to cover costs. In order to do so, he had to first identify and estimate the types of costs the coffee house would incur as well as the profit that would be generated on each beverage served. These topics are covered in Chapters 6 and 7. Chapter 6 shows how managers identify different types of cost behavior, while Chapter 7 shows how managers determine the profitability of each unit sold as well as the company's breakeven point. Chapter 8 continues to use cost behavior information to

<sup>2</sup> Starbucks 2019 10-K filing.

walk through common business decisions, such as outsourcing and pricing decisions. Finally, Chapter 12 shows how managers decide whether to invest in new equipment, new projects, or new locations.

4. **Planning** Budgets are management's primary tool for expressing its plans. Chapter 9 discusses all of the components of the master budget and the way companies like Starbucks use the budgeting process to implement their business goals and strategies.
5. **Controlling and Evaluating** Management uses many different performance evaluation tools to determine whether individual segments of the business are reaching company goals. Chapters 10 and 11 describe these tools in detail. Chapters 13 and 14 describe how the statement of cash flows and financial statement analysis can be used to evaluate the performance of the company as a whole. Finally, Chapter 15 discusses how companies are beginning to address the sustainability of their operations, by measuring, reporting, and minimizing the negative impact of their operations on people and the environment. As you saw in the opening story, some of Starbucks's primary business concerns are to use ethically sourced coffee, contribute to local communities, and provide superior employee benefits to part-time as well as full-time employees.

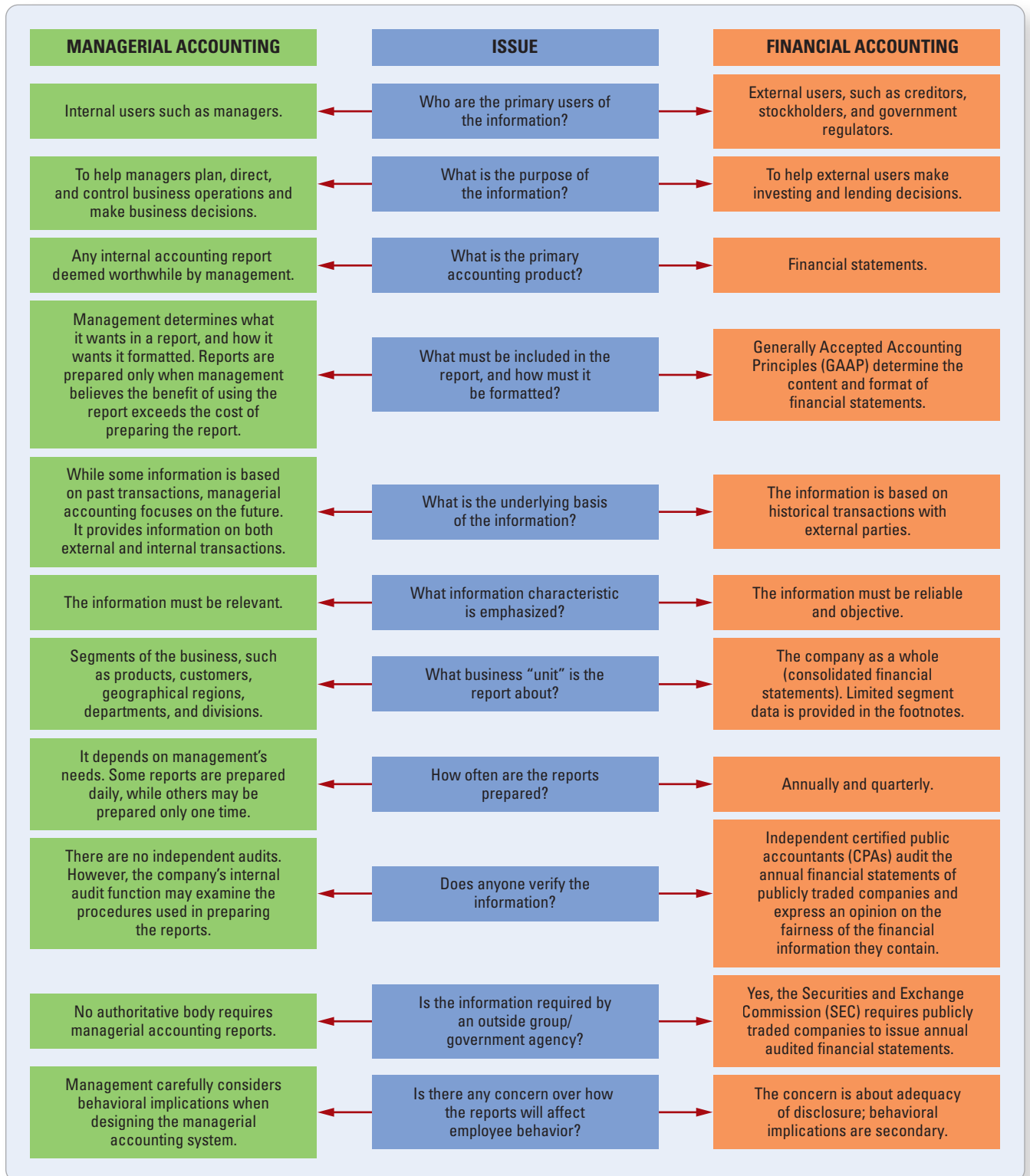
## Differences Between Managerial Accounting and Financial Accounting

### 2 Distinguish financial accounting from managerial accounting

Managerial accounting information differs from financial accounting information in many respects. Exhibit 1-2 summarizes these differences. Take a few minutes to study the exhibit (on page 5), and then we'll apply it to Starbucks.

Starbucks's *financial accounting* system is geared toward producing annual and quarterly consolidated financial statements that will be used by investors and creditors to make investment and lending decisions. Since Starbucks is a publicly traded company, its financial statements can be easily found on the Internet by searching for its 10-K (annual) and 10-Q (quarterly) SEC filings. The financial statements, which must be prepared in accordance with Generally Accepted Accounting Principles (GAAP), objectively summarize the transactions that occurred between Starbucks and external parties during the previous period. The Securities and Exchange Commission (SEC) requires that the annual financial statements of publicly traded companies, such as Starbucks, be audited by independent certified public accountants (CPAs). Starbucks's financial statements are useful to its investors and creditors, but they do not provide management with enough information to run the company effectively.

Starbucks's *managerial accounting* system is designed to provide internal managers with the accounting information needed to plan, direct, and control operations. Since managerial accounting information is specifically designed to help *internal* management, it is confidential information that is generally *not* available to the public. There are no GAAP-type standards or audits required for managerial accounting. To provide Starbucks's management with the information needed to make good business decisions, managerial accounting reports focus on smaller segments of the company (such as individual retail locations, geographic areas, and specific beverages and products) rather than the company as a whole. Rather than preparing reports just once a year, Starbucks prepares managerial accounting reports as often as needed, which could be as frequently as daily or even hourly. Many companies even use "real-time performance dashboards" that constantly update so that managers have the financial information they need to control operations and make timely decisions. Since managerial accounting revolves around planning and decision making, much of it focuses on the *future* rather than on the past. Any information that is *relevant* to management will be included. Finally, since every company is different, managerial accounting systems will vary from company to company. In designing the system, management will

**EXHIBIT 1-2** Managerial Accounting Versus Financial Accounting


weigh the costs of collecting and analyzing information with the benefits they expect to receive. Management will also consider how the system will affect employees' behavior. Employees try to perform well on the parts of their jobs that the accounting system measures and rewards.



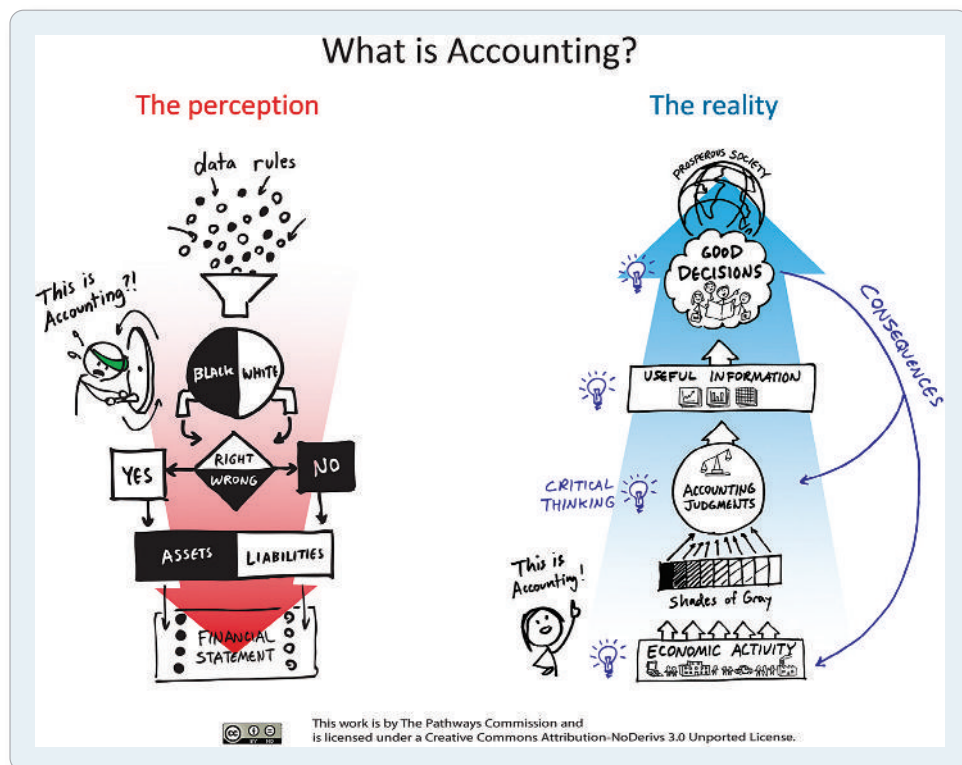
## What Role Do Management Accountants Play?

In this section, we'll look at the role of management accountants within the organization and the skills they need to help their organizations succeed.

### The Role of Management Accountants

When you think of accountants, what do you picture? Many people picture accountants the way they were 50 to 100 years ago, before the widespread use of computers when everything about measuring business transactions was relatively simplistic. As shown on the left in Exhibit 1-3, many people have the erroneous conception that accountants are nothing more than “bean counters,” plugging numbers into set formulas and using a black and white set of rules to churn out information for others to use. If this were true, being an accountant would be tedious and noncreative work indeed. Thankfully, nothing could be further from the truth.

**EXHIBIT 1-3** The Perception and the Reality



Source: © American Accounting Association. Used with permission.

As shown on the right in Exhibit 1-3, today's accountants are professionals who use an immense amount of critical thinking, insight, and judgment to capture the reality of today's complex economic events. As valued financial advisors, managerial accountants partner with management to make critical business decisions that have widespread and significant consequences for the business and for society. Let's face it: the business world is much more complex than it was in your grandparents' day. With rapidly changing technology and continual business innovation, the role of accountants has drastically changed from what it used to be. In fact, management accountants are rarely referred to by that name any more; instead, they are usually referred to as business advisors, analysts, or finance professionals.

As you go through each topic in this book, keep the blue picture in Exhibit 1-3 in mind, and ask yourself the following questions:

1. **What is the business issue, event, or problem, and how can accounting help to solve it?** Management accounting always begins with some relevant business issue that management is facing or some economic event that occurred in the past or might occur

in the future. Management accounting is used to shed light on the issue and direct management's path.

2. **What are the "gray areas"?** In other words, what differences in methods, assumptions, estimates, measurement choices, and judgment calls might impact the information that is used for decision making? Because of the gray areas and judgment involved, accounting numbers are rarely as precise as they may seem.
3. **What are the implications for the business if the accounting information used in the decision is "wrong"?** Because of the gray areas, it's difficult to say that accounting information is ever "wrong." However, judgment in these gray areas could lead to financial estimates that are on the high side or on the low side. What are the consequences of numbers that are too high or too low? Would estimates that are "off" in one direction be worse than the other direction?

Since you are studying management accounting for the first time, the topics in the book may at first appear very straightforward and immutable. However, if you consider the three questions listed above, you'll begin to see the significance of the judgment calls that go into management accounting and the ramifications to the business decisions that are consequently made.

## The Skills Required of Management Accountants

To understand the skills required of management accountants, let's go back to the definition of management accounting with which we started the chapter:

*Management accounting is a profession that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization's strategy.<sup>3</sup>*

First and foremost, management accounting is a profession. Since management accountants work in a professional advisory role, they need a vast array of technical and soft skills. Exhibit 1-4 summarizes some of these skills.<sup>4</sup>

**EXHIBIT 1-4** Technical and Nontechnical Competencies Needed by Management Accountants

Technical Competencies	Nontechnical Competencies
<ul style="list-style-type: none"> <li>• Planning, budgeting, and forecasting</li> <li>• Internal financial reporting</li> <li>• Performance measurement</li> <li>• Cost management</li> <li>• Internal controls</li> <li>• Technology and data analytics</li> <li>• Decision analysis</li> <li>• Financial statement analysis</li> <li>• Capital investment decisions</li> <li>• Risk management</li> <li>• Tax planning and compliance</li> <li>• Corporate finance</li> </ul>	<ul style="list-style-type: none"> <li>• Ethics</li> <li>• Communication</li> <li>• Customer service</li> <li>• Adaptability</li> <li>• Strategic and critical thinking</li> <li>• Process improvement</li> <li>• Leadership</li> <li>• Collaboration and teamwork</li> <li>• Business acumen</li> <li>• Change and conflict management</li> <li>• Professionalism</li> <li>• Project management</li> </ul>

<sup>3</sup> Statement on Management Accounting, "Definition of Management Accounting," Institute of Management Accountants, 2008.

<sup>4</sup> IMA Management Accounting Competency Framework, Institute of Management Accountants, 2019; and "The Skills Gap in Entry-level Management Accounting and Finance," Institute of Management Accountants and American Quality and Productivity Center, 2014.



This book will introduce you to most of the technical competencies listed in Exhibit 1-4. As you can see in the exhibit, the ability to use technology such as Microsoft Excel, is critical. Because Excel is used so pervasively in business, you will see many of the exhibits in this book featured in Excel. You will also see learning objectives in all chapters that teach you how to use Excel to perform various types of data analysis. Regardless of your future career path, becoming as proficient as you can with Excel will help you become more marketable and more valuable to your future employer.

## Managerial Accounting Is Important to All Careers

As you can see, management accountants don't fit the stereotypical accountant portrayed in movies and shows. Because of their expanding role, management accountants have truly become trusted and valued internal business advisors. But what if you don't plan to major in accounting? How can this course be of use to you? Here are just a few specific ways this course can help you prepare for your future business career:

- **Entrepreneurs** If you are planning to be an entrepreneur, you'll first want to know if your business idea makes financial sense. How high will volume have to be for your business to at least break even? How high will it have to be for your business to earn the level of profit that you want to achieve? As you begin to implement your business plan, should you negotiate sales contracts that are more fixed (flat fee) or variable (fee per activity)? What about costs? Would having more fixed costs or variable costs be better? How sensitive will your profits be to changes in volume if the economy booms or if it takes a turn for the worse? How will you decide whether to invest in new equipment and technology? As your business grows in size, how will you divide it into manageable segments and relinquish oversight of day-to-day operations to others, while at the same time retain control? How can you design systems to ensure your managers will make decisions that are consistent with your goals? And if you decide to raise capital or sell your business, what will potential investors want to see when they analyze your financial statements and study your statement of cash flows? All of these topics are addressed in this book.
- **Business Management** If you are planning to be a general business manager, not a day will go by in which you don't consider the financial ramifications of your decisions. You'll need to have a firm grasp on the costs of obtaining or manufacturing every product you sell and/or every service you deliver. You'll also want to understand how costly every activity within the company is to perform and have specific strategies in hand for controlling and reducing those costs. You'll need to understand which costs will increase as your volume increases and which costs will be unaffected by changes in volume. Cost information will drive many, if not all, of your decisions about where to locate, what to produce, which suppliers to use, whether to outsource, which products to emphasize, whether to implement quality improvement initiatives, whether to automate some of your processes, how to price your products or bid for jobs, whether to discontinue certain products or operations, and so forth. Every business decision you make will be rooted in revenue and cost information, so it will be important for you to understand how those costs were obtained and what they include. Different costs will be used for different purposes. All of these topics are addressed in this book.
- **Marketing and Sales** If you are planning to be in marketing and sales, your marketing strategy, assumptions, and predictions will be the driving force behind the company's entire budget. As a result, you will be intimately involved with developing the budget. Product-line profitability reports will show you which products are most profitable and will guide your decisions about which products to emphasize. Cost information will drive many of your pricing decisions, as well as decisions about whether to accept special orders at reduced sales prices or give volume discounts. The company's stance on sustainability may impact your ability to attract various customers and target different markets. All of these topics are addressed in this book.

- **Nonbusiness Majors** Even if you are planning to be a nurse, engineer, musician, or fashion designer, the information you learn in this course will be of consequence to you. All organizations, including nonprofits and governmental agencies, use cost and revenue information to guide their plans, actions, and decisions. No matter what your career path, every activity you engage in will impact the costs and revenues of your organization. That holds true, whether you are tending to sick patients, designing bridges, managing a symphony orchestra, or designing clothes. Management will expect you to operate under limited resources and will often look to you for revenue and expense estimates for specific projects or for specific periods of time. Management may also hand you budgets, cost data, and performance reports and expect you to understand it and use it for making decisions. The more you understand the underlying financial information, the better prepared you will be.

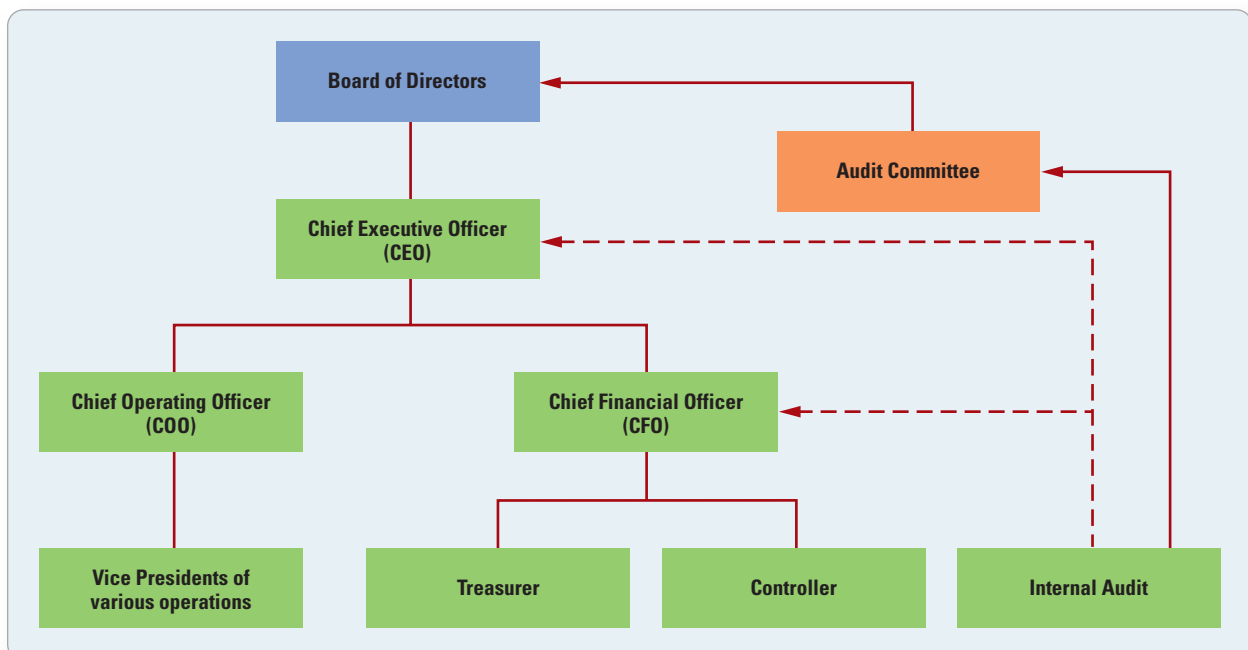
We've chosen to highlight just a few specific business career tracks here, but many of the same issues will pertain to all business careers, including those in logistics, supply chain management, production, and finance. There is such a huge overlap in business between managerial accounting and finance that both are often referred to as the "finance function," and the people who work in this function, regardless of whether they were accounting or finance majors, are often referred to as analysts. No matter what your eventual career, you will be using managerial accounting information. As is often said, accounting is the language of business, so the more you know about it, the more valuable you will be to your organization.

## Accounting within the Organizational Structure

Most corporations are too large to be governed directly by their stockholders. Therefore, stockholders elect a **board of directors** to oversee the company. Exhibit 1-5 shows a typical organizational structure, with the green boxes representing employees of the firm and the orange and blue boxes representing nonemployees.

The board members meet only periodically, so they hire a **chief executive officer (CEO)** to manage the company on a daily basis. The CEO hires other executives to run various aspects of the organization, including the **chief operating officer (COO)** and the **chief financial officer (CFO)**. The COO is responsible for the company's operations, such as research and

**EXHIBIT 1-5** Typical Organizational Structure



development (R&D), production, and distribution. The CFO is responsible for all of the company's financial concerns. The **treasurer** and the **controller** report directly to the CFO. The treasurer is primarily responsible for raising capital (through issuing stocks and bonds) and investing funds. The controller is usually responsible for general financial accounting, managerial accounting, and tax reporting. Many organizations have other C-Suite personnel not pictured in Exhibit 1-5, such as chief information officer (in charge of the company's technology infrastructure) and the chief sustainability officer (in charge of devising, implementing, and reporting on the company's sustainability initiatives). The CFO, controller, and others within the accounting function work closely with these individuals since technology plays a significant role in collecting managerial accounting information, and, as you'll see later in the chapter and book, managerial accounting both impacts and is impacted by sustainability initiatives.

Let's now turn our attention to the right side of Exhibit 1-5. The New York Stock Exchange requires that listed companies have an **internal audit function**. The role of the internal audit function is to ensure that the company's internal controls and risk management policies are functioning properly. The Internal Audit Department reports directly to a subcommittee of the board of directors called the **audit committee**. The audit committee oversees the internal audit function as well as the annual audit of the financial statements by independent CPAs. Both the Internal Audit Department and the independent CPAs report directly to the audit committee for one very important reason: to ensure that management will not intimidate them or bias their work. However, since the audit committee meets only periodically, it is not practical for the audit committee to manage the internal audit function on a day-to-day basis. Therefore, the internal audit function also reports to a senior executive, such as the CFO or CEO, for administrative matters.

### Why is this important?

**"Management accountants act as internal business advisors. They provide the financial information and in-depth analysis needed to make good business decisions."**

When you look at the organizational chart pictured in Exhibit 1-5, where do you think management accountants work? It depends on the company. Management accountants used to work in accounting departments and reported directly to the controller. Now, over half of management accountants are located throughout companies and work on cross-functional teams. **Cross-functional teams** consist of employees representing various functions of the company, such as R&D, design, production, marketing, distribution, and customer service. Cross-functional teams are effective because each member can address business decisions from a different viewpoint. These teams often report to various vice presidents of operations. Management accountants frequently take the leader-

ship role in cross-functional teams since financial impact is the driving force in almost all business decisions.

## Professional Associations

The **Institute of Management Accountants (IMA)** is the 100-year-old professional association for management accountants. Its vision is to be the leading resource for developing, certifying, connecting, and supporting accountants and financial professionals who work within companies and organizations. According to the IMA, about 85% to 90% of accountants work in organizations, performing the roles discussed earlier.

The IMA issues the **Certified Management Accountant (CMA)** certification. Over 60,000 people around the globe have become CMAs. To become a CMA, you must pass a rigorous examination, gain two years of relevant professional experience, and maintain continuing professional education. You must also have a baccalaureate degree, although the degree does *not* need to be in accounting. One nice feature of the CMA exam is that you don't have to wait until you graduate from college to take it. Thus, you can start working on valuable credentials that will earn you a higher salary even before you graduate from college. The 2019 Global Salary Survey conducted by the IMA revealed that, globally, CMAs earn more than double the salary of their non-CMA peers.

The CMA exam, which was revamped for 2020 to ensure continued relevance with the critical knowledge and skills needed by financial professionals in business, consists of

- 4** Describe the role of the Institute of Management Accountants (IMA) and apply its ethical standards

two parts. Each part of the exam is four hours long and consists of 100 multiple-choice questions as well as two essay questions. As shown below, most of the topics on the exam are introduced in this textbook:

**Part 1: Financial Reporting, Planning, Performance and Analytics**—Cost Management (Chapters 2, 3, 4, 5, and 6); Technology and Analytics (all chapters); External Financial Reporting Decisions (Chapters 13 and 14); Planning, Budgeting, and Forecasting (Chapters 6 and 9), Performance Management (Chapters 10 and 11); and Internal Controls.

**Part 2: Strategic Financial Management**—Financial Statement Analysis (Chapter 14); Investment Decisions (Chapter 12); Corporate Finance; Decision Analysis (Chapters 7 and 8); Risk Management; and Professional Ethics (Chapters 1 and 15).

If you like the material in this course as well as in your finance course, you should strongly consider taking the CMA exam.<sup>5</sup> You can also become a student member of the IMA for a significantly reduced annual fee. Membership will give you access to the IMA's job posting website as well as all of its publications including *Strategic Finance*, the IMA's monthly journal devoted to helping finance professionals keep abreast of recent trends and techniques. Finally, the IMA hosts an annual three-day student leadership conference at a different location in the United States each year. You can find out more about the IMA at its website: [www.imanet.org](http://www.imanet.org).

In 2012, the American Institute of Certified Public Accountants (AICPA), joined forces with England's Chartered Institute of Management Accountants (CIMA) to launch a separate specialized credential geared toward members who work or have worked in accounting roles in business, industry, or government. The Chartered Global Management Accountant (CGMA) designation, which is available to qualifying AICPA and CIMA members, is meant to recognize the unique business and accounting skill set possessed by those certified public accountants (CPAs) who fill or have filled accounting roles within an organization, as opposed to strictly public accounting roles. The CGMA has issued a "Competency Framework" that covers many of the same technical and nontechnical skills shown in Exhibit 1-4.<sup>6</sup> Qualification for the CGMA designation is based on examination and professional experience. Currently, 150,000 accounting professionals hold this designation worldwide. You can find out more about the CGMA designation, qualifications, and benefits at [www.CGMA.org](http://www.CGMA.org).



Throughout each chapter you will see several "Try It!" features. These features will allow you to see if you understand something you just learned about in the reading. Click the Try It! icon to practice and get immediate feedback in the etext.

Determine whether each of the following statements is true or false:

1. Managers' three primary responsibilities are planning, directing, and controlling.
2. Management accounting is geared toward external stakeholders, such as investors and creditors.
3. Management accountants often work in cross-functional teams throughout the organization.
4. The internal audit function reports to the audit committee of the board of directors.
5. Management accountants are now more often looked upon as internal business advisors rather than "bean counters" recording historical transactions.
6. Management accountants should be technically proficient, but they don't need strong oral and written communication skills.
7. Management accountants should be proficient in Excel.
8. The AICPA (American Institute of Certified Public Accountants) issues the CMA (Certified Management Accountant) certification.

Please see page 70 for solutions.

<sup>5</sup> For more specific information about topics covered on the CMA exam, see [www.imanet.org/cma-certification/getting-started/cma-2020-exam-changes?ssopc=1](http://www.imanet.org/cma-certification/getting-started/cma-2020-exam-changes?ssopc=1).

<sup>6</sup> [www.aicpa.org/About/Pages/About.aspx](http://www.aicpa.org/About/Pages/About.aspx).

## Average Salaries of Management Accountants

The average salaries of management accountants reflect their large skill set. Naturally, salaries will vary with the accountant's level of experience, his or her specific job responsibilities, and the size and geographical location of the company. However, to give you a general idea, in 2019, the average base salary (before benefits, profit sharing, or bonuses) of *all* IMA members in the United States was \$101,178, while the median base salary of IMA members in lower management positions (early years of career) in the United States was approximately \$70,000. Those professionals in the United States holding the CMA certification earned 31% more in total compensation than members with no certification, while those who held *both* the CMA and CPA certifications earned 50% more than noncertified members. You can obtain more specific salary information in the IMA's 2019 Global Salary Survey.<sup>7</sup>

Robert Half International, Inc., is another good source for salary information. Robert Half publishes a free yearly guide to average salaries for all types of finance professionals. The guide also provides information on current hiring trends. In addition, Robert Half offers a free online interactive salary calculator, which allows you to drill down to salary information by zip code, years of experience, job title, and company size. To explore salaries in the fields of accounting and finance, do a web search on the phrase "Robert Half Salary Guide and Calculator."

## Professional Ethics

### ETHICS

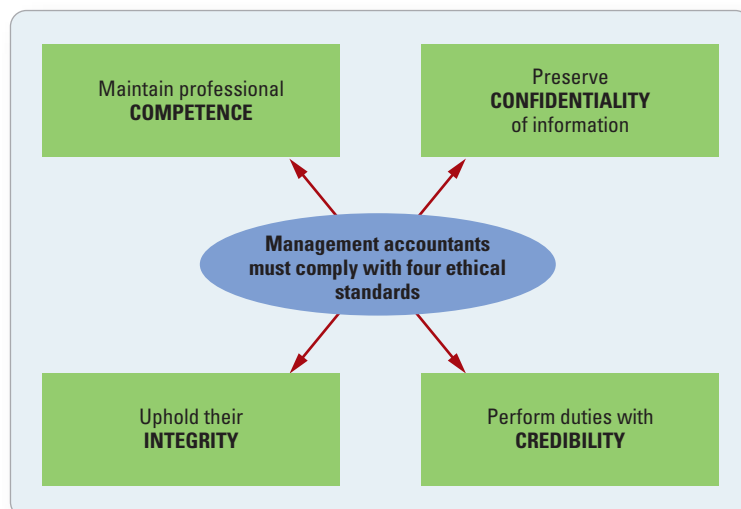
Management accountants continually face ethical challenges. The IMA has developed principles and standards to help management accountants deal with these challenges. The principles and standards remind us that society expects professional accountants to exhibit the highest level of ethical behavior. The IMA's *Statement of Ethical Professional Practice* requires management accountants to do the following:

- Maintain their professional competence.
- Preserve the confidentiality of the information they handle.
- Uphold their integrity.
- Perform their duties with credibility.

These ethical standards are summarized in Exhibit 1-6, while the full *Statement of Ethical Professional Practice* appears in Exhibit 1-7.

If an IMA member encounters unethical situations or behavior, the member should actively seek resolution first by following their company's established policies for

**EXHIBIT 1-6** Summary of Ethical Standards



<sup>7</sup> IMA's 2019 Global Salary Survey Strategic Finance. [www.imanet.org/resources-publications/thought-leadership-new/salary-survey](http://www.imanet.org/resources-publications/thought-leadership-new/salary-survey)

**EXHIBIT 1-7** IMA Statement of Ethical Professional Practice (Effective July 1, 2017)

Members of IMA shall behave ethically. A commitment to ethical professional practice includes overarching principles that express our values and standards that guide our conduct.

**Principles**

IMA's overarching ethical principles include: Honesty, Fairness, Objectivity, and Responsibility. Members shall act in accordance with these principles and shall encourage others within their organizations to adhere to them.

**Standards**

IMA members have a responsibility to comply with and uphold the standards of Competence, Confidentiality, Integrity, and Credibility. Failure to comply may result in disciplinary action.

**I. Competence**

1. Maintain an appropriate level of professional leadership and expertise by enhancing knowledge and skills.
2. Perform professional duties in accordance with relevant laws, regulations, and technical standards.
3. Provide decision support information and recommendations that are accurate, clear, concise, and timely. Recognize and help manage risk.

**II. Confidentiality**

1. Keep information confidential except when disclosure is authorized or legally required.
2. Inform all relevant parties regarding appropriate use of confidential information. Monitor to ensure compliance.
3. Refrain from using confidential information for unethical or illegal advantage.

**III. Integrity**

1. Mitigate actual conflicts of interest. Regularly communicate with business associates to avoid apparent conflicts of interest. Advise all parties of any potential conflicts of interest.
2. Refrain from engaging in any conduct that would prejudice carrying out duties ethically.
3. Abstain from engaging in or supporting any activity that might discredit the profession.
4. Contribute to a positive ethical culture and place integrity of the professional above personal interests.

**IV. Credibility**

1. Communicate information fairly and objectively.
2. Provide all relevant information that could reasonably be expected to influence an intended user's understanding of the reports, analyses, or recommendations.
3. Report any delays or deficiencies in information, timeliness, processing, or internal controls in conformance with organization policy and/or applicable law.
4. Communicate professional limitations or other constraints that would preclude responsible judgment or successful performance of an activity.

Institute of Management Accountants. (Effective July 2017)

Source: IMA Statement of Ethical Professional Practice, July 2017

reporting unethical behavior. If no policies are in place, then the member should consider the following:

- Discuss the situation with the immediate supervisor. If the supervisor is involved in the unethical situation, then present the issue to the next level of management.
- The IMA offers an anonymous hotline that members may call to request how key elements of the Statement of Professional Practice (Exhibit 1-7) could be applied to the issue.
- Consider consulting an attorney to learn of any legal obligations, rights, and risks concerning the issue.

If the issue cannot be resolved, the member may wish to consider disassociating from the organization.



## Examples of Ethical Dilemmas

Because professional ethical behavior is so critical, we have included short exercises and cases related to ethical behavior in each chapter of the book. An ethics icon will mark each of these exercises so that they are readily identifiable to you and your instructor.

Unfortunately, the ethical path is not always clear. You may want to act ethically and do the right thing, but the consequences can make it difficult to decide what to do. Let's consider several ethical dilemmas in light of the IMA *Statement of Ethical Professional Practice*.

### Dilemma #1

Sarah Baker is examining the expense reports of her staff, who counted inventory at Top-Flight's warehouses in Arizona. She discovers that Mike Flinders has claimed but not included hotel receipts for over \$1,000 of accommodation expenses. Other staff, who also claimed \$1,000, did attach hotel receipts. When asked about the receipts, Mike admits that he stayed with an old friend, not in the hotel, but he believes that he deserves the money he saved. After all, the company would have paid his hotel bill.

By asking to be reimbursed for hotel expenses he did not incur, Flinders violated the IMA's integrity standards (conflict of interest in which he tried to enrich himself at the company's expense). Because Baker discovered the inflated expense report, she would not be fulfilling her ethical responsibilities of integrity and credibility if she allowed the reimbursement.

### Dilemma #2

As the accountant of Entrée Computer, you are aware of your company's weak financial condition. Entrée is close to signing a lucrative contract that should ensure its future success. To do so, the controller states that the company must report a profit this year (ending December 31). He suggests, "Two customers have placed orders that are really not supposed to be shipped until early January. Ask production to fill and ship those orders on December 31 so we can record them in this year's sales."

The resolution of this dilemma is less clear-cut. Many people believe that following the controller's suggestion to manipulate the company's income would violate the standards of competence, integrity, and credibility. Others would argue that because Entrée Computer already has the customer orders, shipping the goods and recording the sale in December is still ethical behavior. In this situation, you might discuss the available alternatives with the next managerial level or the IMA ethics hotline counselor.

### Dilemma #3

As a new accounting staff member at Central City Hospital, your supervisor has asked you to prepare the yearly Medicare Cost Report, which the government uses to determine its reimbursement to the hospital for serving Medicare patients. The report requires specialized knowledge that you don't believe you possess. Your supervisor is busy planning for the coming year and cannot offer much guidance while you prepare the report.

This situation is not as rare as you might think. You may be asked to perform tasks that you don't feel qualified to perform. The competence standard requires you to perform professional duties in accordance with laws, regulations, and technical standards; but laws and regulations are always changing. For this reason, the competence standard also requires you to continually develop knowledge and skills. CPAs and CMAs are required to complete annual continuing professional education (about 40 hours per year) to fulfill this responsibility. However, even continuing professional education courses will not cover every situation you may encounter.

In the Medicare cost report situation, advise your supervisor that you currently lack the knowledge required to complete the Medicare report. By doing so, you are complying with the credibility standard that requires you to communicate any limitations that would preclude you from successful performance of an activity. You should ask for training on the report preparation and supervision by someone experienced in preparing the report.

#### Dilemma #4

Your company is negotiating a large multiyear sales contract that, if won, would substantially increase the company's future earnings. At a dinner party over the weekend, your friends ask you how you like your job and the company you work for. In your enthusiasm, you tell them not only about your responsibilities at work but also about the contract negotiations. As soon as the words pop out of your mouth, you worry that you've said too much.

This situation is difficult to avoid. You may be so excited about your job and the company you work for that information unintentionally slips out during casual conversation with friends and family. The confidentiality standard requires you to refrain from disclosing information or using confidential information for unethical or illegal advantage. Was the contract negotiation confidential? If so, would your friends invest in company stock in hopes that the negotiations increase stock prices? Or were the negotiations public knowledge in the financial community? If so, your friends would gain no illegal advantage from the information. Recent cases in the news remind us that insider trading (use of inside knowledge for illegal gain) has serious consequences. Even seemingly mundane information about company operations could give competitors an advantage. Therefore, be sure to disclose only information that is meant for public consumption.

#### Unethical Versus Illegal Behavior

Finally, is there a difference between unethical and illegal behavior? Not all unethical behavior is illegal, but all illegal behavior is unethical. For example, consider the competence standard. The competence standard states that management accountants have a responsibility to provide decision support information that is accurate, clear, concise, and timely. Failure to follow this standard is unethical but in most cases not illegal. Now, consider the integrity standard. It states that management accountants must abstain from any activity that might discredit the profession. A management accountant who commits an illegal act is violating this ethical standard. In other words, ethical behavior encompasses more than simply following the law. The IMA's ethical principles include honesty, fairness, objectivity, and responsibility—principles that are much broader than what is codified in the law.

### Why is this important?

**"At the root of all business relationships is trust. Would you put your money in a bank that you didn't trust, invest in a company you knew was 'cooking the books,' or lend money to someone you thought would never pay you back? As a manager, your trust in the other party's ethical behavior, and vice versa, will be a vital component of the business decisions you make."**



# Decision Guidelines

## Managerial Accounting and Management Accountants

Starbucks had to consider the following in designing its managerial accounting system.

Decision	Guidelines
What is the primary purpose and focus of managerial accounting?	Managerial accounting provides information that helps managers plan, direct, and control operations. By focusing on <i>relevant</i> information, managerial accounting assists managers in formulating and implementing the organization's strategy and making good business decisions.
What should managers take into consideration when designing managerial accounting systems?	Managers need to weigh the costs of the system (for example, collecting and analyzing data) with the benefits that are expected from using the information to make better decisions. Managers must carefully consider the behavioral effects of the system since employees tend to focus on those aspects of performance that are measured.
Where should management accountants be placed within the organizational structure?	In the past, most management accountants worked in accounting departments. Now, over 50% of management accountants work on cross-functional teams across the organization, where they serve in an advisory role.
What skills should management accountants possess?	Because of their expanding role within the organization, management accountants need both technical skills (such as managerial and financial accounting knowledge and technology skills) and nontechnical skills (such as ethics, communication, critical thinking, and leadership).
What professional associations advocate for management accountants in the United States?	The Institute of Management Accountants (IMA) is the premier organization advocating strictly for the advancement of the management accounting profession. The IMA also issues the CMA certification. In addition, the American Institute of Certified Public Accountants (AICPA) has launched a specialized credential (the CGMA) for CPAs who have experience in industry, business, and government.
By what ethical principles and standards should management accountants abide?	<p>The IMA's overarching ethical <i>principles</i> include the following:</p> <ul style="list-style-type: none"> <li>• Honesty</li> <li>• Objectivity</li> <li>• Fairness</li> <li>• Responsibility</li> </ul> <p>The IMA's ethical <i>standards</i> include the following:</p> <ul style="list-style-type: none"> <li>• Competence</li> <li>• Integrity</li> <li>• Confidentiality</li> <li>• Credibility</li> </ul>

# SUMMARY PROBLEM 1

## Requirements

1. Each of the following statements describes a responsibility of management. Match each statement to the management responsibility being fulfilled.

Statement	Management Responsibility
1. Identifying alternative courses of action and choosing among them	a. Planning
2. Running the company on a day-to-day basis	b. Decision making
3. Determining whether the company's units are operating according to plan	c. Directing
4. Setting goals and objectives for the company and determining strategies to achieve them	d. Controlling

2. Are the following statements more descriptive of managerial accounting or financial accounting information?

- Describes historical transactions with external parties
- Is not required by any authoritative body, such as the SEC
- Reports on the company's subunits, such as products, geographical areas, and departments
- Is intended to be used by creditors and investors
- Is formatted in accordance with GAAP

3. Each of the following statements paraphrases an ethical responsibility. Match each statement to the standard of ethical professional practice being fulfilled. Each standard may be used more than once or not at all.

Responsibility	Standard of Ethical Professional Practice
1. Do not disclose company information unless authorized to do so.	a. Competence
2. Continue to develop skills and knowledge.	b. Confidentiality
3. Don't bias the information and reports presented to management.	c. Integrity
4. If you do not have the skills to complete a task correctly, do not pretend that you do.	d. Credibility
5. Avoid actual <i>and</i> apparent conflicts of interest.	

## ■ SOLUTIONS

### Requirement 1

- (b) Decision making
- (c) Directing
- (d) Controlling
- (a) Planning

### Requirement 2

- Financial accounting
- Managerial accounting
- Managerial accounting
- Financial accounting
- Financial accounting

### Requirement 3

- (b) Confidentiality
- (a) Competence
- (d) Credibility
- (a) Competence
- (c) Integrity

## What Business Trends and Regulations Affect Management Accounting?

Business trends and regulations are continually changing. To remain competitive, companies need to be nimble and adaptable. In this section, we'll describe some of the business trends and regulations that are significantly affecting management accounting.

### Data Analytics and Critical Thinking

The collection of data from sensors, social media, GPS signals, texts, pictures, customer reward cards, and so forth is increasing at an unprecedented rate. This type of unstructured data, coupled with traditional business transaction data, is changing the ways in which companies operate. In fact, data analytics has become so important to business survival and growth that we'll spend the last two learning objectives of this chapter describing it in more detail. Each chapter will also conclude with a learning objective dedicated to illustrating how data analytics can help solve a business issue related to the chapter topic.

For business transaction data, many small businesses use ready-to-use accounting software packages, such as QuickBooks or Sage 50, to track their costs and to develop the information that owners and managers need to run the business. But large companies use **enterprise resource planning (ERP)** systems that can integrate all of a company's worldwide functions, departments, and data. ERP systems such as SAP and Oracle gather company data into a centralized data warehouse. The system feeds the data into software for all of the company's business activities, from budgeting and purchasing to production and customer service.

Advantages of ERP systems include the following:

- Companies streamline their operations before mapping them into ERP software. Streamlining operations saves money.
- ERP helps companies respond quickly to changes. A change in sales instantly ripples through the ERP's purchases, production, shipping, and accounting systems.
- An ERP system can replace hundreds of separate software systems, such as different software in different regions, or different payroll, shipping, and production software.

Gone are the days when decisions were made based on gut feelings. Data-driven decision making is here to stay. What can you do to prepare yourself for a data-driven business career? Data are only data, unless they are turned into useful information. The way to turn big data into information is to use critical thinking skills in conjunction with technological skills, such as competency in Excel, SAP, and Tableau. As mentioned earlier in the chapter, management accountants are expected to possess both technical *and* critical thinking skills. In other words, data cannot stand on their own; they require analysis and interpretation if they are to be of use to management.

### Critical Thinking

You will need to use critical thinking throughout this course and throughout your career. But what does critical thinking really entail? **Critical thinking** can be described as improving the quality of thought by skillfully analyzing, assessing, and reconstructing it.<sup>8</sup> Critical thinking can be improved by asking yourself the following series of questions about any issue or problem you encounter:<sup>9</sup>

1. What is the purpose, goal, or objective? In other words, what am I trying to accomplish?
2. What is the specific question I'm trying to address? The question will guide your thought process.
3. What data will I need to answer the question? With the sheer magnitude of data available, you'll need to hone in solely on the data that will help you answer the question at hand.

<sup>8</sup> [Criticalthinking.org](http://Criticalthinking.org)

<sup>9</sup> [www.criticalthinking.org/ctmodel/logic-model1.htm](http://www.criticalthinking.org/ctmodel/logic-model1.htm)

4. What concepts am I using, and what assumptions might I be taking for granted? Make sure you clearly identify the concepts and assumptions you are using, since a change in assumption might impact your conclusions.
5. What conclusions am I coming to, and are my inferences logical? *Always* check for logic.
6. What are the implications and consequences of these conclusions? All decisions have repercussions. Think ahead to what the outcome might be.
7. What is my point of view or reference point through which I have viewed the problem? Could I look at the problem from another equally valid point of view? Recognize that your point of view, which is the lens through which you view an issue, might be only one of several equally valid viewpoints.

Often in business, school, and life, you may be faced with problems you don't feel you know how to attack. By asking yourself the series of questions listed above, you can put a thoughtful, intellectual framework around the problem that will help guide your journey toward a solution.

## STOP & THINK

Companies are constantly faced with decisions about investing in technological innovations that could potentially save money. While Chapter 12 discusses investment decisions in more detail, we'll consider a simple one-year cost-benefit analysis here. Faced with rising pressure for a \$15 per hour minimum wage rate, the fast-food industry is currently exploring the possible use of robotics for order-taking and food preparation tasks. Assume the following facts:

1. By investing in one robotic arm, a fast-food restaurant could potentially save \$15 per hour plus 7.65% payroll tax. While the tasks performed by a human associate are more flexible and adaptable than those performed by a robot, assume the robot would replace 10 hours of human labor, 365 days per year.
2. The robotic arm is estimated to cost \$35,000 plus \$5,000 for installation. While the equipment itself may be in workable condition for up to five years, the company is viewing its implementation as a one-year experiment.
3. The annual cost of running the robotic arm, including utilities and servicing, is expected to be \$1,500.

Perform a cost-benefit analysis for the first year of implementation to determine whether the robotic arm would be a financially viable investment if the minimum wage were to be raised to \$15 per hour.

**Answer:**

	A	B	C
1	Cost-Benefit Analysis		Total
2	<b>Expected benefits (cost savings):</b>		
3	Wages: \$15 per hour × 10 hours per day × 365 days per year	\$ 54,750	
4	Payroll taxes: 7.65% of gross wages	4,188	
5	Total expected benefits		\$ 58,938
6	<b>Expected costs:</b>		
7	Robotic arm and installation	\$ 40,000	
8	Cost of operating and servicing	1,500	
9	Total expected costs		41,500
10	<b>Net expected benefit in first year</b>		<b>\$ 17,438</b>
11			

Based on this one-year cost-benefit analysis, the fast-food restaurant would expect to benefit from investing in the robotic technology. This analysis is based on several key assumptions (hours of labor replaced, hourly wage rate, and equipment fully expensed in one year). As with most decisions, the projected financial impact would vary under different assumptions.

## Knowledge Economy

The U.S. economy is becoming a “knowledge economy” in which more and more people are employed for their intellectual capital than for their ability to provide manual labor in agricultural and manufacturing roles. Outside of government, more people are now employed in the service sector of the U.S. economy than in retail merchandising, manufacturing, construction, mining, and agriculture combined. Service companies provide consulting, financial services, health care, communication, education, and sports and leisure activities as well as other important benefits to society. The critical thinking framework outlined earlier highlights the importance of these skills to knowledge workers in the new economy.

Although many managerial accounting practices were first developed to meet the needs of manufacturers during the industrial age of the early twentieth century, most of these practices are still applicable and used in the service sector of the economy.

For example, health-care providers need to know the cost of performing procedures and running lab tests; hotel managers need to know the cost of providing rooms and amenities to guests; cell phone and Internet service providers need to know the cost of providing texts, data, and cloud computing services; and entrepreneurs that develop apps, such as Uber and Airbnb, need to have a good understanding of their cost structure and how they will monetize the site. No matter what the industry, cost information helps managers make vital business decisions, such as pricing decisions, marketing decisions, decisions to invest in new technology, and market expansion decisions.

## Globalization

The barriers to international trade have fallen over the past decades, allowing foreign companies to compete with domestic companies. Firms that are not highly efficient, innovative, and responsive to business trends will vanish from the global market. However, global markets also provide highly competitive domestic companies with great opportunities for growth.

Globalization has several implications for managerial accounting:

- Stiffer competition means managers need more accurate and timely information to make wise business decisions. Detailed, accurate, and real-time cost information has become a necessity for survival.
- Companies need to be aware of regulations and laws in the countries where they do business. For example, England and Europe tend to have much stricter environmental protection laws than the United States.
- Companies can learn new management techniques by observing their international competitors. For example, lean thinking, which is discussed in Chapter 4, was developed in Japan by Toyota. Lean practice has now been adopted, expanded upon, and refined by U.S. companies.

### Why is this important?

**“To survive in the global marketplace, businesses must quickly respond to customer demand, providing high-quality products and services at a reasonable price.”**

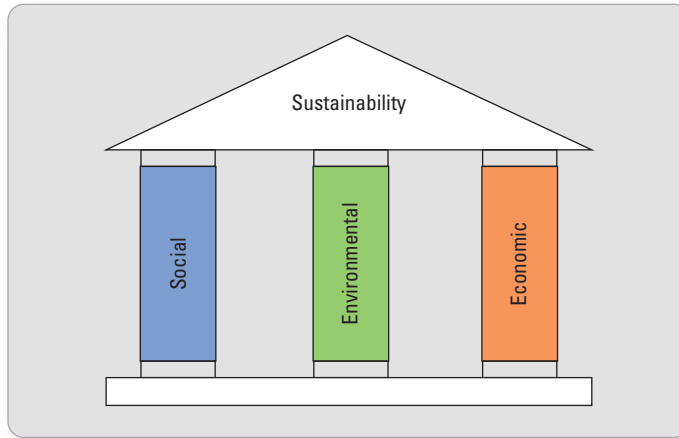
## Sustainability, Social Responsibility, and the Triple Bottom Line

Recent years have witnessed an increasing awareness and growing interest in sustainability and social responsibility by both consumers and corporations. The dictionary definition of **sustainability** refers to the ability of a system to maintain its own viability, endure without giving way, or use resources so that they are not depleted or permanently damaged.<sup>10</sup> In other words, it's the ability of a system to operate in such a manner that it is able to continue indefinitely. The United Nations has defined sustainability as “the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>11</sup> Others have defined sustainability as an expansion of the golden rule: “Do unto others, including future generations, as you would have done unto you.”<sup>12</sup>

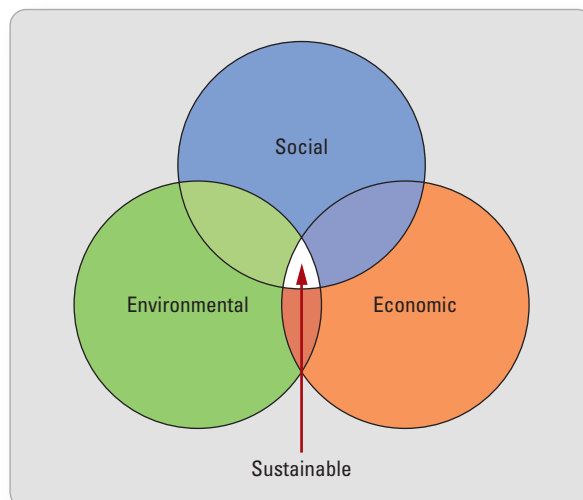
<sup>10</sup> [www.merriam-webster.com](http://www.merriam-webster.com); <http://dictionary.reference.com>

<sup>11</sup> 1987 World Commission on Environment and Development, [www.un.org/documents/ga/res/42/ares42-187.htm](http://www.un.org/documents/ga/res/42/ares42-187.htm)

<sup>12</sup> Gary Langenwaller, “Business Sustainability: Keeping Lean but with More Green for the Company’s Long Haul,” 2010, AICPA, Lewisville, Texas.

**EXHIBIT 1-8** The Three Pillars of Sustainability

As pictured in Exhibit 1-8, sustainability has three pillars: environmental, social, and economic. A company will be viable in the long run only if all three of these factors are considered when making business decisions. For example, a company will not be able to survive in the long run if the natural resources (e.g., air, water, soil, minerals, plants, fuel supplies, etc.) or people (e.g., suppliers, customers, employees, communities) it relies on are put in jeopardy. Thus, sustainability is also viewed as the intersection of all three factors, as pictured in Exhibit 1-9. As a result, many companies take into consideration a triple bottom line framework when making decisions. The **triple bottom line** framework looks at company performance based on the company's impact on (1) people, (2) the planet, and (3) the company's profitability. To move toward sustainability, companies are introducing "greener" ways of doing business that have fewer negative consequences for the earth's resources. They are also recognizing the need to be socially responsible by carefully considering how their business affects employees, consumers, citizens, and entire communities. Many companies have introduced means of giving back to their local communities by supporting local schools, employee volunteerism, and charities. Most of the leading companies in the world are now issuing corporate social responsibility (CSR) reports through which they communicate their social and environmental impacts. Businesses are now viewing sustainability and social responsibility as opportunities for

**EXHIBIT 1-9** Sustainability as the Intersection of Three Factors

innovation and business development. These initiatives not only allow a company to “do the right thing,” but they also can lead to economic profits by increasing demand for a company’s products and services and reducing costs.



In every chapter of this text, you will see a special section illustrating how management accounting can help companies pursue sustainable, socially responsible business practices. These sections will be marked with a green recycle symbol and will also point you to corresponding homework problems. In addition, Chapter 15 is devoted to sustainability, examining the reasons sustainability makes good business sense and the framework and methods companies use to measure and report on their social and environmental impact.

### Why is this important?

“SOX puts more pressure on companies, their managers, and their auditors to ensure that investors get financial information that fairly reflects the company’s operations.”

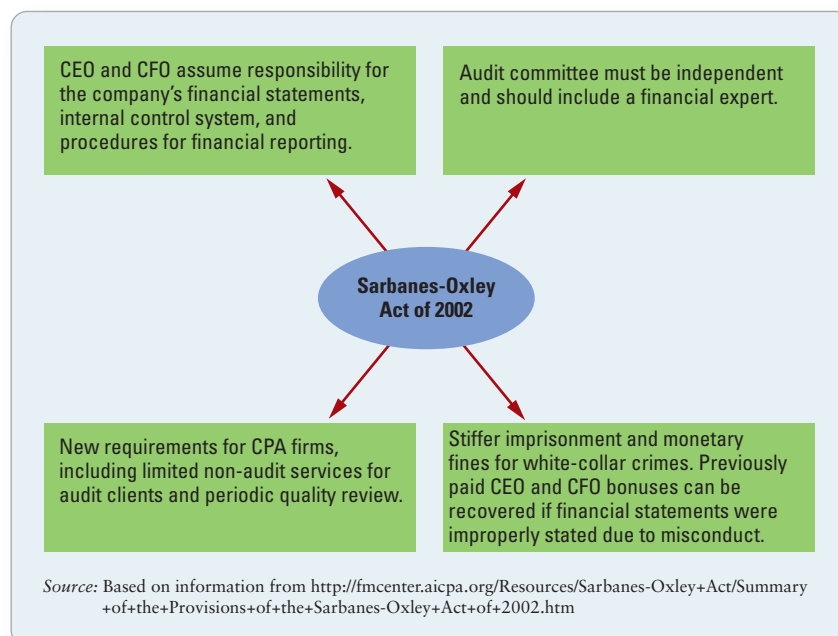
## The Sarbanes-Oxley Act of 2002

As a result of corporate accounting scandals, such as those at Enron and WorldCom, the U.S. Congress enacted the Sarbanes-Oxley Act of 2002 (SOX). The purpose of SOX is to restore trust in publicly traded corporations, their management, their financial statements, and their auditors. SOX enhances internal control and financial reporting requirements and establishes regulatory requirements for publicly traded companies and their independent auditors.

As shown in Exhibit 1-10, SOX requires the company’s CEO and CFO to assume responsibility for their company’s financial statements and disclosures. The CEO and CFO must certify that the financial statements and disclosures fairly present, in all material respects, the operations and financial condition of the company. Additionally, they must accept responsibility for establishing and maintaining an adequate internal control structure and procedures for financial reporting. The company must have its internal controls and financial reporting procedures assessed annually.

SOX also requires audit committee members to be independent; that is, they may not receive any consulting or advisory fees from the company other than for their service on the board of directors. In addition, at least one of the members should be a financial expert. The audit committee oversees not only the internal audit function but also the company’s audit by independent CPAs.

**EXHIBIT 1-10** Some Important Features of SOX





To ensure that CPA firms maintain independence from their client company, SOX does not allow CPA firms to provide certain nonaudit services (such as bookkeeping and financial information systems design) to companies during the same period of time in which they are providing audit services. If a company wants to obtain such services from a CPA firm, it must hire a different firm to do the nonaudit work. Tax services may be provided by the same CPA firm if pre-approved by the audit committee. The audit partner must rotate off the audit engagement every five years, and the audit firm must undergo quality reviews every one to three years.

SOX also increases the penalties for white-collar crimes such as corporate fraud. These penalties include both monetary fines and substantial imprisonment. For example, knowingly destroying or creating documents to “impede, obstruct, or influence” any federal investigation can result in up to 20 years of imprisonment.<sup>13</sup> Additionally, any previously paid bonuses must be recovered if CEO or CFO misconduct is uncovered.

Since its enactment in 2002, SOX has significantly affected the internal operations of publicly traded corporations and their auditors. SOX will continue to play a major role in corporate management and the auditing profession.



## Why and How Do Managers Use Data Analytics?


From sports to health care to business, the term *data analytics* is heard just about everywhere. But what exactly is data analytics, especially as it relates to managerial accounting? In this section of the chapter, we'll introduce foundational concepts related to data analytics. Then, at the end of every chapter, we'll provide an example of how data analytics can help solve a real managerial accounting issue related to the chapter topic. We'll also give step-by-step directions on how to use the analytical tool we've described. By the end of this course, you should possess fundamental knowledge and skills in data analytics that you can build upon in your future courses and ultimately, in your future career.

### The Heart of Data Analytics

At its core, **data analytics** is all about using data to make good business decisions. As you will see throughout the rest of this book, managerial accounting has always centered on collecting, summarizing, and analyzing data in order to make good business decisions. What, then, makes data analytics new and different from what has always been done in managerial accounting? The answer lies in the sheer amount and variety of data that are now collected and used for business decisions as well as the types of tools that are used for analysis. What started with pencil-and-paper calculations 100 years ago has continued to progress as technology has led us into the Digital Revolution. Never before, in the history of humanity, have such vast quantities of data been so economically feasible to collect, store, and analyze. And most businesspeople agree that in the future, even more data will be available for analysis, which will require even more sophisticated analytical tools. Regardless of the data or tools, the heart of data analytics will always center on turning raw data into actionable insights. In other words, the purpose of data analytics is to gain insights from data that management can act upon in order to advance the strategy and mission of the organization.

### Benefits of Data Analytics

Successfully harnessing the power of data analytics provides many benefits.<sup>14</sup> Decision making has always been part science and part art, with managers' instinct, experience, and judgment playing a role. However, data analytics add more fact-based information to the decision-making process, leading to data-driven decisions. For example, as a professor, I can take a guess at how long it will take students to complete different homework



**6** Describe foundational concepts in data analytics

**DATA ANALYTICS**

<sup>13</sup> Go to [www.AICPA.org](http://www.AICPA.org) to learn more about SOX.

<sup>14</sup> Data Analysis and Presentation Skills: the PwC Approach Specialization; [www.softwebsolutions.com](http://www.softwebsolutions.com); [www.teradata.com](http://www.teradata.com); [www.quora.com](http://www.quora.com)

problems in this textbook. But now, thanks to data analytics, I can actually see the average and median time spent by students across the country who have done the homework problems in MyAccountingLab as well as the percentage of students who completed the homework correctly. As a result, I use this fact-based information when I select the homework problems that I assign to my students. This homework data helps me set a realistic expectation of what students can accomplish in a certain amount of time. As another example, do you ever look at online reviews of products before buying them or restaurants before eating at them? If so, you are harnessing the power of data analytics to make your decisions.

Second, data analytics can help businesses make quicker decisions. As you go through this text, you'll see many examples of how Excel can improve the speed of analysis, which in turn should increase the speed with which decisions can be made. With so much competition in the global marketplace, speed can provide companies with a real competitive advantage.

Third, data analytics can increase the efficiency of internal operations. For example, some companies, like Walmart, Target, and the Cleveland Foodbank, use sensors to turn lighting on when a customer or employee is in the vicinity. Others use cell phone pings to adjust the heating and cooling of the physical environment based on how many people are adding body heat to the room. Both of these technologies save money and add to the company's sustainability efforts.

Fourth, data analytics can help companies better adapt and respond to customer's individual preferences by more specifically tailoring marketing efforts. For example, have you ever received a string of coupons from CVS or a grocery store after using your rewards card? Behind-the-scenes analytics causes the information system to automatically generate coupons for products that match your previous buying habits or habits of people like you. As another example, have you ever found a product on Amazon.com and at the bottom of the website seen the suggestion: "Customers who viewed this item also bought..."? This is another example of target marketing using data analytics.

Fifth, data analytics can drive company innovation and have a disruptive effect on existing industries. For example, think about the impact data-driven companies like Amazon.com, Uber, and Airbnb have had on brick-and-mortar retail stores, taxis, and hotels. No doubt drones, self-driving cars, and other technological innovations will have far-reaching effects that few have even dared to imagine.

## Data Analytics Process

Students preparing to enter the business world need to know how to frame and solve business problems using data analytics. Since data analytics is all about using data to inform decision making, the process generally starts with a business issue or question. The question will guide the rest of the process. While the process will vary, it generally follows the following sequence:

1. **Business issue:** What business question are we trying to solve?
2. **Data:** What types of data will we need to answer the question? How and where will we get the data?
3. **Tools and technology:** What types of tools and analysis are available and appropriate?
4. **Analysis and insights:** Obtain and clean the data and perform the analysis. Develop insights based on the analysis and potential action plans.
5. **Communicate:** Effectively communicate the insights and possible action plans, often using visualizations to simplify and summarize vast quantities of information.
6. **Follow-through:** Choose and implement action plan. Monitor results.

Many different data analytic tools are available. However, in this book we focus our attention on tools available in Microsoft Excel. Why? For two reasons. First, Excel is extremely prevalent in practice. It is used almost universally by most companies. Second, Excel is often referred to as the "gateway" analytics tool, meaning most businesspeople start by developing Excel skills and then, if needed, transfer those skills to other robust business intelligence software programs that are able to handle more lines of data, such as PowerBI,

SAS, Tableau, and Clickview. In this book, we will teach you, step-by-step, how to use some Excel data analytics tools. Learning these skills will help make you a more valuable intern and employee and set you apart from others who don't possess these skills. While technology will continue to change, the more you embrace this change and focus on becoming a lifelong learner, the better positioned you will be for a dynamic and fulfilling career.

## Different Types of Data

In general, **data** can be defined as a collection of observations. While not technically an “asset” on a company's balance sheet, as defined by generally accepted accounting principles (GAAP), many companies consider it something of value—especially if that data can be sold to other organizations or used internally to improve a company's profitability.

Data can be structured or unstructured. **Structured data** is data that is highly organized into predefined discreet categories, often contains labels, and is fairly easy to search and manipulate. Most of a company's financial data, which is often stored in ERP systems, is highly structured. For example, the company's sales records contain data organized into predefined categories such as date of sale, invoice number, customer name, customer number, product sold, quantity sold, price per unit, total sales revenue, and so forth. This type of data can be extracted from the company's database and manipulated using programs like Microsoft Access and Excel.

**Unstructured data** is essentially the opposite of structured data in that it is not organized into predefined categories. Examples of unstructured data include social media posts, digital photos, sensor data, satellite images, weather patterns, and so forth. Unstructured data is messy in comparison to structured data, which means that in the past, it was not cost-effective to analyze. However, new tools are being developed which make this type of data more cost-effective for companies to mine and analyze.

Finally, **semi-structured data** is somewhere in between unstructured and structured data. Often tags or markers are used to add structure to data that is inherently unstructured. For example, a “like” on a Facebook or Instagram post adds an element of structure to what would otherwise be considered unstructured data. Likewise finding a particular word in an email (like a company name) would add some structure to the data.

Data can also be from internal or external sources. Internal data could include structured data (like the sales records mentioned above) and unstructured data (such as emails between employees, footage from company surveillance cameras, sensor data on company products like smart appliances, and so forth). External data sources are almost limitless, including website hits, drones, satellites, cell phone pings, GPS tracking, social media posts, sensors, YouTube videos, and so forth.

Finally, data can be categorical (nominal), ordinal, or quantitative. **Categorical (nominal) data** represent things that have no numerical value (such as customer name, state, and distribution channel). **Ordinal data** has a clearly defined order and may or may not have numbers associated with it (such as customer satisfaction rankings and employee rank). Finally, **quantitative data** can be measured, counted, and aggregated (such as sales revenue, number of customers, and cost of product).

No doubt you have heard the term *big data*. **Big data** is a catchphrase used to refer to data that is often characterized by five Vs:

1. **Volume:** Incredibly large amounts of data
2. **Velocity:** Data collected extremely fast, often in real time
3. **Variety:** Many different types of data from many different sources
4. **Veracity:** Varying quality of data, in terms of the amount of bias, errors, and noise
5. **Value:** Varying degrees of usefulness to those with access to the data

Since this is an introductory-level course, all of the data analytics examples in the chapters will use structured data from an internal source. We are also going to assume that the data has been cleaned, meaning that errors, duplicates, or missing observations have been removed. In reality, cleaning externally sourced data is a big task that must be completed before the data is ready for analysis.

## Different Types of Analytics

Different types of analytics are used to address different business needs. We'll briefly describe the most common types of analytics.<sup>15</sup>

**Descriptive analytics** describe what has happened or is happening. This type of analytics is useful for understanding the current state. For example, when you go to the doctor's office, they'll start by taking your vital statistics: height, weight, blood pressure, temperature, pulse, and so forth. Each of these measures, or metrics, helps describe your current state. Likewise, in business, a company will often keep a running tally, or dashboard, of key statistics such as the defect rate, average customer response time, average number of products in the shopping cart, ratio of new to returning customers, and so forth. These statistics are often visually presented in terms of a dashboard where managers can continually see the current state of the business.

**Diagnostic analytics** help to uncover the root cause of the current state. For example, say you have a fever. The doctor will try to determine whether the fever is caused by a virus, a bacterial infection, or something else based on other observations, like listening to your lungs or looking in your sinus cavity or ears. In business, a company might use diagnostic analytics to uncover *why* the current customer response time is slow. It might be due to inadequate staffing, breakdown in communication, low inventories, or some other reason. Diagnostic analytics help shed light on the root cause of the problem.

**Predictive analytics** seek to predict what will happen in the future. For example, the doctor may predict that you'll feel lousy for five days and then start feeling better. His or her prediction is based on other, similar cases. In business, companies can use predictive analytics to build models that will predict the future state. These predictions can be based on current conditions or hypothetical adjustments to the current operations.

**Prescriptive analytics** seek to determine what should be done. For example, if the doctor says you have a bacterial infection, he or she will generally prescribe antibiotics to rid your body of the bacteria. On the other hand, if the doctor says you have a virus, he or she will only prescribe medications to help alleviate your symptoms but not rid you of the virus. The same is true in business: prescriptive analytics help guide managers to what they *should* do to make the business more profitable.

**Adaptive and autonomous analytics** collect and analyze data, learn, and adjust without human intervention. For example, the Nest Learning Thermostat learns your routine comfort settings over time and will automatically cool and heat your house based on its "learned" settings.

As a second example, has your credit card number ever been stolen and used for fraudulent purposes? Since the credit card companies can be on the hook for any fraudulent charges made on your card, they have incentive to build very sophisticated analytical models that can detect potential fraudulent charges based on your buying habits and the buying habits of people like you. If the system detects an anomaly (a potential fraudulent charge), it will notify you via text and email within minutes so that you can verify or deny the legitimacy of the purchase before any more charges can be made on the card. The model "learns" and improves from your response. All of this is automated, without any human intervention other than your electronic confirmation or denial of the purchase.

As a final example, the MyStudyPlan and Dynamic Study Modules that are packaged with MyAccountingLab will automatically adjust the problems given to you based on your performance on other problems. In addition, the Dynamic Study Modules take into consideration your self-described confidence level on your answers to previous questions. Based on your responses, it will automatically adjust the questions given to you.

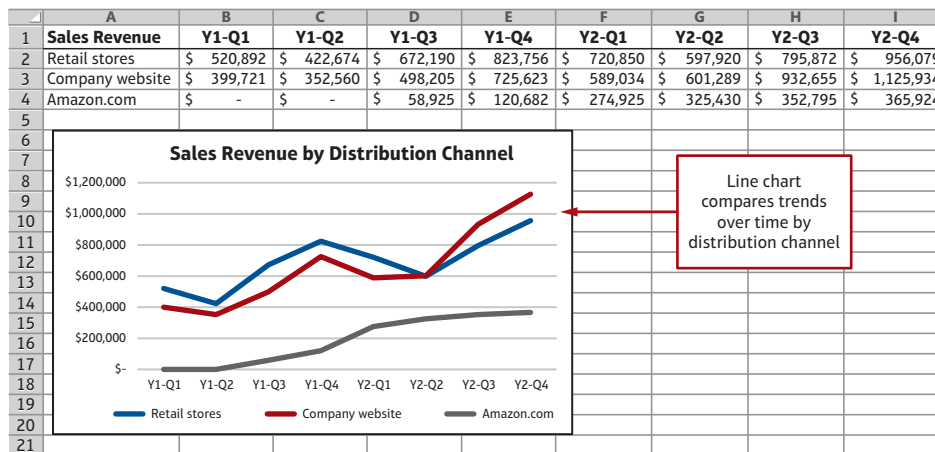
In summary, data analytics can help to describe what happened, why it happened, what will happen next, and what should possibly be done about it. The insights garnered can help guide management decisions and actions.

<sup>15</sup> Data Analysis and Presentation Skills: the PwC Approach Specialization; DataIQ.com; Acagild.com.

## Data Visualization

**Data visualization** is the art and science of communicating quantitative information through visual presentations.<sup>16</sup> Visualization is a common part of data analytics as it provides a visual format for summarizing vast quantities and varieties of information so that people can analyze, interpret, and observe patterns and relationships and make inferences based on the data. Visualizations range from simple bar charts, line charts, and scatter charts to more complex or unique presentations, such as choropleth maps and box and whisker charts. The point of visualizations is not to dazzle the reader with complex, colorful displays but rather to faithfully represent the data in such a way that the intended audience can readily draw meaningful and accurate conclusions from the depictions.

But why visualize data rather than simply present the data in numeric and/or text format? The answer lies in the fact that our brains process pictures faster than words, which is confirmed by the adage “a picture is worth a thousand words.” Visualizations make use of **preattentive attributes**, which are things our brains process in milliseconds before we actually pay attention to anything else.<sup>17</sup> Some examples of preattentive attributes include, color, length, width, size, shape, hue, position, and spatial groupings. All of these features of visualizations, if done properly, allow the viewer to quickly see patterns and anomalies or make comparisons. However, if used improperly, they can also mislead the viewer. In the following visualization, notice how much easier it is to see the patterns in the line graph than to see patterns in the numeric data.



Whole books have been written on how to create effective visualizations.<sup>18</sup> Here, we only wish to introduce you to the idea of visualizations and alert you to a few common pitfalls. First, keep the audience and purpose for the visualization in mind. There is no such thing as a perfect visualization, and every person will have his or her own preferences. However, it's best to keep visualizations simple and always representative of the facts. Don't over-decorate or over-clutter with color, text, decimal places, gridlines, 3D displays, or other unnecessary features that distract from the central focus of the story that you are trying to convey. The goal of every visualization is to present the facts in a way that is easy for the viewer to see and understand.

Second, although colors are commonly used in visualizations, approximately 8% of men and 0.5% of women suffer from color-blindness, or CVD (color vision deficiency),

<sup>16</sup> Valerie Sue and Matthew Griffin, *Data Visualization and Presentation with Microsoft Office*, SAGE Publications, Los Angeles, CA, 2016.

<sup>17</sup> Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave, *The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios*, John Wiley & Sons, Hoboken, NJ, 2017.

<sup>18</sup> See, for example, footnotes 16 and 17.



which prevents them from distinguishing certain colors in the same way as the rest of the population. For people who suffer with CVD, the colors red and green are especially difficult to distinguish from the other, so it is best to avoid using the “stoplight colors” in visualizations.

Third, although pie charts are commonly used, they are actually a poor type of chart to use. Why? Because the brain has difficulty accurately estimating the size of the slices in the chart due to the angles and orientation of the wedges. If a pie chart must be used, always include the percentage label with each slice. Bar charts are a much better option since length is one of the most efficient visual attributes for the brain to process.

## Summary

Now that you know some of the foundational concepts in data analytics, you may be wondering how all of this fits into an introductory class. While we’ll just be able to scratch the surface of data analytics, we’ll do so in the context of every chapter topic. Specifically, in the last learning objective of every chapter, we’ll introduce you to a business issue, problem, or question that could be addressed through data analytics. We’ll then show you a specific tool in Excel that could be used to help guide managers’ decisions. Since you’ll be using Excel, the next section of this chapter provides an overview of Excel’s fundamental features. You may already be familiar with Excel, but if not, you should find the following section to be a useful learning aid and reference guide.

## What Are the Fundamental Excel Features?

While many data analytics tools exist, Microsoft Excel is the most widely used. Excel is often described as the gateway to other more advanced data analysis tools. In other words, before you learn other data analytics tools, you should gain a working knowledge of Excel. By learning how to navigate, manipulate, summarize, analyze, and visualize large data sets, you will make yourself more marketable to potential employers. Once you have the basic Excel skills down, you’ll be able to transfer many of those skills to more advanced tools such as Power BI and Tableau. If you are new to Excel, don’t worry. We think you’ll have fun as you learn new skills that will be invaluable as you prepare for your future career.

**7** Describe fundamental Excel features and perform basic Excel operations

## Elements of an Excel Workbook

Before we get started, we recommend that you download the latest version of Excel available from your university’s software website. We’ll be using Windows Excel 365 for our screenshots. If you are a Mac user, any differences in keystrokes will be described in the text.

Exhibit 1-11 shows a screenshot of what you’ll see when you open an Excel 365 workbook. If you are using a different version of Excel, it will be similar but not identical.

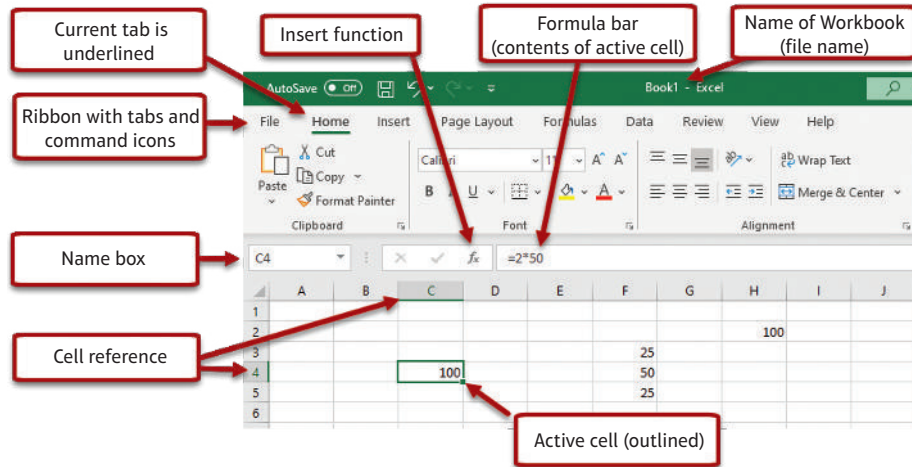
The top bar is called the **ribbon**. Within the ribbon, you’ll see various **tabs**, such as **File**, **Home**, **Insert**, **Page Layout**, **Formulas**, **Data**, and so forth. Each tab has a unique set of command icons, which are shown below the tabs. For example, under the **Home** tab, we see icons related to the clipboard, font, alignment, and so forth. Along the top center of the ribbon, you’ll see the name of the workbook, which will just be called “Book 1” until you save the workbook and give it a different file name.

A **workbook** is composed of one or more worksheets. As shown in Exhibit 1-11, an Excel **worksheet** is made up of rows and columns. Notice that each row in the worksheet is numbered, whereas each column is headed by a letter. As a result, each cell in the worksheet has a unique address, or **cell reference**. You **select**, or activate, a cell by clicking your cursor on it, as we

### Why is this important?

Employers expect entry-level accounting and finance professionals to possess basic Excel skills, including the ability to manipulate and analyze large data sets.



**EXHIBIT 1-11** Top of an Excel Workbook

have done with cell C4. You'll know which cell is the **active cell** in two ways: (1) it will have a colored border around it, and (2) the cell reference will appear in the **name box**. The name box is below the ribbon, on the left side of the worksheet.

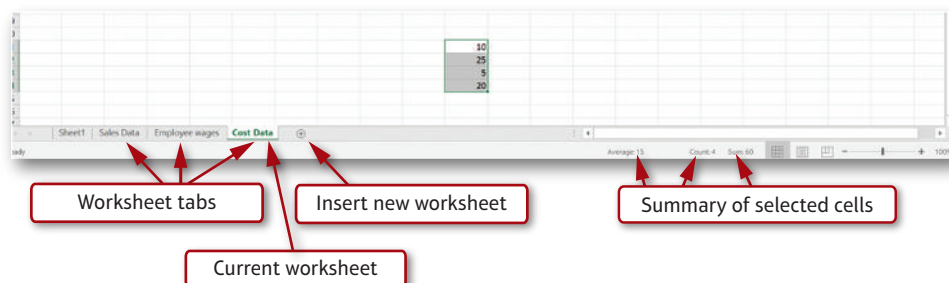
To the right of the name box, you'll see the **insert function** button, which is a short-cut to all of Excel's predefined functions. Further to the right, you'll see the **formula bar**, which displays how the content of the active cell was generated.

For example, we see that the value in cell C4 is 100. We could have generated this number by:

- Typing a number in cell C4 (for example, 100),
- Using a mathematical formula in cell C4 (for example,  $=2*50$ ),
- Using a predefined function in cell C4 (for example, the sum function  $=SUM(F3:F5)$ ), or
- Referencing a different cell in cell C4 (for example,  $=H2$ ).

The formula bar shows that the content of C4 was generated by multiplying 2 times 50. We'll explain how the mathematical formulas and functions work later, but for now, it's important for you to know that the formula bar shows exactly how the value in the active cell was generated.

Now let's look at the bottom of the workbook, as pictured in Exhibit 1-12. Notice three things. First, there are separate tabs for each **worksheet** in a workbook. For example, we have separate worksheets for sales data, employee wages, and cost data. More worksheets can be added to this workbook using the circled plus symbol to the right of the tabs. The default name for a worksheet is Sheet 1. You can give your worksheets more specific names, such as "Sales Data," by right-clicking on the worksheet tab and then choosing "**rename**" to customize. To move between worksheets, simply click on their tabs. To change the order of the worksheets in the workbook, simply drag and drop the worksheet tab to a different location. For example, we could drag Sheet 1 and drop it after the Cost Data tab.

**EXHIBIT 1-12** Bottom of an Excel Workbook

Selecting Cells

Often you'll want to select a whole range of cells as we did in Exhibit 1-12 rather than just one cell. To select more than one cell in a range, simply click on the first cell in the range and drag your cursor to the final cell in your specified range. For example, in Exhibit 1-12, you can see that we have selected cells containing the numbers 10, 25, 5, and 20. We can tell they have been selected because they have a colored border around them and all but the active cell have been shaded.

The mathematical summary of the selected cells is displayed at the bottom right of the worksheet: Average (15), Count (4), and Sum (60). These summaries are handy if you need to get quick statistics on a range of cells in your worksheet

While dragging the cursor to select cells works, it is not efficient when you have a very large data set. To select a large range of data, follow the keystrokes shown in Exhibit 1-13.

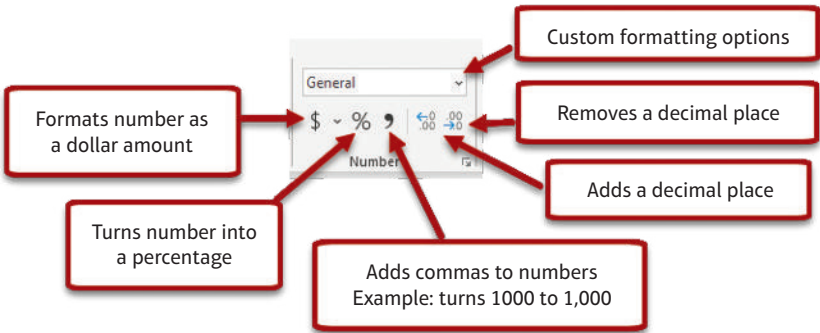
EXHIBIT 1-13 Selecting a Large Range of Data

To Select...	Place Cursor on...	Hold Down These Keys Simultaneously
Whole column of data	Top cell of the column	Ctrl + Shift + arrow down key
Whole row of data	First column of the row	Ctrl + Shift + arrow right key
Whole data set	Any cell within the data set	Ctrl + A (think A for All)

Formatting Cells

As shown in Exhibit 1-14, a set of icons under the **Home** tab provides shortcuts for formatting the numbers in each cell to look a particular way. This is handy because you should always type in numbers without any particular formatting (example: 49235) and then use the formatting icons to change the way the numbers look on the worksheet (example: \$49,235.00). The formatting icons allow you to add or delete additional decimal places, add commas to make large numbers easier to read, change a number to a dollar amount, or turn numbers into percentages. First, select the cells you want formatted, and then click on the appropriate icons. Alternatively, after selecting the cells, choose a particular format, such as currency, from the list of custom formatting options.

EXHIBIT 1-14 Formatting Numbers in Cells



Finally, if you ever get a series of hashtags in a cell (#####), it means that the number is too wide for the current column width. You can easily adjust the width of any column by dragging the vertical line separating the columns. Or you can automatically adjust the width of the column to the necessary size by double-clicking the line separating the columns header (A, B, C, and so forth) at the very top of the columns.