

Data and Analytics in the Accounting Profession

Chapter Preview

Changes in data and technology are impacting the role of accountants in all areas of accounting. The accountants of the future must be agile, creative, data and technology literate professionals. They will be critically thinking problem-solvers who can use technology and data to drive business understanding and change. They need to “think outside the box” to create value using data and analyses. This chapter is an overview of how these changes are happening, the types of data and analytics new graduates are likely to encounter, and the skills they need to be successful in this changing environment.

Professional Insight: Why Does Data Analytics Matter for Your Career?

This chapter previews data and analytics in the accounting profession and the related skills needed for your future accounting career. Some quotes from leaders at two of the world’s largest accounting firms put the importance of these skills into perspective.

Roger O’Donnell, Global Head of Data and Analytics, in KPMG’s auditing practice:

Technology is not displacing accountants; rather, it is augmenting their technical proficiency as well as their **critical thinking and problem-solving skills** to make more insightful decisions, reducing the risks and increasing the efficiency of producing financial statements and tax filings... **But there’s a growing need for accounting students to learn how to harness and analyze financial and accounting data, as it can greatly enhance their abilities.**¹

Patty Pogemiller, Managing Director of Global Talent Experience for Deloitte:

Problem solving skills are essential in a client business like professional services. Employers are looking for people who demonstrate an ability to think analytically and approach a problem in a structured and methodical way. Can they objectively analyze and solve an issue? And once they have a solution, they must have the ability to communicate it to others – their clients, managers and fellow team members.²

¹Forbes (2019). The next generation accountant. <https://www.forbes.com/sites/insights-kpmg/2019/04/29/the-next-generation-accountant/?sh=57090091ae67> (accessed April 2022).

²U.S. News & World Report. What is an accountant? <https://money.usnews.com/careers/best-jobs/accountant> (accessed April 2022).

Chapter Roadmap

LEARNING OBJECTIVES	TOPICS	APPLY IT
LO 1.1 Summarize how advances in data and technology are impacting accounting professionals.	• Data and Technology • Analytics and Accounting Professional Practice	Match Data Analytics to Accounting Areas
LO 1.2 Describe the stages of the data analysis process.	• Stage 1: Plan • Stage 2: Analyze • Stage 3: Report • MOSAIC: Putting it All Together	Explain the Data Analysis Process for a Fraud Risk Assessment (Example: Auditing)
LO 1.3 Identify the skills necessary to perform data analyses.	• Critical Thinking • Data Literacy • Technology Skills • Communication Skills	Evaluate the Relationships between Skills and Tasks (Example: Tax Accounting)
LO 1.4 Explain how to apply a data analytics mindset to the data analysis process.	• Understand the Stakeholders • Identify the Purpose • Consider Alternatives • Assess Risks • Identify Knowledge • Perform Self-Reflection • SPARKS: A Critical Thinking Toolkit	Integrate Critical Thinking with the Data Analysis Process (Example: Auditing)

Data The Data tag appears in the chapter when the data for an example, illustration, or application are available on Wiley’s online learning platform.

Data analytics software is continuously changing, and there may be more recent versions of the software referenced in this chapter. For more information access the accompanying video on Wiley’s online learning platform.

1.1 How are Data and Analytics Transforming the Accounting Profession?

LEARNING OBJECTIVE 1

Summarize how advances in data and technology are impacting accounting professionals.

This is an exciting time to enter the accounting profession! New, user-friendly technology allows accountants to complete accounting functions, such as creating journal entries and preparing financial statements and reports, in a fraction of the time they used to take. Because these repetitive accounting functions can be automated, accountants can focus on activities that add value to their organizations, such as evaluating controls, providing financial insights, and performing analyses to aid in business decision-making.

This evolution of the accounting profession is also reflected in the professional certification exams required to practice in the field:

- The Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams now include the topic of data analytics.
- Beginning in 2020, the Institute of Management Accountants (IMA) added a “Technology and Analytics” section to the CMA exam. The IMA stated that the changes were implemented to “make the exam more relevant to the current job market.”
- The American Institute of Certified Public Accountants (AICPA), in a joint effort with the National Association of the State Boards of Accountancy (NASBA), launched the CPA Evolution in 2021. The CPA Evolution is a change in the CPA licensure model to “recognize the rapidly changing skills and competencies the practice of accounting requires today and will require in the future.”³ While the current CPA exam already includes data analytics, the new exam format, which will be implemented in 2024, will include more technology and data analytics in both the core and the discipline exams.

Data and Technology

As these changes to accounting professional exams show, data, analytics, and technology are changing the accounting profession. But what *are* data and analytics? Note the separation of the words “data” and “analytics.” While it is often referred to simply as “data analytics,” each is its own element—and it is important to think about them separately. Performing data analytics includes identifying both the data necessary for the analysis and the appropriate analysis method.

Data are raw figures and facts. Technology helps convert that data to **information**, which is the knowledge gained from the data. For example, sales transaction data will include the date sold, the product purchased, quantity sold, and price for each sale. We can get information such as the total sales by product by summarizing the data (multiplying quantity sold by price) by product. **Data analytics** is the process of analyzing raw data to answer questions or provide insights.

The emergence of **self-service business intelligence (SSBI) software** has fostered the increased use of data and analytics. SSBI is now readily available and accessible by all business users. There are two key features of SSBI software:

- It provides extended data processing capabilities for preparing data, analyzing data, and reporting data analysis results.
- It is easy to use. No degree in computer science is required!

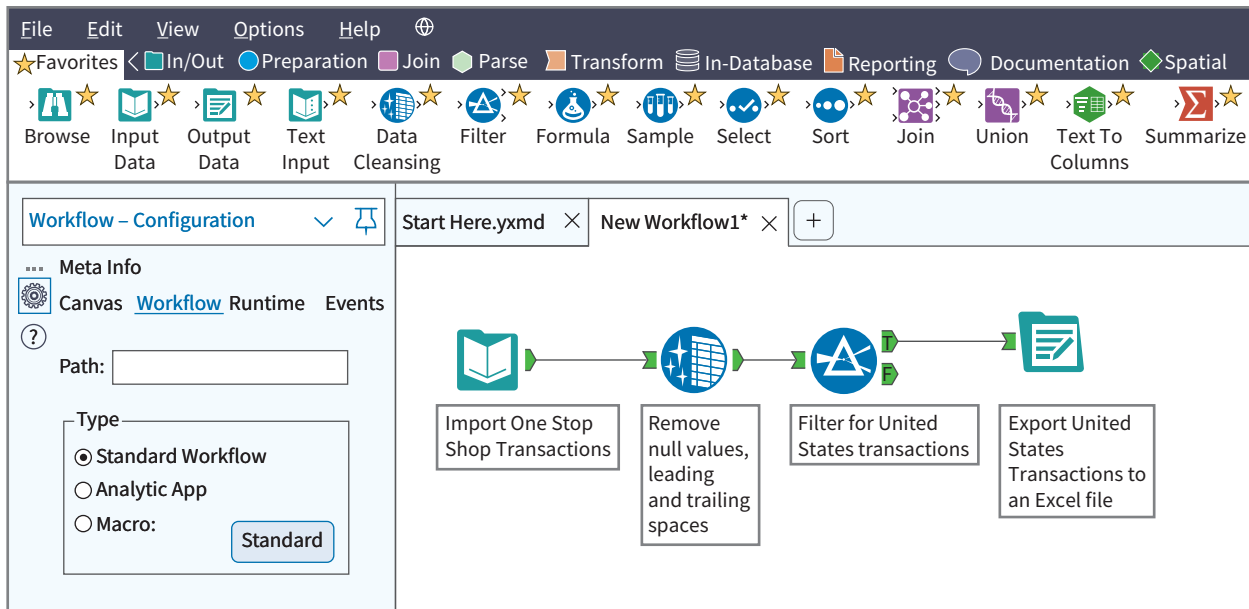
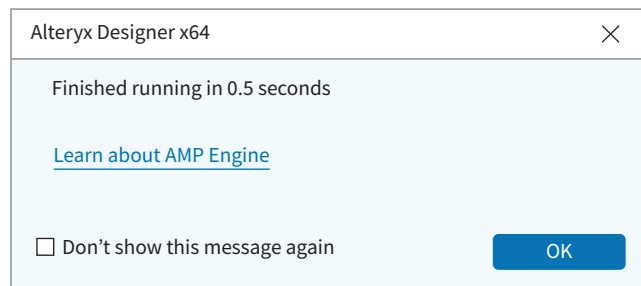
Several excellent SSBI tools are available, including Alteryx, Microsoft Excel, Power BI, and Tableau. These tools allow all businesses to be successful in the new data environment. **Illustration 1.1** is an example of the SSBI software Alteryx. Alteryx lets users quickly design workflows that access, manipulate, analyze, and output data. Like all SSBI software, the interface is user-friendly and does not require knowing how to program.

The workflow in Illustration 1.1 imports, cleans, filters, and exports results. In this example, the user wants to do an analysis of U.S. transactions for a company. The workflow begins with an import of an Excel spreadsheet of all transactions. Next, the data is cleaned to remove null values and leading and trailing spaces. A **null value** indicates an unknown or missing value. (Later in the course you will learn the importance of cleaning data prior to analysis). Once the data are cleaned, they are filtered to separate transactions made in the United States from transactions made in other countries. **Illustration 1.2** shows how long (run time) it took for the software to complete the workflow.

It took only 0.5 seconds to import, clean, filter, and export over 2,000 rows of data. Software such as Alteryx can save accountants countless hours of tedious work.

The growing availability of data, the techniques and tools used to create value from them, and the ease with which these tools can be used have impacted how accountants, from auditors to financial accountants, do their jobs every day.

³CPA Evolution. <http://www.evolutionofcpa.org>.

ILLUSTRATION 1.1 Alteryx Software Workflow Example**ILLUSTRATION 1.2** Alteryx Workflow Run Time

Analytics and Accounting Professional Practice

Using self-service business intelligence tools has empowered accountants in different practice areas to use data and analytics to provide value-added services to their clients and employers.

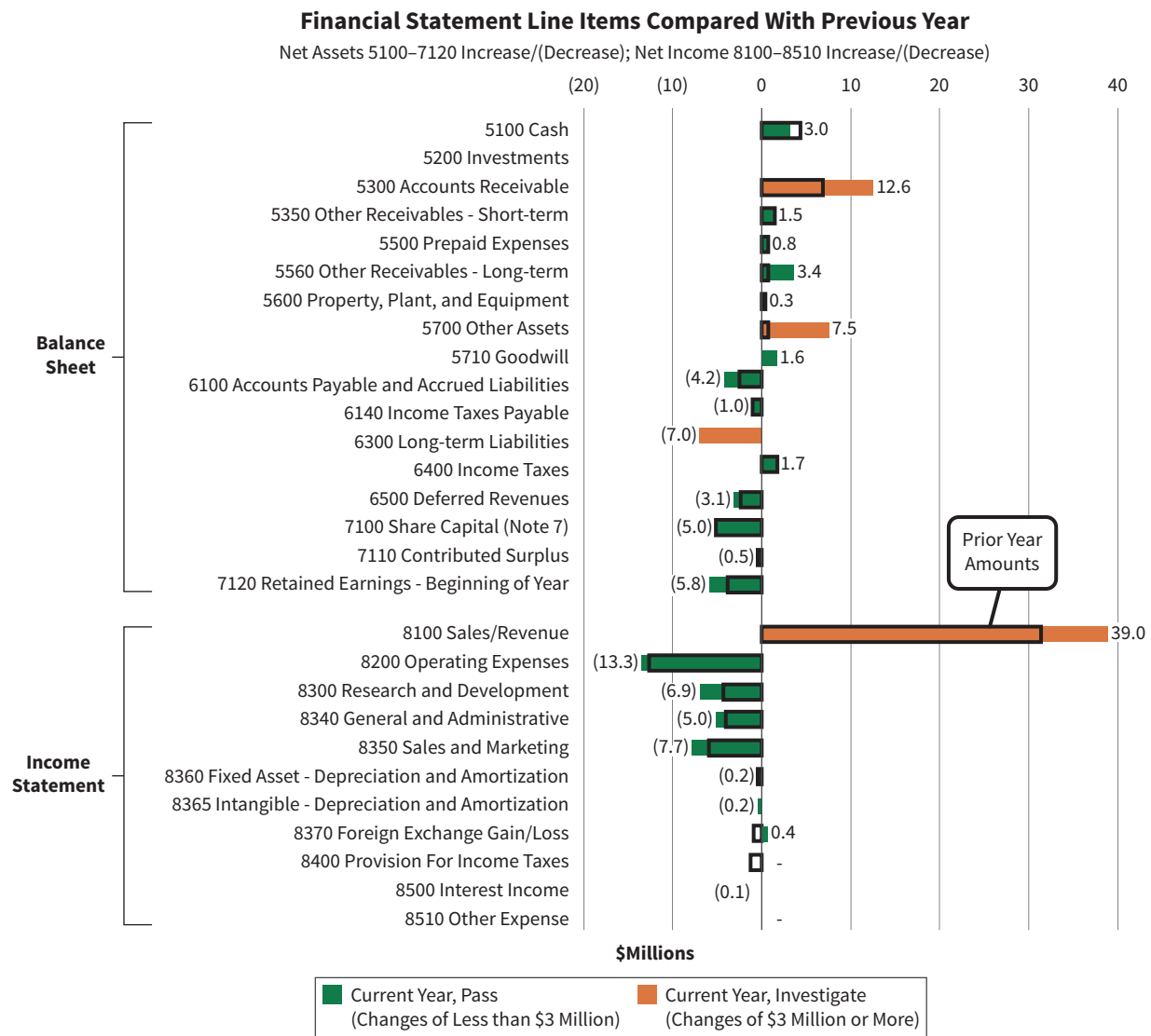
Auditing

The use of analytics in the audit profession is growing:

- Audits have expanded beyond sample-based testing to include analyses of entire populations of audit-relevant data.
- Auditors can review entire data sets to identify all exceptions, anomalies, and outliers.
- Data driven audits reduce the time the client spends gathering information for the auditor and allows more time for the analysis, making audits a better experience for everyone involved.

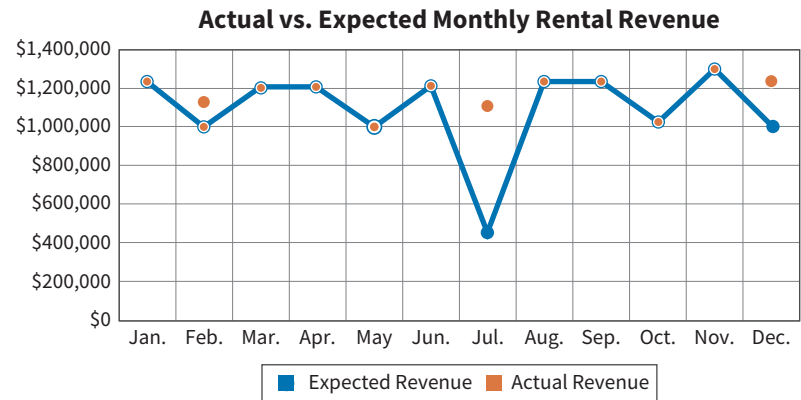
Both internal and external auditors use analytics to perform risk assessment and substantive procedures. **Illustration 1.3** is an example of how analytics are used to perform risk assessment by showing the increase or decrease in each general ledger account for the current and prior year. Notice that the visual includes prior year amounts by showing them enclosed in a black border. The green bars represent current year amounts that are less than \$3 million. The orange bars represent the current year amounts that are more than \$3 million and should be investigated further. This type of analysis helps the auditor quickly identify the accounts that appear to have a higher risk of misstatement, so they can investigate further.

ILLUSTRATION 1.3 Audit Risk Assessment Example



In addition to risk assessment, auditors can use data analytics to perform substantive analytical procedures that support the assertion that the financial records of an entity are complete, valid, and accurate. **Illustration 1.4** is an example of this using **data visualization**, which is the graphical representation of information and data.

ILLUSTRATION 1.4 Substantive Analytical Procedure Example



The example in Illustration 1.4 used data visualization to compare expected and actual revenue to identify if any months require additional analysis. It shows that actual revenue was higher than expected in February, July, and December, so the auditor may decide to focus on those three months for additional testing.

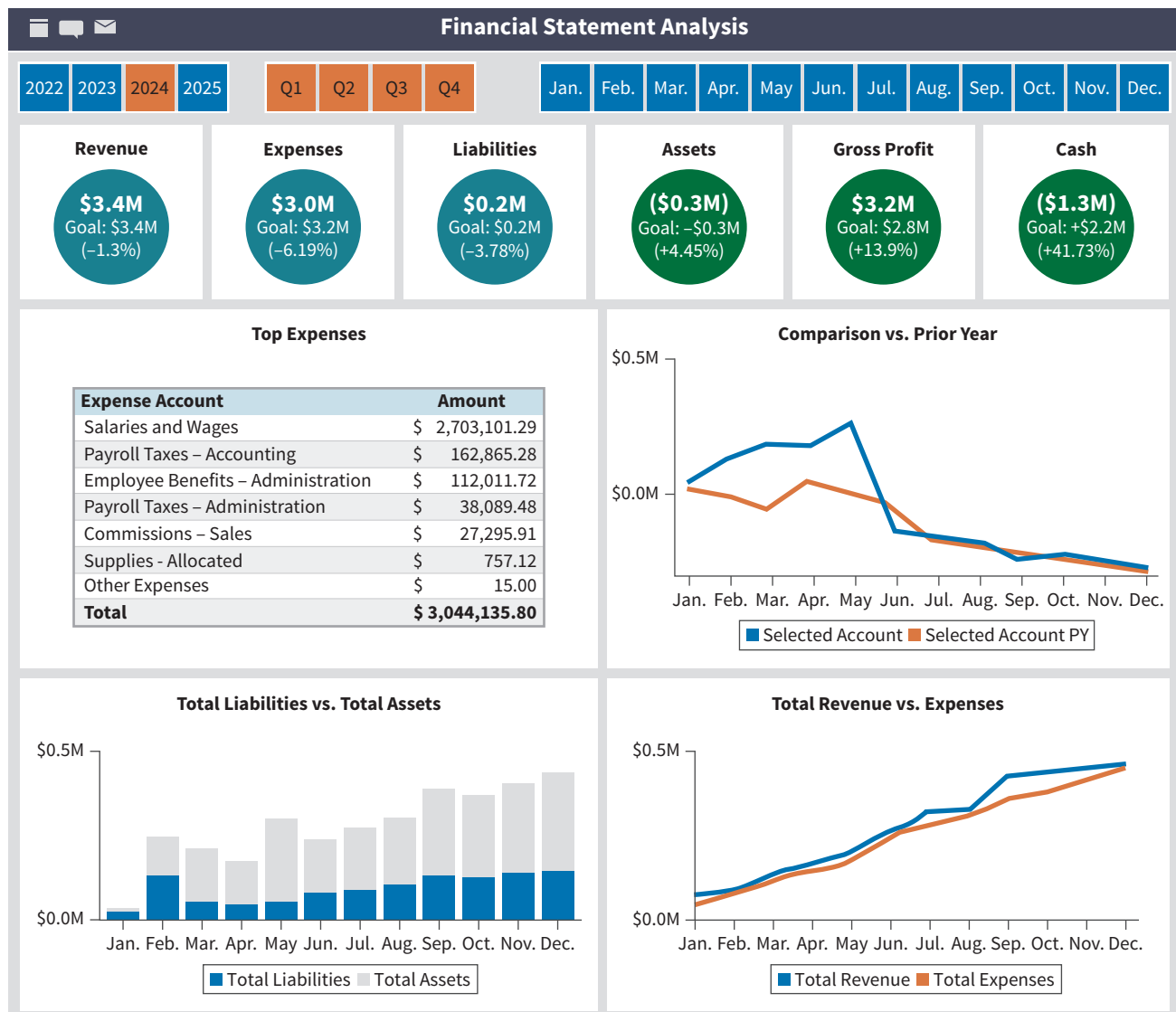
Auditing procedures are also changing. Since many firms are investing in robotic process automation software (RPA) and analytics automation software to automate manual audit tasks, auditors can focus on analysis and providing valuable insights.

Financial Accounting

The role of financial accountants is also shifting. As in auditing, changes are related to both automation software (RPA and analytics automation software) and SSBI software. Using automation software to perform routine financial accounting functions such as recording journal entries, creating trial balances, doing preliminary account analyses, and creating financial statements lets accountants spend more time analyzing data for insights.

SSBI software lets financial accountants perform analytics and create financial dashboards to support decision-making. A **dashboard** is a graphical user interface that shows key performance indicators for an organization. **Illustration 1.5** is an example of the types of insights financial accountants can find using data—in this case, a dashboard that can monitor financial performance.

ILLUSTRATION 1.5 Financial Statement Analysis Dashboard



This dashboard brings together analyses of different elements of the financial statements. Users can quickly see key performance indicators that provide insight into overall business performance:

- The dashboard information can be viewed by year, quarter, or month using the tabs across the top.
- The top row is a snapshot of how revenue, expenses, liabilities, assets, gross profit, and cash compare to goals.
- The visualizations in the dashboard provide an analysis of revenue and expenses, total assets and total liabilities, and a visualization that allows the user to choose an account to view compared to the prior year.
- Finally, the table in the top left of the dashboard provides the top expenses incurred by the company.

Frequently used in business, dashboards are a useful tool to communicate key information to everyone who needs it.

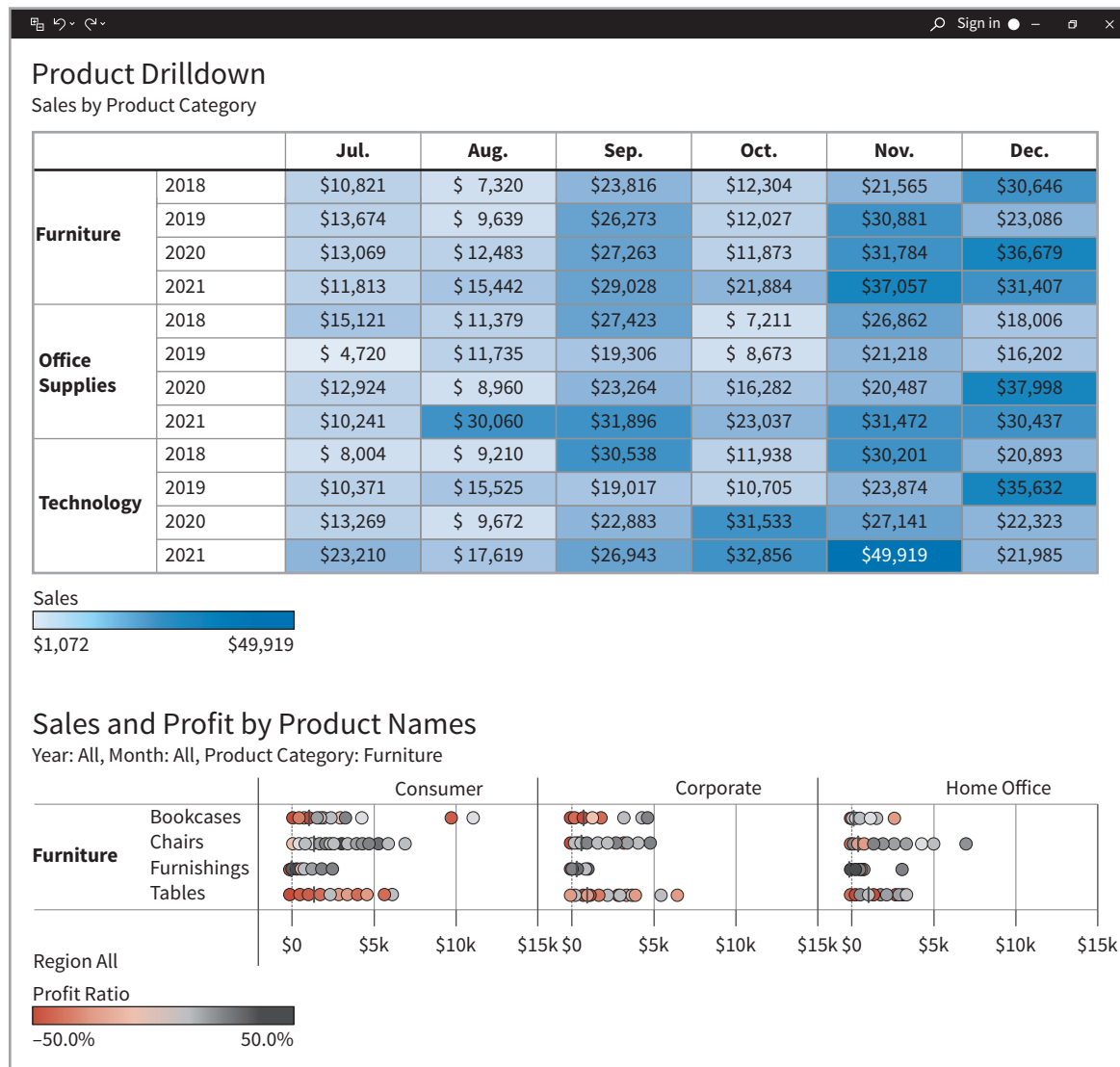
Managerial Accounting

While financial accountants analyze financial statements for external reporting, managerial accountants deal with internal reporting and performance analysis. With SSBI software, management accountants can more easily use data to help identify and manage risks, improve budgeting and forecasting (by using more data), and automate internal reporting. SSBI software can also help identify operational improvements and create dashboards of key performance indicators (KPI).

Illustration 1.6 is a dashboard that provides analysis of product sales and profit for an office supply company:

- The top visualization in the dashboard is called a highlight table. The colors are on a scale from light to dark. Darker colors indicate higher sales and lighter colors indicate lower sales. User can quickly locate high performing and low performing products. For example, the darkest color is technology sales in 2021 in the month of November.
- The bottom visualization in the dashboard provides both sales and profit margin information by product and subcategory. The colored dots represent individual sales to customers by total amount. The color of the dots indicates the profit ratio on each sale. The color scale of profit ratio ranges from negative 50 percent (dark red) and positive profit ratios up to 50 percent (dark black).

This product dashboard provides management with real-time updates of sales and profit information, enabling management to identify and respond to possible issues quickly. For example, customers with negative profit ratios can be investigated immediately.

ILLUSTRATION 1.6 Product Performance Dashboard

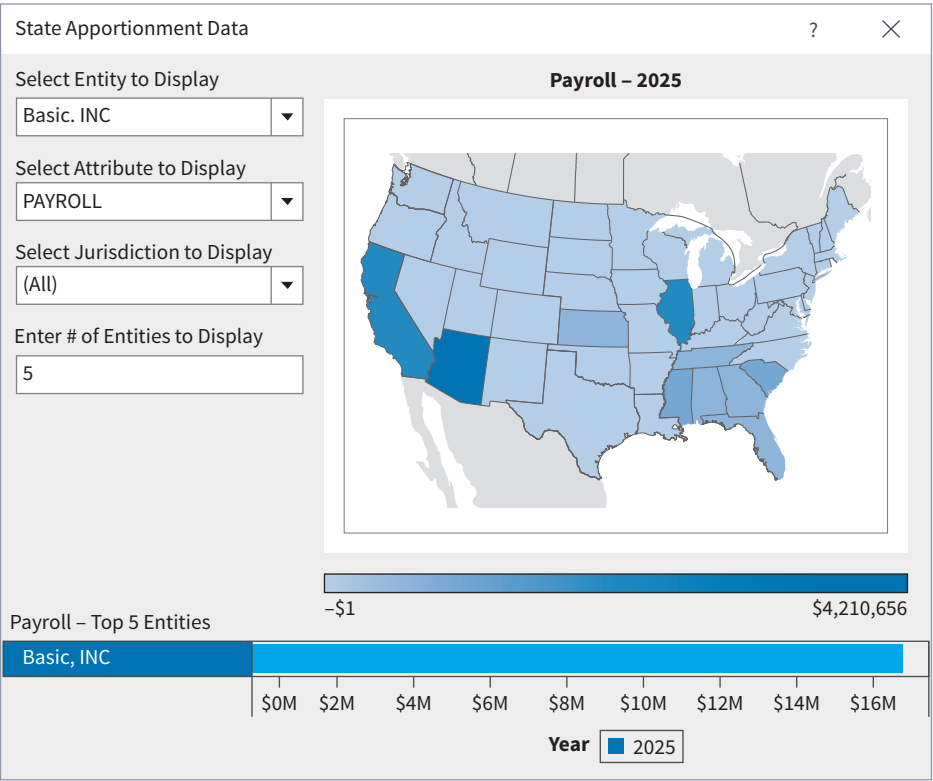
Tax Accounting

Data analytics can also be used to analyze tax efficiency of business units, identify tax opportunities, and aid in evaluating global opportunities:

- Data analytics is used to help with tax compliance.
- Automation of data gathering for tax compliance can help speed the process, leaving the tax accountant with more time to do tax analysis and planning.
- Tax dashboards can help organizations monitor real-time tax positions.

Illustration 1.7 is a tax dashboard that uses data visualization to dynamically portray state tax information to help tax professionals monitor the organization's tax position. The menus at the top left let the user interact with the data to drill down to the supporting detail. Users can pick the corporate entity, the type of taxes, the jurisdiction (state), and how many entities to show. The visualization on the top of the dashboard is an overview of payroll taxes by state for the chosen entity. The bottom visualization shows the total amount of payroll taxes.

ILLUSTRATION 1.7 State Income Tax Dashboard



Of course, these examples\analytics being used in the accounting profession are dependent upon the accountant not only understanding the relevant accounting knowledge, but also having the ability to use the available tools.

Apply It 1.1
Match Data
Analytics to
Accounting Areas



You are a new hire at a large regional CPA firm called Castillo, Flowers, & Welch (CFW). With approximately \$94 million in annual revenue, the firm has 16 offices, 83 partners, and 484 employees. CFW provides accounting, advisory, assurance, and tax services:

- Accounting services include financial statement preparation and services such as bank account reconciliation, payroll tax filings, and maintenance of general ledgers (financial accounting).
- The advisory group specializes in helping clients understand their financial position so they can better manage their business. Services include cash flow analysis, budgeting, industry benchmarking, and key performance indicator reporting (managerial accounting).
- The assurance services include audit services and fraud risk assessment (auditing).
- Tax services provided by CFW include tax preparation, estate planning, state and local tax consulting, and sales and use tax consulting (tax accounting).

CFW is considering increasing their use of data analytics. They want to use data analytics both within the firm and to provide value-added services to their clients. Identify how CFW can apply data analytics in their accounting, advisory, assurance, and tax services areas, both internally and for their clients.

Area	Internal	For Clients
Financial Accounting		
Managerial Accounting		
Auditing		
Tax Accounting		

SOLUTION

Area	Internal	For Clients
Financial Accounting	Automate routine tasks. Create dashboards to monitor firm performance.	Automate preparation of bank reconciliations, tax filings and general ledger maintenance. Create dashboards so clients can monitor their financial performance.
Managerial Accounting	Create dashboards to monitor projects and profitability.	Use data analytics to help clients better understand their performance. Create dashboards with KPIs for clients.
Auditing	Automate routine audit tasks.	Use data analytics to perform risk assessment and substantive procedures.
Tax Accounting	Automate routine tasks.	Create analyses and dashboards to monitor and evaluate tax compliance and tax planning.

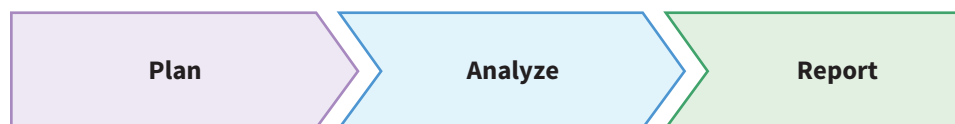
1.2 What are the Stages of the Data Analysis Process?

LEARNING OBJECTIVE 2

Describe the stages of the data analysis process.

Regardless of the area of accounting, accountants follow a data analysis process comprised of three equally important stages (**Illustration 1.8**).

ILLUSTRATION 1.8 The Data Analysis Process



Following a data analysis process helps assure that data analyses are performed efficiently and effectively. There are specific chapters devoted to each stage, but we use a high-level example here to introduce the process.

One Stop Shop (OSS) is a wholesale distributor for convenience stores. A wholesale distributor buys products from suppliers in large quantities and then sells the products to retailers for a slightly higher price, keeping the difference as profit. Since its humble beginnings in 1888 in San Francisco, California as a general store, OSS has grown into one of the largest distributors of consumer goods in North America. OSS has the same goal today as it did over one hundred and thirty years ago—to provide customers with quality goods and fast service.



Today, OSS operates in Canada, Mexico, and the United States. The company has 15 regions (5 regions in each country) and 30 distribution centers. OSS distributes products from the following categories:

- Baby food
- Beverages
- Cereal
- Clothes
- Cosmetics
- Fruits
- Household
- Meat
- Office supplies
- Personal care
- Snacks
- Vegetables

Imagine you are an accountant at OSS and your manager has asked you to use data analytics to evaluate performance. Let’s apply the data analysis process to this task.

Stage 1: Plan

The first stage of the data analysis process is planning. This includes identifying the motivation for the analysis, determining the objective and questions to answer, and devising a strategy to perform the analysis.

Understand Motivation

Motivation is the reason the analysis is being performed. It is why we are doing the analysis. The “why” behind a project can vary from taking advantage of opportunities to solving problems, and its source can be external or internal:

- External motivation: The project originates from a request or requirement by another party, such as external stakeholders. These external stakeholders could be investors, creditors, supply chain partners, industry regulators, or government agencies. Another example of external motivation is when someone internal to the organization, but on a different team, assigns the project.
- Internal motivation: The project is motivated by a desire to better serve a client, better understand phenomena to gain business intelligence, or to perform job responsibilities. Projects are motivated internally when the incremental information gained is believed to outweigh potential costs involved with performing the data analyses.

Illustration 1.9 is an analysis of sales and profit for the last four years at OSS.

ILLUSTRATION 1.9 One Stop Shop Sales and Profit: 2022–2025

Year	Sum of Total Sales	Sum of Total Profit	Profit Percent Increase/(Decrease)
2022	\$ 628,166,810	\$ 182,498,922	
2023	\$ 650,651,094	\$ 185,587,854	1.7%
2024	\$ 779,599,949	\$ 229,372,260	23.6%
2025	\$ 727,151,326	\$ 207,834,052	(9.4%)

The analysis reveals that total sales and total profit increased from 2023 to 2024, but decreased from 2024 to 2025 by 9.4%. OSS is concerned about the decrease, so their motivation for performing the analysis is to understand why revenue decreased from 2024 to 2025. This type of motivation would be considered internal motivation. Once the motivation for the data analysis is established, it is time to move from the big picture to specific objectives.

Determine the Objective

Every data analysis project begins with setting an **objective**, which is the project’s goal. A clear objective narrows the analysis’ focus, and specific questions that guide the analysis can be developed based on it.

For example, the objective of the OSS analysis is to determine what factors are driving the decrease in sales and profits. Based on that, you could develop these specific questions:

- Is there a single product category that has experienced a decrease in sales and profit?
- Has there been a decrease in all the countries and regions?

Design the Data and Analysis Strategy

Developing a strategy for the project is the final step in the planning stage. There are two aspects to this—determining the data necessary to answer questions and deciding what type of analysis is appropriate considering both the data and those questions.

Designing a strategy for the data involves identifying the specific data needed and knowing how to access it. There are two categories of data:

- **Internal data** are found within the organization. This includes transaction data, general ledger data, sales data, customer data, vendor data, internal documents, and internal email.
- **External data** are acquired from outside the organization. Data like this might come from social media, websites, weather data, government data, and maps.

Understanding the potential source of data is critical. For example, performing an analysis of accounts payable requires access to internal data sources for general ledger data and vendor data. If a company sells beverages and the objective of the analysis is to predict the sales of hot chocolate, then both internal data (transactions) and external data (weather data) would be used.

As to analysis strategy, there are four types of data analysis methods, each of which is discussed in future chapters. **Illustration 1.10** offers some brief examples and definitions for them.

ILLUSTRATION 1.10 Types of Data Analytics

Method	Objective	Sample Question
Descriptive	Investigates <i>what</i> is happening currently or has occurred in the past.	What were gross sales by region for the past two years?
Diagnostic	Helps understand <i>why</i> something happened.	Why did sales decrease in Region 1 in the prior year?
Predictive	Forecasts <i>what might happen</i> in the future.	What will sales be next year if we increase market share by 10%?
Prescriptive	Helps understand <i>what should happen</i> to meet goals and objectives.	What is the most cost-effective way to ship our products?

The most common and easily understood analytics, **descriptive analytics** reveal what is currently happening or what has happened in the past. They are the first analytics performed to help understand data. Sum, count, average, median, standard deviation, and proportions are examples.

Instead of telling us that something happened, **diagnostic analytics** reveal *why* something has happened. The information gained from descriptive analytics about what happened lets us drill down further to understand why. The results of these analyses inform decision-making about actions in the future. Examples include anomaly and outlier detection, trend analysis, and pattern recognition.

Predictive analytics also help to understand and predict what might happen in the future. Predictive analytics use data, statistical algorithms, and machine learning to identify the likelihood of future outcomes based on historical data. The goal is to use what is known about the past to make a better assessment of what might happen in the future. Forecasting, regression analysis, and time-series analysis are a few examples.

Finally, **prescriptive analytics** help determine the best course of action to achieve a goal in a given scenario. These analyses go beyond descriptive and predictive analyses by recommending one or more possible courses of action. Prescriptive analytics include optimization and what-if analyses.

Illustration 1.11 summarizes the planning stage for OSS, including the data analysis method that should be used to perform the analyses.

ILLUSTRATION 1.11 Applying the Planning Stage to the One Stop Shop Data Scenario

Planning Stage	Explanation
Motivation	Understand the reason for the data analysis. One Stop Shop Example: • Management wants to understand why profit decreased from 2024 to 2025.
Objective	Articulate the goal, or objective, and develop a specific question(s). One Stop Shop Example: • Objective: What is driving the decrease in sales and profit from 2024 to 2025? • Specific question: Which product categories have experienced a decrease in sales and profits from 2024 to 2025?
Strategy	Identify the necessary data and analysis methods to answer questions. One Stop Shop Example: • Use transaction data from 2022 to 2025. This is internal data. • The data analysis method would include descriptive and diagnostic analyses.

Stage 2: Analyze

After careful planning, it is time to begin the analysis. This stage includes data preparation, building information models, and exploring the data. Each is covered in detail later in this course, but they are briefly described here and applied to the OSS scenario.

Prepare Data

Good quality data result in good quality analyses, so preparing the data for analysis is a critical step in this stage. This process is often referred to as **extract-transform-load (ETL)**.

- Extracting is the process by which data are retrieved from a source. This could be downloading an Excel file or extracting data from a database or a data warehouse.
- Transforming the data occurs when data are cleaned, restructured, and/or integrated with other data prior to using it for analysis.
- Loading is the process of importing transformed data into the software used to perform analyses. There are many types of analysis software available, including Excel, Power BI, and Tableau.

In the OSS example, the company has extracted a file of thousands of transactions and a file with the region numbers and names. Both files must be prepared for analysis. The first step is determining if data needs to be cleaned. The process of reviewing the data for possible issues is called **data profiling**. To verify all the data have been extracted, you can compare the row counts of the data extracted to the total number of rows that should be in the data.

To ensure that the data were transferred correctly, compare the amounts transferred to control amounts. The OSS data could be prepared like this:

- **Extract:** Compare the data to the total sales and revenue numbers provided to be sure all the transactions are there.
- **Transform:** Integrate the file with the OSS regions Excel file to get the region names for the analysis by region.
- **Load:** Once cleaned and transformed, the files can be loaded into the analysis software.

Once the data are loaded, the analysis can begin by building information models and exploring the data.

Build Information Models

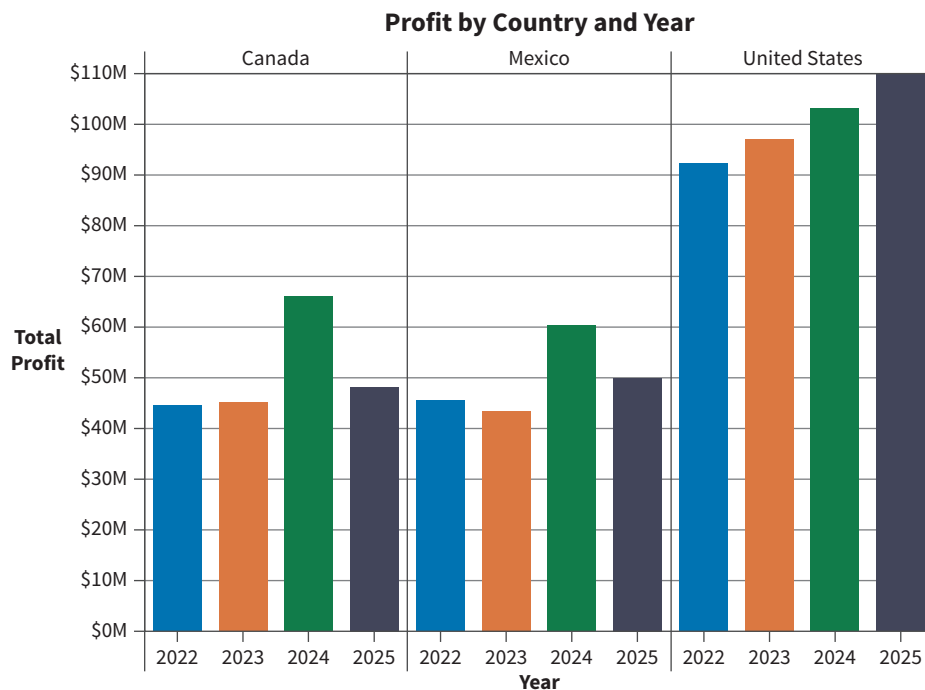
Information modeling is the creation of information needed for analysis purposes, starting from the data collected. Examples are calculations such as net income, profit margin, total assets, or even break-even point in sales dollars.

Let's build the information model using the OSS example to diagnose if one or more products or regions are driving the decline in profit. To analyze profit by product and region, use the cleaned and transformed OSS data:

- Create a model that calculates profit margin by product and region.
- Create a model that calculates the profit margin ratio.

Illustration 1.12 is an analysis of profit by country.

ILLUSTRATION 1.12 Analysis of Profit by Country for One Stop Shop

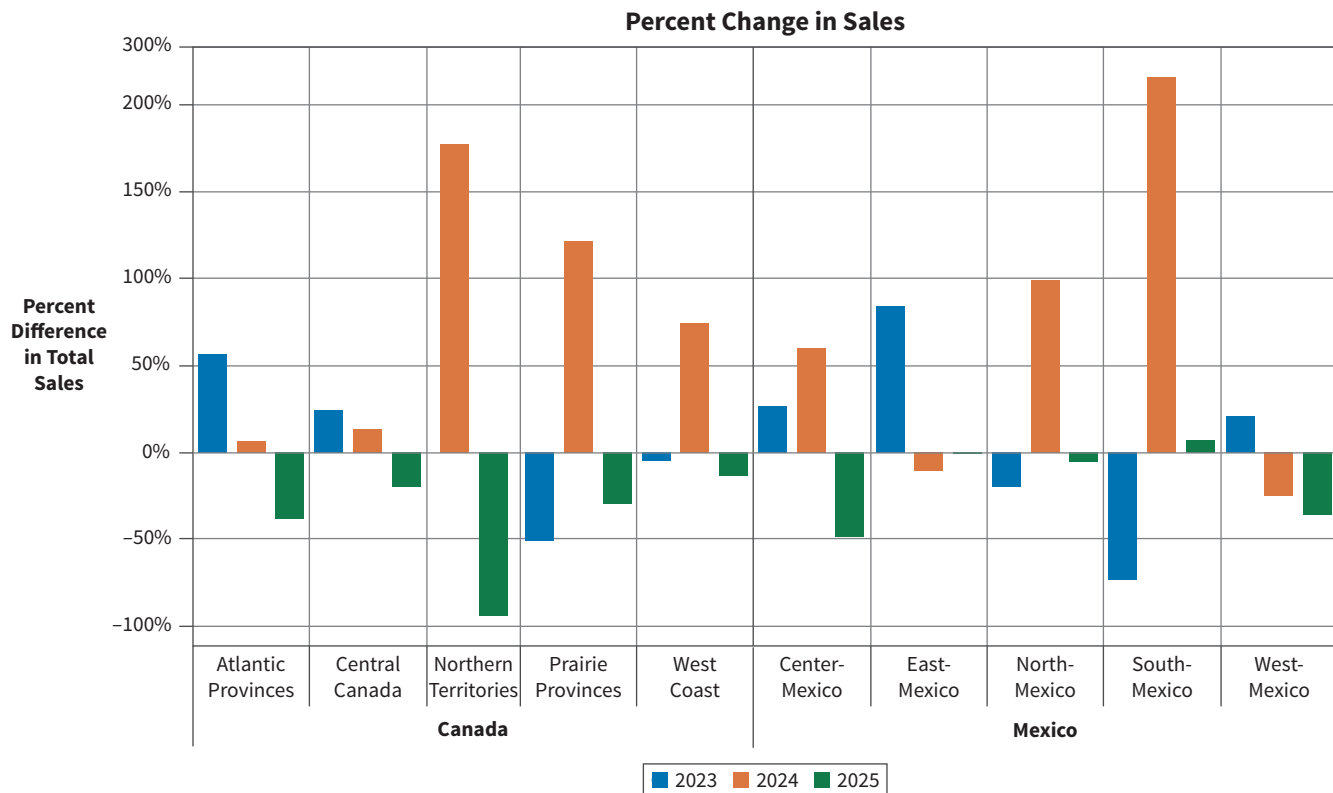


It shows that profits are only decreasing for Canada and Mexico. Exploring further could identify specific regions in Canada and Mexico that may be contributing to the decline.

Explore Data

The core goal of data analysis is to explore data to identify patterns, trends, or unusual observations. Exploring data lets us discover, question, and investigate data relationships to successfully execute data analysis objectives. The combined OSS data set and data generated by

the profit margin analysis can be explored to find relationships, patterns, or insights that help explain why profit has decreased from 2024 to 2025. Sales is a significant driver of profit, so the sales data for Canada and Mexico can be explored for insights. **Illustration 1.13** is an analysis of sales by country and region for Canada and Mexico.

ILLUSTRATION 1.13 Change in Sales by Country and Region for One Stop Shop

This analysis shows there are many regions in both countries where sales are declining.

Data You can explore the OSS data yourself using Excel, Tableau, or Power BI.

Stage 3: Report

The goal of this stage is to determine if the analyses met the project's objectives and then to share the results. Interpreting the analyses and communicating the results is a crucial stage—an amazing analysis that does not meet the project's objectives is useless. Moreover, if the results are not communicated effectively, then the analyses and recommendations cannot be acted on.

Interpret Results

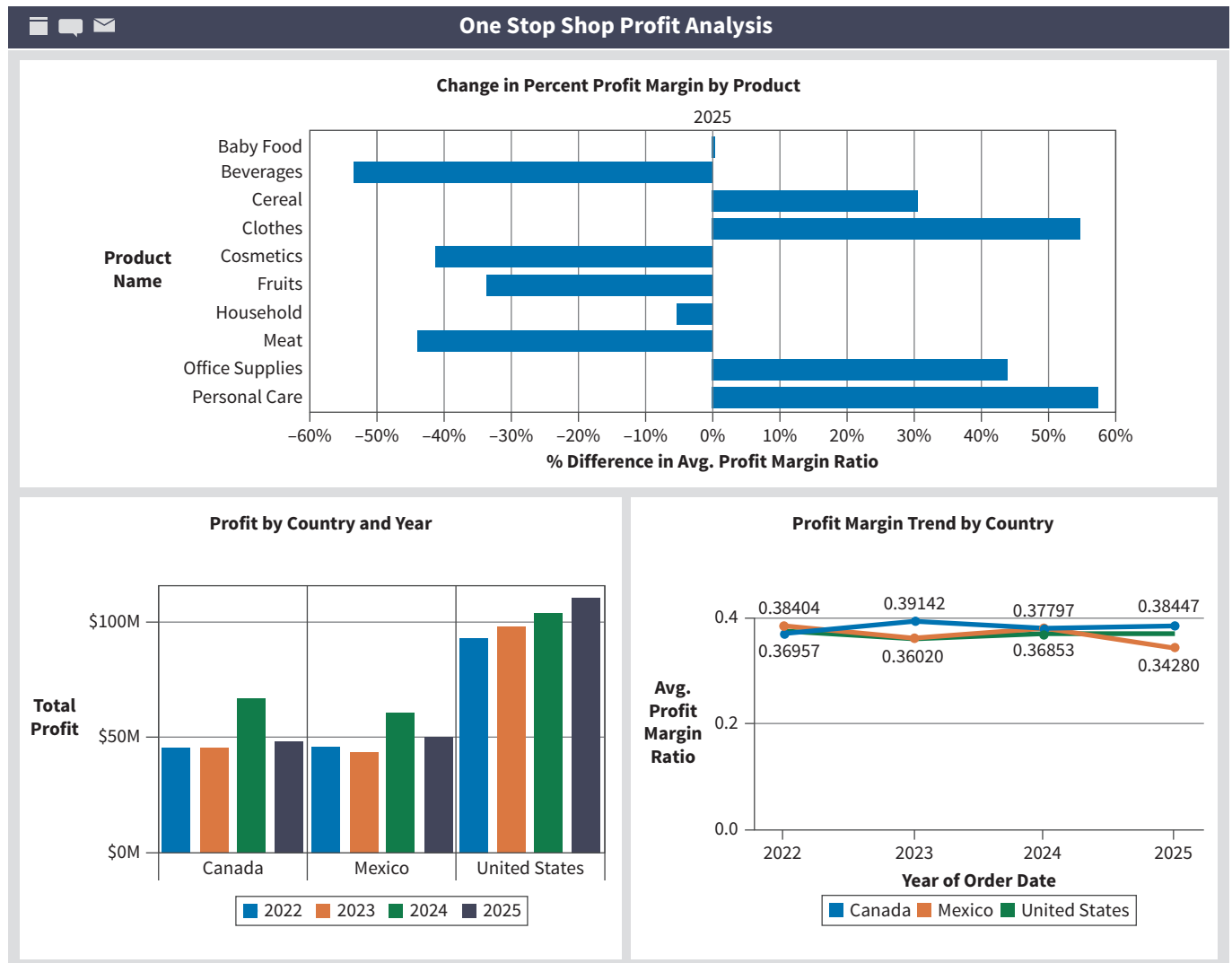
Data analysis interpretation is the process of reviewing analyses to be sure they make sense based on the project's objective and that the results are valid and reliable. Imagine that you or someone else prepared the analysis of profit for OSS shown in Illustration 1.12. Recall that OSS's objective is to determine what is driving the decrease in profit from 2024 to 2025. Does the analysis meet the objective?

- It is a good start. The visualization in Illustration 1.12 shows that Canada and Mexico had declines in profit, whereas the United States had a small increase in profit.
- However, the analysis is not finished. The next step is to dig deeper into the decreases to find out *why* Canada and Mexico had such large declines.

Communicate Results

The results of a data analysis project can be communicated orally, with visuals, or in writing. Typically, data analysis communication will include data visualizations (Illustrations 1.12 and 1.13). Communication can also include dashboards (Illustration 1.14).

ILLUSTRATION 1.14 Communicating Using Dashboards: One Stop Shop Profit Analysis



The dashboard in Illustration 1.14 communicates changes in profit to OSS's management:

- The percent change in profit by country from prior year (2024–2025).
- Total profit by country (2022–2025).
- How profit for each country has changed from the prior year.

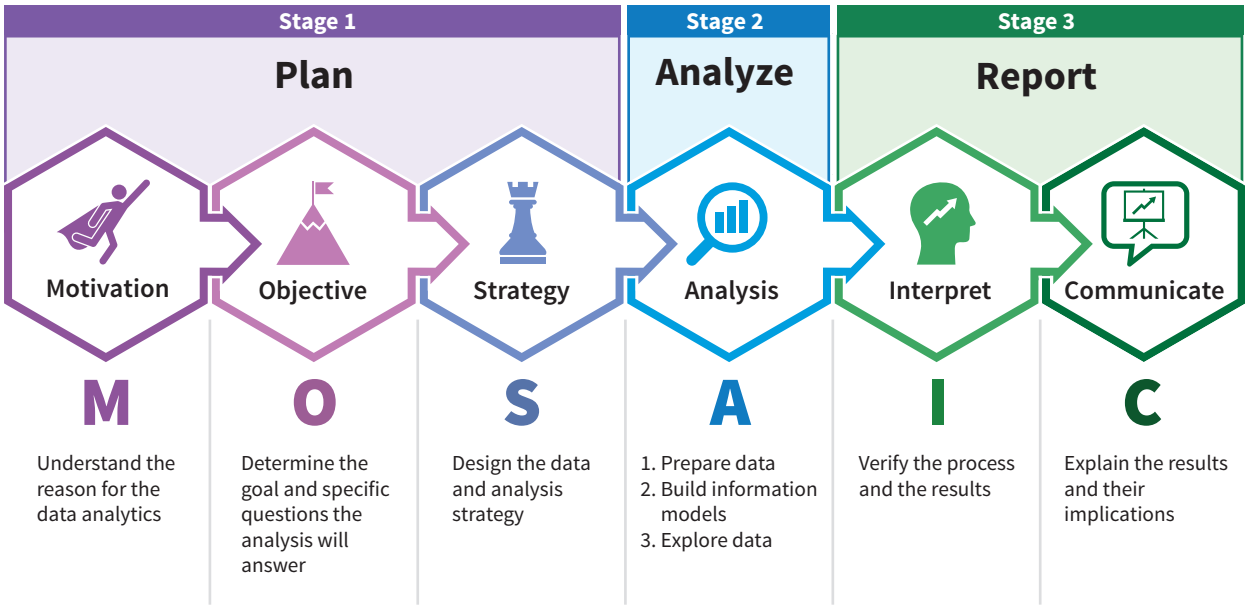
Management can use this analysis to monitor profit. For example, it seems like OSS's profits have decreased in all products except cereal, clothes, office supplies, and personal care. Like the other steps in the data analysis process, communication is also discussed in more detail later in the course.

MOSAIC: Putting it All Together

Created by arranging tiny pieces of different colored tiles into patterns, mosaics are visual art forms that evoke meaning and emotion. To easily remember the steps in the data analysis process, imagine using data to create a mosaic that will tell a story. Like the artists who use

creative and logical processes to reveal meaning about the world around them through art, accountants use data analytics to interpret the meaning of data and reveal business insights to help organizations meet their goals. **Illustration 1.15** provides a visual representation of the MOSAIC data analysis process.

ILLUSTRATION 1.15 The Data Analysis Process



This course will cover each aspect of MOSAIC.

Apply It 1.2
Explain the Data Analysis Process for a Fraud Risk Assessment



Auditing LocalPics (LP) is a busy movie theater chain with hundreds of sales each day and thousands on the weekends. LocalPics was tipped off by an employee that some workers were stealing the cash from ticket sales. Unfortunately, the anonymous person did not identify in which of the seven theaters the theft was happening. The CPA firm, CFW, has been hired to perform a fraud risk assessment for the company.

Identify the steps in the data analysis process for the fraud risk assessment, and provide a brief explanation of each.

Data Analysis Stage	Step	Explanation
Plan		
Analyze		
Report		

SOLUTION

Data Analysis Stage	Step	Explanation
Plan	Motivation	Discover if theft is occurring.
	Objective	Determine if any employees are stealing cash.
	Strategy	Collect sales data and compare to bank deposits.
Analyze	Prepare the data	Determine if the data needs to be cleaned or transformed.
	Build information models	Calculate what cash deposits should be based on sales.
	Explore the data	Examine the data for anomalies.
Report	Interpret	Review analyses to be sure they are accurate and make sense.
	Communicate	Prepare a memo or presentation summarizing the findings.

1.3 What is a Data Analytics Mindset?

LEARNING OBJECTIVE 3

Identify the skills necessary to perform data analyses.

A **data analytics mindset** is the professional habit of critically thinking through the planning, analysis, and reporting of data analysis results before making and communicating a professional choice or decision. Individuals with a data analytics mindset are inquisitive. They always ask “why” when interpreting results, they are open to learning new technologies, and they evaluate their own thinking. How can you develop a data analytics mindset? Focus on developing skills such as critical thinking, data literacy, technological agility, and communication skills.

The shortage of employees with these data analytics skills has led to increased demand for data and analytics education in all business programs, and there are many available degree and certificate programs for data analytics. While all accounting professionals do not need a specialized degree or certificate, they do need to develop the skill set needed to effectively work with data.

Professional Insight: What Skills are Employers Looking For?

The following are excerpts from the EY Careers webpage:⁴

It's clear that many of us will be working with technology that hasn't yet been invented, solving problems that haven't yet been identified. **So, while technical skill sets are evolving faster than ever, many are becoming irrelevant or obsolete just as quickly. That's why we recruit people today based on their mindset – not just their skillset.** When you join us, we invest in your development, so you can continue to build the mindset and technology skillset to thrive.

What is an analytics mindset? **You'll understand the importance of analytics and data to your profession, with the ability to extract, transform and interpret the relevant data.** You'll be a natural **problem-solver**, able to **translate complex data into simple and useful insights.** You'll be comfortable **sharing these results with both internal and external stakeholders.** You'll also **be committed to asking better questions** to get relevant data and understand how to use it.

These are the “preferred knowledge skills” from a tax associate job posting for PwC:

- Innovating through **new** and **existing technologies**, along with experimenting with **digitization solutions**; and,
- Working with large, complex data sets to **build models and leverage data visualization tools.**

Critical Thinking

Critical thinking is disciplined reasoning used to investigate, understand, and evaluate an event, opportunity, or an issue. **Reasoning** is the human process of logically forming conclusions, judgments, or inferences from facts. Not only do employers want critical thinkers, but professional certification exams such as the CPA exam and the CMA exam also include assessment questions that test critical thinking skills. Critical thinking is the foundation of a data analytics mindset and should be integrated throughout the data analysis process. (Critical thinking will be explored and applied to the data analysis process at the end of the chapter.)

Data Literacy

Data literacy is the ability to understand and communicate data. Gartner, Inc., a world leading research and advisory company, defines it in more detail, stating that data literacy is “the ability to read, write and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use of case application and resulting value.”⁵

Why is data literacy so important?

- A study by the data visualization software company Qlik and the consulting firm Accenture found that 63% of employees use data for decision making at least once a week.⁶
- Further, a study by the consulting firm McKinsey & Company found that companies where employees consistently use data in decision-making are more likely to report revenue growth of more than 10% in the past three years.⁷

⁴https://www.ey.com/en_us/careers/what-we-look-for

⁵Gartner, Inc, 2018. Logan, V. Information as a second language: enabling data literacy for a digital society. 21 September 2018 ID: G00365697.

⁶Qlik and Accenture (2020). The human impact of data literacy. Data Literacy Project. <https://thedataliteracyproject.org/humanimpact> (accessed July 2022).

⁷QuantumBlack AI by McKinsey, 2019. Catch them if you can: how leaders in data and analytics have pulled ahead. <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/catch-them-if-you-can-how-leaders-in-data-and-analytics-have-pulled-ahead> (accessed July 2022).

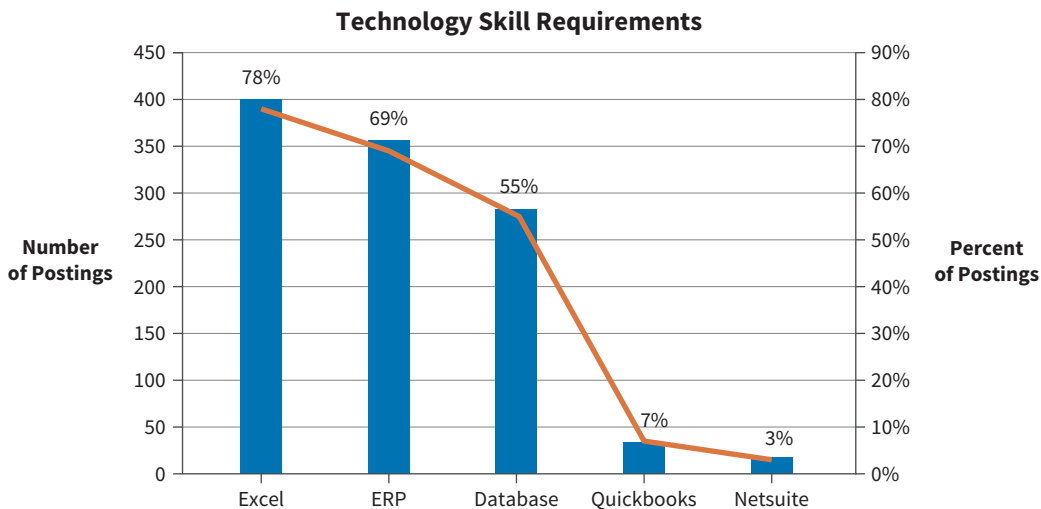
These examples show that the ability to read, write, and communicate with data is a skill that is critical for success.

Technology Skills

Along with data literacy skills, accountants must know how to use technology to work with data. An analysis of over 500 entry-level accounting job postings for graduates with a bachelor of science degree in accounting confirms these skills are highly sought by employers.⁸

Illustration 1.16 shows an analysis of the technology skills listed in the Robert Half July 2022 postings. Notice that most of the job postings required that applicants have strong Excel skills and more than half the postings are looking for ERP and database skills.

ILLUSTRATION 1.16 Technology Skill Requirements in Entry Level Accounting Job Postings



We have emphasized the influence of technology on the accounting profession, the demand for technology skills, and that technology changes rapidly. But how do you develop technology skills if technology is always changing?

If mental agility is the ability to think and understand quickly, then **technological agility** is an awareness of the latest technological developments and a willingness to try new things. We can become technologically agile by learning new technology and developing the skills that help us to do so. In fact, being comfortable learning new technology leads to more agility. This “learn to learn” mindset is what employers are looking for in new employees.

While the ability to learn and use new technology is important, so is in-depth knowledge of specific software packages essential to accountants. Microsoft Excel is a perfect example of an essential skill, which Illustration 1.16 demonstrates is one desired by most employers.

Finally, tools are just that—tools. They help accountants do their jobs more effectively, but they do not replace professional judgment or critical thinking, and they do not make decisions. In-depth accounting and business knowledge are what differentiates accountants from machines. Technology has just become an important part of that knowledge.

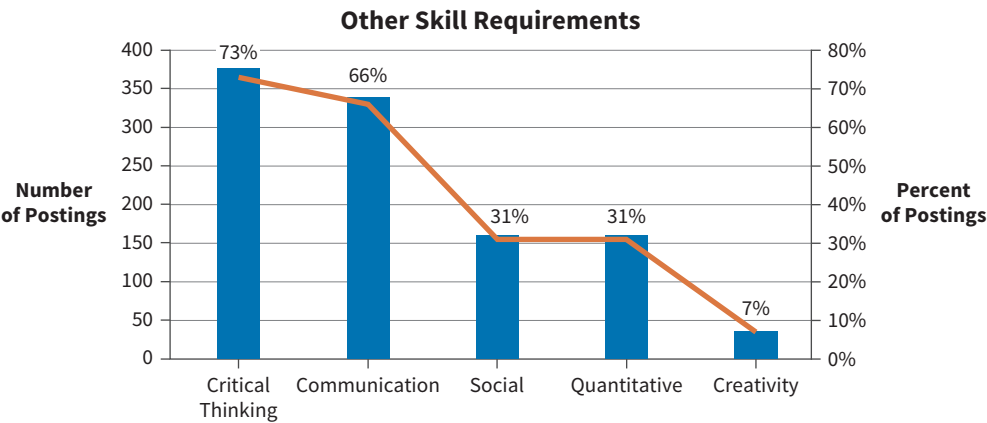
Communication Skills

Further evaluation of the Robert Half job postings reveals more skills required for entry level accounting positions (**Illustration 1.17**). Critical thinking skills are mentioned in 73% of the postings, closely followed by communication skills at 66%.

The ability to communicate is important for all aspects of your accounting career. Recall that the managing director for Deloitte stated staff members must be able to communicate solutions to others. The Professional Insight feature at the beginning of this chapter also emphasized the need for strong communication skills. The EY careers website post mentions “sharing these results with both internal and external stakeholders” which clearly indicates that communicating the results of data analyses is a critical skill for new graduates.

⁸This data was collected by the authors from roberthalf.com in July, 2022.

ILLUSTRATION 1.17 More Skill Requirements in Entry Level Accounting Job Postings



Communicating data analysis results requires specific skills:

- Writing clear and effective memos and reports.
- Preparing successful presentations.
- Creating meaningful data visualizations.
- Telling compelling data stories.

Data visualization is particularly important because it is used to perform data analysis and to communicate the results of data analysis. Data visualization is introduced in the foundations of data analysis chapter, and those skills are used throughout the course. The communication chapter also explores data visualization best practices, as well as how to communicate data analysis results.

Apply It 1.3
Evaluate the
Relationship
between Skills and
Tasks



Tax Accounting You are a new tax associate at CFW assigned to work on the LocalPics corporate tax preparation. Match the following skills with the tasks that you will be performing. Skills can be used once, more than once, or not at all. Each task will require at least two skills and often more than two.

- Critical thinking
 - Data literacy
- Technological agility
 - Communication skills

Task	Skill
Gather relevant data.	
Compare to prior year filings.	
Prepare an analysis of changes from prior year.	
Compare to similar organizations.	
Upload current year data to tax preparation software.	
Upload current year and prior year data to data analysis software.	
Prepare a presentation on current tax liability for LocalPics senior management.	

SOLUTION

Task	Skill
Gather relevant data.	Critical thinking and data literacy
Compare to prior year filings.	Critical thinking and technological agility
Prepare an analysis of changes from prior year.	Critical thinking, data literacy, and technological agility
Compare to similar organizations.	Critical thinking, data literacy, and technological agility
Upload current year data to tax preparation software.	Critical thinking, data literacy, and technological agility
Upload current year and prior year data to data analysis software.	Critical thinking, data literacy, and technological agility
Prepare a presentation on current tax liability for LocalPics senior management.	Critical thinking, data literacy, and technological agility, and communication

1.4 How is a Data Analytics Mindset Applied?

LEARNING OBJECTIVE 4

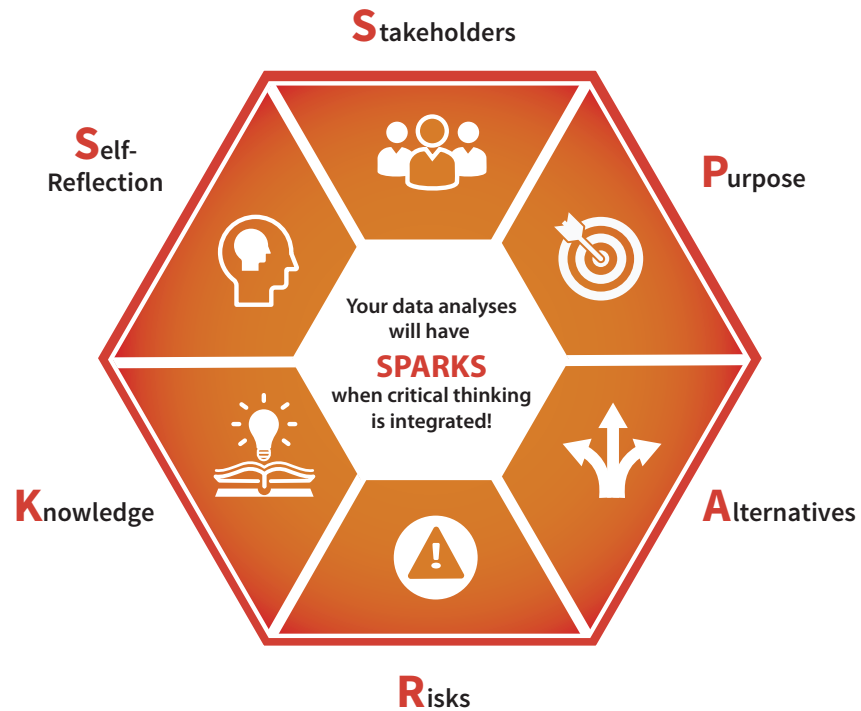
Explain how to apply a data analytics mindset to the data analysis process.

You have learned that a data analytics mindset is the professional habit of critically thinking through the planning, analysis, and interpretation of data results before making and communicating a professional choice or decision. The data analysis process requires applying critical thinking skills at each stage:

- **Stage 1:** Taking the time to critically create and evaluate a data analysis plan will ensure you have considered all possible aspects of the analysis.
- **Stage 2:** Preparing data, building information models, and exploring data also require thinking critically as you move through the analyze stage of the project.
- **Stage 3:** Finally, critical thinking will help you interpret and communicate findings in the results stage.

There are six elements of critical thinking to consider when performing data analytics: stakeholders, purpose, alternatives, risks, knowledge, and self-reflection (**Illustration 1.18**). Keep in mind that these elements are not sequential, rather they are recursive. In other words, the order in which you consider the elements is not as important as continually thinking through them.

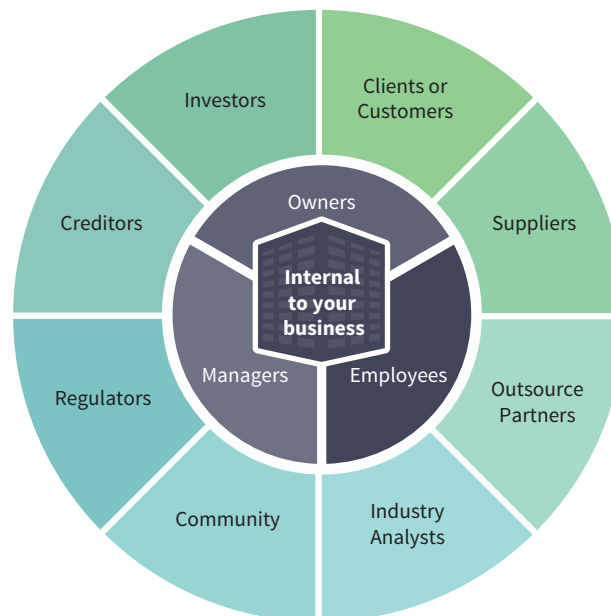
ILLUSTRATION 1.18 SPARKS: The Six Elements of Critical Thinking



Understand the Stakeholders

Stakeholders are those individuals or groups with an interest in the outcome of a data analysis project. Stakeholders can be internal or external to an organization (**Illustration 1.19**).

ILLUSTRATION 1.19 Internal and External Stakeholders



- **Internal stakeholders** are individuals or groups involved in a businesses' operations. They include an organization's managers and employees.
- **External stakeholders** are individuals or groups outside the company. Examples include investors and creditors, regulators, organizational partners (clients or customers, suppliers, outsource partners, and donors), and community leaders and members.

Let's go back to the One Stop Shop (OSS) analysis. Who are the relevant stakeholders in the analysis of OSS performance? Internal stakeholders would include the person performing the analysis, the supervisor, and the employees affected by the outcome of the analysis. If the analysis showed that the decrease in sales and profit was primarily driven by one region, internal stakeholders such as the employees in the region would have an interest in the analysis.

As for external stakeholders, investors want to be sure they are getting a positive return on their investment and creditors want to know that OSS can pay their debts. If profits are declining, both parties will be interested in the results of the analysis. If sales and profits are down due to a poor product, external stakeholders such as customers will likely stop purchasing that product, and suppliers would eventually be affected as demand slows. Overall, understanding the stakeholders helps us to better understand the impact of the analysis and can guide our choice of data and analysis methods.

Identify the Purpose

Knowing the reason for data analyses and articulating specific questions maintains focus on the data and analyses steps that will achieve objectives. The importance of identifying specific questions was covered with the discussion of data analysis objectives. Here, the emphasis is on repeatedly returning to those questions to keep the analysis on track.

For example, we might discover interesting insights during data exploration that could distract from the analysis's original purpose. It can be tempting to follow every lead, regardless of whether it will help answer the main objective and questions. Focusing on the purpose of the analysis avoids wasting time on irrelevant findings. It is always possible to go back to the additional insights after the analysis that meets the stated purpose is completed.

In the OSS case, the objective was determining what was driving the decrease in sales and profits in the current year. What if, in the analysis of expenses, the depreciation was found to be higher in 2023 than in 2024? This may be an important finding, but it doesn't contribute to knowing what is driving the decrease in sales and profits in 2025. In this case, note the finding about depreciation and return to it after the current analysis is complete to avoid wasting time.

Consider Alternatives

Performing data analyses involves many choices—which questions to evaluate, what data are needed, which method to use, and how to best communicate the results. How should we consider these alternatives? First, identify the available choices, rank them, then choose the highest ranked option.

As with all business decisions, weighing the cost of performing the analysis against its expected benefits is good practice. While we should only perform analyses where the benefits exceed the cost, the costs and benefits of performing an analysis cannot always be quantified. In these cases, think critically about the choices and select the option that best supports the purpose.

Consider the OSS analysis. They want to identify what is driving the decrease in sales and profits. The following data and analysis choices are options for answering this question:

- Data: Sales transactions 2022–2025 by region, competitor data, inflation rate.
- Analysis methods: Descriptive, diagnostic, predictive, or prescriptive analytics.

To select the best data for the analysis, rank the data by their relevance and availability. Data that are both relevant and available will rank higher than data that are relevant but not available or data that are irrelevant. In the OSS example, the sales transaction data are the most relevant and also available. The competitor data would be relevant but unavailable. The inflation rate might be useful, but it would only be one indication of changes in profits.

Finally, the methods of analysis that are most relevant for this question are descriptive and diagnostic methods.

Assess Risks

There are many risks to consider when performing data analyses, and it’s important to examine all aspects of the analysis to identify them. This begins with the data and extends to potential biases, including our own, that may be held by the stakeholders. Potential risks in four areas—data, analyses, assumptions, and biases—can affect decisions. These risks are illustrated with the OSS example in **Illustration 1.20**.

ILLUSTRATION 1.20 Types of Risks

Risk	Description	OSS Example
Data	Choosing inappropriate data, or data that are incomplete or incorrect.	Are the transaction data we plan to analyze complete and accurate?
Analysis	Choosing an inappropriate method, or applying a data analysis method incorrectly.	Are the descriptive and diagnostic analysis methods the correct methods? Were the analyses performed correctly?
Assumptions	Not understanding or evaluating assumptions about the data or the results.	What assumptions were made when collecting data, and are they correct? For example, are we assuming that we have all the data? Are we assuming that the 2023–2024 results are as expected? Perhaps they were higher than expected, and the 2024–2025 results did not decline as we initially thought.
Biases	Mental shortcuts that can affect decisions.	Do we have biases that could influence the data analysis? For example, assumptions about the cause of the sales decline could bias the preparation for the analysis or interpretation of the results.

A habit of critically considering inherent risks in the data analyses work performed by ourselves or others avoids unintentionally creating or using incorrect data.

Identify Knowledge

The next element of critical thinking in data analytics includes identifying knowledge gaps:

- Recognizing when more knowledge is necessary to complete the analysis.
- Acquiring knowledge from a reliable source.
- Learning how to correctly apply it to the data analysis.

Performing the analysis for the OSS case requires understanding how wholesale distributors operate, how profit is calculated, and how to perform descriptive and diagnostic data analyses. There is also a technology component, as it is necessary to know how to use the available technology to download the data and perform the descriptive and diagnostic analyses.

Perform Self-Reflection

The final critical thinking element is investing in a “post-project audit” habit honestly and without self-criticism. A start-to-finish project review connects and synthesizes what happened and why. The professional development we gain by this practice, whether the project was a success, a struggle, or a failure, can be valuable for both individuals and teams.

When the analysis of the decline in sales and profit for OSS is complete, reflect on what worked well and what did not. For example, if you had difficulty downloading the data but eventually figured it out, then use that experience in future projects to avoid similar issues.

SPARKS: A Critical Thinking Toolkit

The mnemonic SPARKS represents the six elements of critical thinking. Considering each will help you continue to develop your critical thinking skills. **Illustration 1.21** provides a summary of the elements of critical thinking in the SPARKS framework.

Critical thinking in accounting data analytics projects is essential because it forces us to anticipate impacts and issues and evaluate our choices. The results are better processes, improved judgments, and the ability to more provide value for our organizations, clients, and stakeholders. As you work through the data analysis process, apply SPARKS continuously. Doing so helps ensure you are performing the individual steps of the data analysis process (MOSAIC) effectively.

Critical Thinking		Definition	Why It Matters
S	 Stakeholders	Parties impacted by the data analysis results.	The potential impacts guide analysis and communication choices.
P	 Purpose	The reason driving the questions for the analysis.	Focusing on the purpose helps select the best data, analysis, interpretation, and communication options.
A	 Alternatives	Every choice should be the best option available.	Generating and ranking alternatives helps us make good choices.
R	 Risks	Consider all risks related to data, strategy, biases, and assumptions.	Anticipating risks improves data and analysis choices.
K	 Knowledge	Proper analysis strategy and interpretation of results often depends on accounting, economics, industry, statistics, and technology knowledge.	Applying knowledge provides meaning to the data and to the results.
S	 Self-Reflection	Reviewing each choice throughout the data analysis process (MOSAIC) reveals what worked best.	Reflecting on lessons learned helps improve future analyses.

ILLUSTRATION 1.21 The Six Elements of Critical Thinking

Apply It 1.4

Integrate Critical Thinking with the Data Analysis Process



Auditing Consider CFW's fraud risk assessment for LocalPics from Apply It 1.3. You were asked to identify and explain the data analysis steps you would perform during the risk assessment. Now, apply the six elements of critical thinking to each of those steps. Complete the last column in the table. Note that two elements are listed in each step, but it is possible that more elements could apply.

Data Analysis			Critical Thinking Element	Application
Stage	Step	Explanation		
Plan	Motivation	Determine if theft is occurring.	Stakeholders Purpose	
	Objective	Identify if employees are stealing cash.	Purpose Risks	
	Strategy	Collect sales data and compare it to bank deposits.	Risks Knowledge	
Analyze	Prepare the data	Determine if the data needs to be cleaned or transformed.	Risks Self-reflection	
	Build information models	Calculate what cash deposits should be based on sales.	Purpose Alternatives	
	Explore the data	Examine the data for anomalies.	Alternatives Knowledge	
Report	Interpret the results	Review analyses to ensure they are accurate and make sense.	Stakeholders Purpose	
	Communicate the results	Prepare a memo or presentation summarizing the findings.	Stakeholders Risks	

SOLUTION

Data Analysis Stage	Step		Explanation	Critical Thinking Element	Application
Plan	M	 Motivation	Determine if theft is occurring.	Stakeholders	The stakeholders are LocalPics management and employees, as well as the accounting firm.
		 Objective	Identify if any employees are stealing cash.	Purpose	The motivation is to determine if fraud is occurring for the client, LocalPics. It is also to do a good job for the firm you work for. The purpose of the analysis is to determine if theft is occurring. You must stay focused on that purpose throughout the analyses.
		 Strategy	Collect sales data and compare to bank deposits.	Purpose	Articulating objective questions requires staying focused on the purpose.
Analyze	A	 Prepare the Data	Determine if the data needs to be cleaned or transformed.	Risks	Risks to consider during data preparation include data completeness and data integrity.
		 Build Information Models	Calculate what cash deposits should be based on sales.	Self-Reflection	Reflect on past experiences with preparing data for analysis, and apply lessons learned to the current analysis.
		 Explore the Data	Examine the data for anomalies.	Purpose	Stay focused on the purpose, which is to identify theft, when building analysis models. The best way to do this is to calculate what the daily deposits should be based on sales and compare that to the actual deposits.
Report	I	 Interpret the Results	Review analyses to ensure they are accurate and make sense.	Alternatives	Consider alternative models. Instead of total daily deposits, break that down into cash and credit card deposits, which is an alternative that will let you focus on cash theft.
		 Communicate the Results	Prepare a memo or presentation summarizing the findings.	Alternatives	You could use a visualization of cash receipts and cash deposits by day and employee to look for anomalies. Consider alternative visualizations to determine which will best answer the questions.
Report	C	 Interpret the Results	Review analyses to ensure they are accurate and make sense.	Knowledge	Necessary knowledge for data exploration includes understanding the visualization software as well as the underlying data. You also must understand what would be considered an anomaly.
		 Communicate the Results	Prepare a memo or presentation summarizing the findings.	Purpose	Losing sight of the purpose of the analysis could lead to interpreting the results incorrectly. In the this example, the purpose is to determine if theft occurred, so ensure the results make sense in that context.
Report	C	 Communicate the Results	Prepare a memo or presentation summarizing the findings.	Risks	Results could be misinterpreted when risks are not considered. If the data is incorrect or incomplete, the wrong employee could be identified in the theft, or the involved employee might not be found at all.
		 Communicate the Results	Prepare a memo or presentation summarizing the findings.	Stakeholders	Before communicating the results, understand the audience for the presentation and the information they need. Identifying the stakeholders in the analysis is the best way to do this.
Report	C	 Communicate the Results	Prepare a memo or presentation summarizing the findings.	Risks	Using the correct visualizations and following best practices will reduce the risk of someone misinterpreting the results.

Chapter Review and Practice

Learning Objectives Review

1 Summarize how advances in data and technology are impacting accounting professionals.

Data and technology are driving major changes in the accounting profession:

- The increased availability of data and easy-to-use technologies are changing the accounting profession and consequently accounting professional exams like the CPA and CMA. Data are raw figures and facts, which technology helps convert into information. Information is the knowledge gained from the data.
- Data analytics is the process of analyzing raw data to answer questions or provide insights. Self-service business intelligence tools have empowered accountants to use data and analytics to provide value-added services to their clients and employers. SSBI software has extended processing capabilities for preparing data, analyzing data, and reporting data analysis results and does not require programming knowledge or skills.
- Auditors use data analytics for risk assessment and substantive procedures. Financial accountants use technology to automate account analyses and routine tasks. They also use dashboards to monitor performance and enable decision-making. Managerial accountants use automation for variance analyses, budgeting, and performance dashboards. Tax accountants use data analytics to help with tax compliance, and dashboards can monitor real-time tax positions.

2 Describe the stages of the data analysis process.

Stage 1: Plan:

- Motivation is the reason the analysis is performed.
- The objective is the goal of the project. To address the objective, form specific questions to guide the analysis.
- Strategy is the final step in the planning stage. There are two aspects: a data strategy and an analysis strategy. There are four types of data analysis methods:
 - Descriptive analytics are used to understand what is currently happening or has happened in the past.
 - Diagnostic analytics help reveal why something has happened.
 - Predictive analytics help predict what might happen in the future.
 - Prescriptive analytics can tell us what we should do to meet a specific objective.

Stage 2: Analyze:

- Data preparation is a critical step in the data analysis stage, and the process is often referred to as extract-transform-load (ETL). Data are extracted from a source and transformed by cleaning, restructuring, or integrating with other data prior to analysis. Loading is the process of uploading transformed data into analysis software.

- Information modeling refers to creating the information needed for analysis purposes. Examples of information models in accounting are models to calculate net income, profit margin, total assets, etc.
- The final step is exploring the data to derive insights occurs once the data and information models are prepared.

Stage 3: Report:

- Interpreting the results requires confirming the results address the objective of the analysis and make sense.
- Communicate the results by choosing the best presentation and method of communication.

The three stages of the data analysis process and the steps within them can be remembered by the mnemonic MOSAIC.

3 Identify the skills necessary to perform data analyses.

A data analytics mindset is the professional habit of critically thinking through the planning, analysis, and interpretation of data results before communicating a professional choice or decision. Data analysis skills that are in demand from employers include critical thinking, data literacy, technology agility, and communication:

- Practice critical thinking skills in every stage of the data analysis process. Critical thinking is disciplined reasoning used to investigate, understand, and evaluate an event, opportunity, or issue.
- Accounting graduates also need to be data literate. They should be able to read, write, and communicate about data in context.
- Accounting graduates must be technologically agile. They should be comfortable learning new technology and be ready to use new technology.
- Finally, accounting graduates must have strong written, oral, and visual communication skills to effectively communicate the results of data analyses.

4 Explain how to apply a data analytics mindset to the data analysis process.

To apply a data analytics mindset to the data analysis process, continuously apply the six elements of critical thinking:

- Identify and consider stakeholders. Stakeholders are individuals or groups with an interest in the outcome of a data analysis project. They can be internal or external to the organization.
- Identify the purpose of the analysis and stay focused on it throughout the process.
- Determine and evaluate data and analysis possibilities and choose the best data and method to achieve the project's objective. Alternatives are determined and evaluated.

- Identify risk to mitigate problems that may occur due to data risks, analysis risks, incorrect assumptions, and biases.
- Acquire and apply the knowledge that is necessary for project success.

- Self-reflection on the planning, processes, and outcomes from prior projects can be applied to future projects.

The mnemonic SPARKS is a tool to remember the six critical thinking elements.

Key Terms Review

Critical thinking 1-18
Dashboard 1-5
Data 1-2
Data analytics 1-2
Data analytics mindset 1-17
Data literacy 1-18
Data visualization 1-4
Descriptive analytics 1-11
Diagnostic analytics 1-11

External data 1-11
External stakeholders 1-22
Extract-transform-load (ETL) 1-12
Information 1-2
Internal data 1-11
Internal stakeholders 1-22
Motivation 1-10
Null value 1-2
Objective 1-10

Predictive analytics 1-11
Prescriptive analytics 1-12
Data profiling 1-12
Reasoning 1-18
Self-service business intelligence software (SSBI) 1-2
Stakeholders 1-22
Technological agility 1-19

Data The Data tag appears when the data required to answer a question or complete an exercise are available on Wiley's online learning platform.

Multiple Choice Questions

- (LO 1)** Data differs from information because
 - a. data are raw figures and facts whereas information is the knowledge we gain from the data.
 - b. data are larger than information.
 - c. information is raw figures and facts whereas data are the knowledge we gain from the information.
 - d. information is larger than data.
- (LO 1)** Self-service business intelligence software
 - a. is used to write data analysis programming code.
 - b. has limited but easy-to-use data processing capabilities to analyze data.
 - c. provides easy-to-use extended data processing capabilities for preparing data, analyzing data, and reporting data analysis results.
 - d. is software that makes it easy to write computer code for data analysis.
- (LO 2)** The question "Based on current year sales, what can we expect for next year's sales?" would be answered using which type of data analysis method?
 - a. Descriptive
 - b. Diagnostic
 - c. Predictive
 - d. Prescriptive
- (LO 2)** The question "Why are costs rising in business unit A?" would be answered using which type of data analysis method?
 - a. Descriptive
 - b. Diagnostic
 - c. Predictive
 - d. Prescriptive
- (LO 2)** Understanding why we are performing data analysis, what the goal is, and which data to use is part of which stage of data analysis?
 - a. Extraction stage
 - b. Plan stage
 - c. Analyze stage
 - d. Report stage
- (LO 2)** The data analysis process stage in which information models are built is the
 - a. extraction stage.
 - b. plan stage.
 - c. analyze stage.
 - d. report stage.
- (LO 2)** Which activities are performed during the reporting stage of data analysis?
 - a. Data cleaning and analysis
 - b. Data preparation and communication
 - c. Data analysis and interpretation
 - d. Data interpretation and communication
- (LO 2)** The analyze stage of the data analytics process includes which of the following tasks?
 - a. Interpreting the analysis findings.
 - b. Communicating the analysis results.
 - c. Cleaning the data set to remove errors and omissions.
 - d. Planning the data analysis strategy.
- (LO 3)** Disciplined reasoning used to investigate, understand, and evaluate an event, opportunity, or an issue is considered
 - a. critical thinking.
 - b. data literacy.
 - c. data analysis.
 - d. process thinking.
- (LO3)** A mindset of being aware of the newest technology and a willingness to try new things is referred to as
 - a. analytical thinking.
 - b. critical thinking.
 - c. data literacy.
 - d. technological agility.
- (LO 3)** The ability to prepare effective data visualizations for the results of an analysis is part of which skill set?
 - a. Analytical thinking
 - b. Communication
 - c. Statistical ability
 - d. Logical thinking

12. (LO 4) Professional critical thinking elements in data analysis include

- a. understanding stakeholders, identifying the purpose, considering alternatives, assessing risks, identifying knowledge needed, and self-reflecting.
- b. understanding stakeholders, considering alternatives, and understanding the desired results of analysis and actively pursuing that outcome.
- c. Understanding stakeholders, assessing risks, identifying knowledge needed, and following instructions without questioning them.
- d. understanding stakeholders, identifying the purpose, and following data analysis best practices to achieve the desired result.

13. (LO 4) Who is an internal stakeholder for a manufacturing company?

- a. The company's bank
- b. The company's customers
- c. The SEC (Securities and Exchange Commission)
- d. The company's CFO (chief financial officer)

14. (LO 4) Which of these is a risk in data analysis?

- a. A client that wants a particular outcome
- b. Data that is current and relevant
- c. You have performed this analysis before
- d. You have used the analysis software before

15. (LO 4) Which element of critical thinking helps avoid wasting time on irrelevant analyses or findings?

- a. Understanding the stakeholders
- b. Identifying the purpose
- c. Considering alternatives
- d. Identifying the knowledge necessary for the analysis

Review Questions

1. (LO 1) How are the CPA exam and CMA exam changing due to shifts in the accounting profession?

2. (LO 1) Match the practice area of accounting to the changes driven by data and technology. You may use more than one accounting area.

- | | |
|-------------------------|--------------------------|
| a. Auditing | c. Managerial accounting |
| b. Financial accounting | d. Tax accounting |

Changes	Accounting Practice Area
1. Ability to use entire data sets to identify exceptions, anomalies, and outliers	
2. Automation of manual processes	
3. Automation of journal entries	
4. Risk identification	
5. Forecasting	
6. Compliance reporting	

3. (LO 1) Discuss the difference between data and information.

4. (LO 2) Match the type of data analytic method with the purpose for the analysis:

- | | |
|----------------|-----------------|
| a. Descriptive | c. Predictive |
| b. Diagnostic | d. Prescriptive |

Purpose	Method
1. Understanding what is happening currently and what has happened in the past.	
2. Understanding what should happen to meet goals and objectives.	
3. Understanding what might happen in the future.	
4. Understanding why something happened.	

5. (LO 2) Discuss the three steps in the planning stage of the data analysis process.

6. (LO 2) Preparing data for analysis is often referred to as ETL (extract-transform-load). Describe each aspect of the ETL process.

7. (LO 2) Match the data analysis process stages to the examples.

- a. Plan b. Analyze c. Report

Example	Data Analysis Process Stage
1. Develop a model to calculate contribution margin.	
2. Get data from a database.	
3. Upload data into analysis software.	
4. Determine the objective of the analysis.	
5. Create a forecast of net income.	
6. Identify the data needed for analysis.	
7. Identify relationships within the data.	
8. Create a visualization to show the results of the analyses.	
9. Identify sales patterns.	

8. (LO 3) Discuss the meaning of having a data analytics mindset.

9. (LO 3) Explain the importance of communication skills when reporting the results of data analysis.

10. (LO 3) Match the data analysis skill to its definition.

- a. Critical thinking
- b. Data literacy
- c. Technology agility
- d. Communication

Definition	Skill
1. Willingness to try new technology.	
2. The ability to read, write, and communicate data in context.	
3. Ability to create effective data visualizations.	
4. Disciplined reasoning used to investigate, understand, and evaluate an event, opportunity, or an issue.	

11. (LO 4) List and describe the six elements of critical thinking.

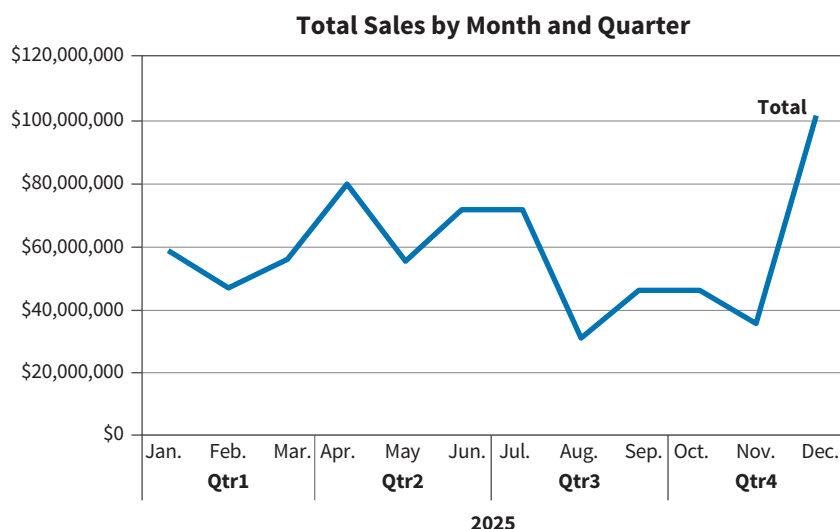
12. (LO 4) Give an example and explain how one of the elements of critical thinking can be applied to the planning stage of the data analysis process.

13. (LO 4) Give an example and explain how one of the elements of critical thinking can be applied to the analyzing stage of the data analysis process.

14. (LO 4) Give an example and explain how one of the elements of critical thinking can be applied to the reporting stage of the data analysis process.

Brief Exercises

BE 1.1 (LO 1) Auditing The following analysis of sales by month and quarter for 2025 has been prepared for One Stop Shop.



- How might an auditor use this analysis?
- Identify any months that might warrant additional investigation.

BE 1.2 (LO1) Data Financial Accounting Examine the available data to do the following:

- Identify total sales, total costs, and total profit.
- Discuss how a financial accountant might use this information to create a dashboard.
- What additional information would a financial accountant find useful in a dashboard?

BE 1.3 (LO 2) Managerial Accounting Denton Hospitality is a hotel chain located in the southwest. Denton wants to know four things:

- Which hotels have the highest revenue?
- Are there any hotels that have unusual revenue?
- Can we estimate expenses for the next year?
- How long does it take, on average, to clean a room?

For each request, identify the appropriate data analysis method to answer the question.

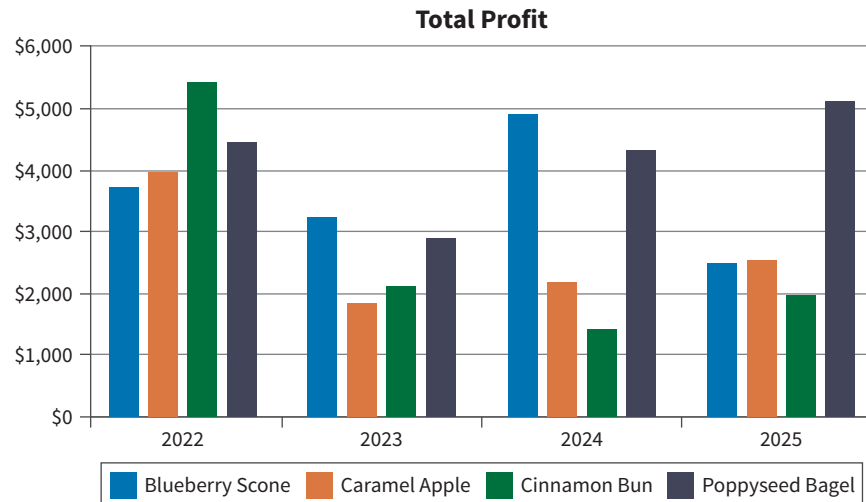
BE 1.4 (LO 2) Managerial Accounting Super Scooters manufactures and sells stand-on motorized scooters. They are considering expanding operations into Canada. They have asked you to analyze the data for their current U.S. operations and to prepare an analysis for expansion into Canada.

1. What data will be useful for your analysis? List both financial and non-financial data.
2. For each data suggested, is the data internal or external?

BE 1.5 (LO 2) Financial Accounting Best Bakes Bakery has a target of an average 42% profit margin on all sales. They are concerned that they may have some customers where the profit margin target is not being met.

1. Why are you performing the analysis?
2. What is the goal of the analysis?
3. How are you going to achieve the analysis?

BE 1.6 (LO 2) Financial Accounting You are a financial accountant for Best Bakes Bakery asked to interpret an analysis of sales by product. The objective is to determine which products are increasing and decreasing in profit. You were given the following visualization.



1. Does this analysis meet the objective of helping Best Bakes Bakery to determine if profits are increasing or decreasing for each product?
2. What are some ways you could communicate your interpretation?

BE 1.7 (LO 3) Auditing Find a recent job posting for an entry-level auditor in a public accounting firm. List the responsibilities and qualifications required for the position. Highlight responsibilities and qualifications that relate to critical thinking, data literacy, technology skills, and communication skills.

BE 1.8 (LO 3) Tax Accounting Find a recent job posting for a tax accounting position in a public accounting firm, company, or non-for-profit organization. List the responsibilities and qualifications required for the position. Highlight responsibilities and qualifications that relate to critical thinking, data literacy, technology skills and communication skills.

BE 1.9 (LO 3) Find a recent job posting for an accounting position (financial, managerial, or internal audit) in a company or not-for-profit organization. List the responsibilities and qualifications required for the position. Highlight responsibilities and qualifications that relate to critical thinking, data literacy, technology skills, and communication skills.

BE 1.10 (LO 4) Indicate whether the party is an internal (I) or an external (E) stakeholder:

1. CEO, CFO, or sales manager
2. Clients or customers
3. Employees
4. Suppliers
5. Outsource partners
6. Investors
7. Creditors and lenders
8. Regulators at state and federal agencies

BE 1.11 (LO 4) Match the definitions to the critical thinking elements.

- | | |
|--|--|
| a. The reason for the analysis. | d. The parties potentially impacted by the results. |
| b. A review of what worked and what did not. | e. The concepts that add meaning to the data. |
| c. Different options that are considered and ranked. | f. Obstacles and challenges to our thinking or analyses. |

Critical Thinking Element	Definition
1. Stakeholders	
2. Purpose	
3. Alternatives	
4. Risks	
5. Knowledge	
6. Self-reflection	

Exercises

EX 1.1 (LO 2, 4) Managerial Accounting Apply Critical Thinking A retail bookstore near a large university sells books, college-branded apparel, and gifts. Store management wants to understand which sales mix of books, apparel and gifts would result in the highest net income.

- List two external stakeholders who may be impacted by the analysis.
- The objective is to determine which combination of products could result in the best net income maximization. Provide three specific questions you could ask of the data.
- Create and compare at least two different data alternatives and two analysis options for this objective. Explain why you selected the data and the analysis options.
- Provide a data risk and an analysis risk example for the options you chose.
- List three accounting concepts that can help you perform the to the data analysis.
- Identify at least one way to leverage your new intelligence about the best-selling product mix.

EX 1.2 (LO 2, 4) Auditing Identify Stakeholders, Objectives, and Risks You are conducting an independent audit of the financial statements for a large car dealer company. They have multiple locations in various cities across the region. You have been assigned the task of recalculating the company's payroll commission expense, which is reported as selling, general, and administrative expenses on the company's financial statements.

- List two external stakeholders who may be impacted by the audit findings.
- Your objective is to determine whether the financial statements are reasonable representations of the company's operations and financial position. Assume you were provided the company's monthly payroll commission payouts for the fiscal year under audit. Develop three specific questions you could ask to achieve your objective.
- Discuss one risk to critical thinking related to your examination of payroll commission pay-out data.
- Identify at least one useful insight to leverage when working with other audit clients.

EX 1.3 (LO 2, 4) Financial Accounting Apply the Data Analysis Process Bonnie, the CFO for a large retail company, has asked you to perform data analysis to identify obsolete inventory and to calculate an inventory obsolescence reserve for the year-end financial statements. Inventory is one of the largest assets on your balance sheet. Complete the chart.

Stage	Data Analysis Process	Response
Plan	1. What is your motivation for performing the analysis?	
	2. What is the objective of your data analysis project?	
	3. What is your strategy to achieve the objective?	
Analyze	4. What would you consider in the data set before you begin your analysis?	
	5. What information model might you use to satisfy the objective?	
	6. Assume your analysis identified several items in inventory that have not sold over the last year. How would you explore initial results?	
Report	7. Assume your analysis results in a calculation of inventory obsolescence as of year-end. What would you consider as you interpret these results?	
	8. How would you communicate your results to the CFO?	

EX 1.4 (LO 2, 4) Accounting Information Systems Auditing Critical Thinking and the Data Analysis Process You are working in the internal audit department of a publicly traded company. This is the first year the company must analyze and report on the operating effectiveness of internal controls over financial reporting.

Hito, the internal audit director, asks you to test controls associated with the authorization and authentication of users into the company's information system. Specifically, you are asked to identify whether any terminated employees continue to have access to login to the information system. You plan to request files from human resources and information technology groups. For each step in the data analysis (MOSAIC) process, use the critical thinking framework by applying at least two critical thinking elements.

Stage	Data Analysis Process	Critical Thinking
Plan	1. Motivation	
	2. Objective	
	3. Strategy	
Analyze	4. Prepare data	
	5. Build models	
	6. Explore data	
Report	7. Interpret	
	8. Communicate	

EX 1.5 (LO 2, 4) Auditing Critical Thinking and the Data Analysis Process You are a first-year external auditor assigned to a client whose primary business activity is breeding and raising bison. They sell the meat to grocery stores and distributors, who then sell to restaurants. You will audit the company's accounts receivable allowance for doubtful accounts. The client has prepared a schedule that indicates they have over 200 customers with outstanding receivables balances as of year-end. Your audit senior indicated that the primary assertion on which you should focus is valuation of the allowance for doubtful accounts. You must perform an analysis to recalculate the company's recorded balance.

For each step in the data analysis process, use the critical thinking framework by applying at least two critical thinking elements.

Stage	Data Analysis Process	Critical Thinking
Plan	1. Motivation	
	2. Objective	
	3. Strategy	
Analyze	4. Prepare data	
	5. Build models	
	6. Explore data	
Report	7. Interpret	
	8. Communicate	

EX 1.6 (LO 2, 4) Financial Accounting Critical Thinking and the Data Analysis Process You are a financial analyst working for a major airline company's accounting department. The CFO wants to understand the company's debt solvency (meaning their ability to meet their debt obligations) compared to that of its primary competitors (Southwest, Delta, American, and Alaska Air). You have been tasked with the calculation, interpretation, and evaluation of the following ratios:

Debt to equity: $\text{Total liabilities} / \text{Stockholders' equity}$

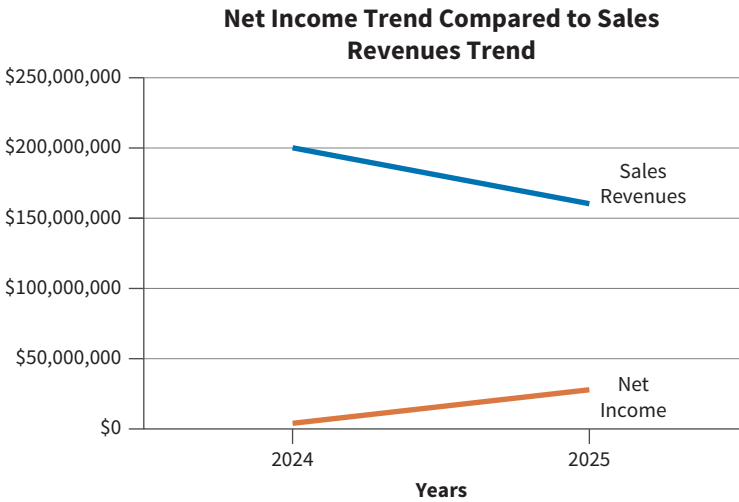
Debt to assets: $\text{Total liabilities} / \text{Total assets}$

Times interest earned: $(\text{Net income} + \text{Interest expense} + \text{Tax expense}) / \text{Interest expense}$

For each step in the data analysis process, use the critical thinking framework by applying at least two critical thinking elements.

Stage	Data Analysis Process	Critical Thinking
Plan	1. Motivation	
	2. Objective	
	3. Strategy	
Analyze	4. Prepare data	
	5. Build models	
	6. Explore data	
Report	7. Interpret	
	8. Communicate	

EX 1.7 (LO 2, 4) Financial Accounting Managerial Accounting Critical Thinking and the Data Analysis Process You are a financial analyst working for a manufacturing company that produces and sells two very different products. The vice president of operations, Jerome, has asked you to prepare an analysis to explain why the company’s total sales revenues decreased, while net income increased. He prepared the following preliminary analysis for you.



Briefly describe what you would suggest for each step in the data analysis process, then use critical thinking by describing at least two critical thinking elements for each step you listed.

Stage	Data Analysis Process	Brief Description	Critical Thinking
Plan	1. Motivation		
	2. Objective		
	3. Strategy		
Analyze	4. Prepare data		
	5. Build models		
	6. Explore data		
Report	7. Interpret		
	8. Communicate		

EX 1.8 (LO 2, 4) Tax Accounting Critical Thinking and the Data Analysis Process You work for a nonprofit in Washington D.C. whose mission is to understand and document how changes in the federal tax code cause changes in predicted federal tax revenues. Your group is currently considering several elements of the newly proposed tax reform bill. You and your team want to predict tax revenue changes if the tax rates were decreased by 1% for the middle brackets of taxable income for single filing individuals (not those who file jointly as married, separately as married, or heads of households). The tax rates you are considering are as follows:

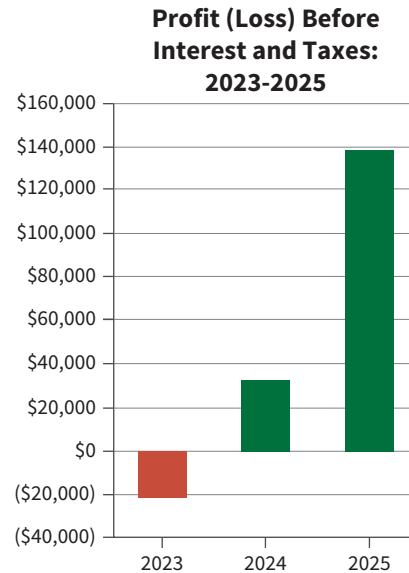
Tax Rate	Taxable Income Bracket	Tax Owed
22%	\$40,126 to \$85,525	\$4,617.50 + 22% on income over \$40,125
24%	\$85,526 to \$163,300	\$14,605.50 + 24% on income over \$85,525
32%	\$163,301 to \$207,350	\$33,271.50 + 32% on income over \$163,300

Briefly describe what you would suggest for each step in the data analysis process, then apply two critical thinking elements to each step listed.

Stage	Data Analysis Process	Brief Description	Critical Thinking
Plan	1. Motivation		
	2. Objective		
	3. Strategy		
Analyze	4. Prepare data		
	5. Build models		
	6. Explore data		
Report	7. Interpret		
	8. Communicate		

Professional Application Case: Little Tots Daycare

Little Tots Day Care operates in Roswell, Georgia, a suburb of Atlanta. It is a mid-sized childcare facility that serves children from three months to six years of age. The facility prides itself on providing a safe and secure environment where parents feel their children are cared for and safe. The market for childcare is very competitive, with just over 20 licensed facilities in Roswell. Little Tots opened in June of 2023 and has seen steady growth since then. As the following visual shows, they operated at a loss during the first year they opened but have increased profit significantly in the last year.



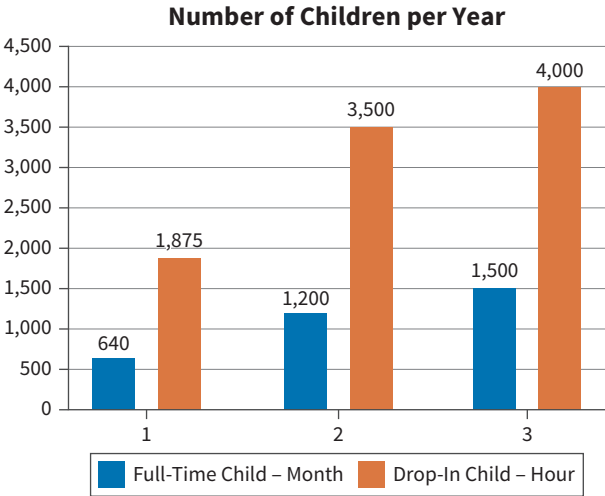
The income statement for the past three years shows that the first year ended with a loss of \$21,579, but by 2025 they earned a profit, before interest and taxes, of \$138,654.

Income Statement Year Ended December 31			
	2023	2024	2025
Income:			
Sales	\$287,787.50	\$566,527.50	\$742,214.00
Direct Cost of Sales	(\$8,586.60)	(\$17,600.00)	(\$23,760.00)
Gross Margin	<u>\$279,200.90</u>	<u>\$548,927.50</u>	<u>\$718,454.00</u>
Expenses			
Payroll	\$235,200.00	\$371,840.00	\$420,000.00
Sales and Marketing and Other Expenses	\$5,000.00	\$5,000.00	\$5,000.00
Leased Equipment	\$1,900.00	\$2,100.00	\$2,300.00
Certifications & Inspections	\$2,500.00	\$2,500.00	\$2,500.00
Utilities	\$1,900.00	\$20,000.00	\$22,000.00
Insurance	\$3,000.00	\$35,000.00	\$40,000.00
Rent	\$16,000.00	\$25,000.00	\$25,000.00
Payroll Taxes	\$35,280.00	\$55,776.00	\$63,000.00
Other	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>
Total Operating Expenses	<u>\$300,780.00</u>	<u>\$517,216.00</u>	<u>\$579,800.00</u>
Profit (Loss) Before Interest and Taxes	<u><u>(\$21,579.10)</u></u>	<u><u>\$31,711.50</u></u>	<u><u>\$138,654.00</u></u>

The balance sheet for Little Tots shows a steady growth in total assets. Total liabilities have remained relatively flat all three years.

Balance Sheet December 31			
	2023	2024	2025
Assets			
Current Assets			
Cash	\$44,676	\$45,065	\$162,840
Other Current Assets	\$0	\$25,000	\$150,000
Total Current Assets	\$44,676	\$70,065	\$312,840
Long-term Assets			
Long-term Assets	\$0	\$0	\$0
Total Assets	<u>\$44,676</u>	<u>\$70,065</u>	<u>\$312,840</u>
Liabilities and Capital			
Current Liabilities			
Accounts Payable	\$6,455	\$10,133	\$17,311
Current Borrowing	\$0	\$0	\$0
Other Current Liabilities	\$0	\$0	\$0
Subtotal Current Liabilities	\$6,455	\$10,133	\$17,311
Long-term Liabilities			
	\$22,800	\$12,800	\$2,800
Total Liabilities	\$29,255	\$22,933	\$20,111
Paid-in Capital	\$40,000	\$40,000	\$40,000
Retained Earnings	(\$3,000)	(\$24,579)	\$114,075
Earnings	(\$21,579)	\$31,711	\$138,654
Total Capital	<u>\$15,421</u>	<u>\$47,132</u>	<u>\$292,729</u>
Total Liabilities and Capital	<u>\$44,676</u>	<u>\$70,065</u>	<u>\$312,840</u>

Little Tots provides two types of services: full-time and drop-in childcare. Full-time services are charged monthly and drop-in services are charged by the hour. The next visualization shows the number of children per year for each service.



Consider how data analytics can be used at Little Tots Daycare in each of the following scenarios.

PAC 1.1 Auditing: Risk Assessment and Audit Procedures

Data Auditing Your audit team has been given a data set of all transactions for the year 2025. A sample of the file is provided.

	A	B	C	D	E	F	G	H
	ReceiptNumber	Date	Service	CustomerFirstName	CustomerLastName	ChildsFirstName	ChildsLastName	Amount
1	F-01251	1/15/2025	Full Time	Teri	Park	Nicholas	Park	\$ 125.00
2	D-01251	1/16/2025	Drop in	Esther	Rodgers	Lucia	Salazar	\$ 45.00
3	D-01252	1/17/2025	Drop in	Brandy	Morales	Krystal	Morales	\$ 60.00
4	F-01252	1/18/2025	Full Time	Hubert	Roberts	Trevor	Roberts	\$ 125.00
5	F-01253	1/19/2025	Full Time	Rebecca	Spencer	Patricia	Spencer	\$ 125.00
6	D-01253	1/20/2025	Drop in	Eula	Pierce	Alec	Luciano	\$ 30.00
7	D-01254	1/21/2025	Drop in	Alexander	Hoffman	Cassy	Hoffman	\$ 55.00

Based on the sample data set, discuss how the audit team might use the data provided to perform each of the following procedures:

1. Audit risk assessment
2. Substantive analytical procedures

PAC 1.2 Financial Accounting: Understand Financial Performance

Data Financial Accounting You have been asked to suggest how data analytics can be used to help better understand the financial position of the company.

1. Discuss how Little Tots can use SSBI software to provide information about company performance.
2. What are some financial statement analysis items that Little Tots should consider for a financial dashboard?
3. Sketch a sample of what a financial dashboard might look like for Little Tots. Consider the data that is available when determining what to include in your dashboard.

PAC 1.3 Managerial Accounting: Understand Operational Performance

Data Managerial Accounting You are preparing the next year budget plan, as well as an analysis to determine which city Little Tots should consider for expansion.

City	State	Country	Population	PercentageFive YearsOldAndUnder	NumberOfChildren FiveYrsOrUnder	MedianIncome
Atlanta	Georgia	USA	498,715	5.4%	26,931	\$ 59,948
Columbus	Georgia	USA	206,922	7.2%	14,898	\$ 46,408
Augusta	Georgia	USA	202,081	6.9%	13,944	\$ 42,592
Macon	Georgia	USA	157,346	5.0%	7,867	\$ 32,161
Savannah	Georgia	USA	147,780	6.4%	9,458	\$ 43,307
Athens	Georgia	USA	127,315	5.3%	6,748	\$ 38,311
Sandy Springs	Georgia	USA	108,080	5.9%	6,377	\$ 78,613
South Fulton	Georgia	USA	107,436	7.1%	7,628	\$ 65,919
Roswell	Georgia	USA	92,833	7.1%	6,591	\$ 99,726
Johns Creek	Georgia	USA	82,453	4.7%	3,875	\$ 122,514

1. Discuss how the managerial accounting team might use the data provided to determine a city in which they could open another daycare location.
2. Identify data that would be useful for a management accounting dashboard.
3. What type of data analytic method would you use to prepare the budget for the next year?

PAC 1.4 Tax Accounting: Use Tax Data for Decision-Making

You are helping the management accounting department with their analysis to determine a potential city for opening another location. You have gathered data from the IRS that shows information about tax returns filed in each zip code in the state of Georgia. A list of the data available for analysis follows. If an item would be useful for your analysis, indicate whether you would use the number of returns or the dollar amount in your analysis. Then, explain why you chose that specific item.

Data Available	Number of Returns	Dollar Amount	Reason
Zip Code			
Size Of Adjusted Gross Income:			
\$1 under \$25,000			
\$25,000 under \$50,000			
\$50,000 under \$75,000			
\$75,000 under \$100,000			
\$100,000 under \$200,000			
\$200,000 or more			
Number of Single Returns			
Number of Joint Returns			
Number of Head of Household Returns			
Total Income			
Salaries and Wages in AGI			
Taxable Interest			
State and Local Income Tax Refunds			
Business or Professional Net Income			
Unemployment Compensation			
Student Loan Interest			
Total Standard Deduction			
Total Itemized Deduction			
State and Local Taxes			
Total Taxes Paid			
Income Before Tax Credits			
Earned Income Credit			
Additional Child Tax Credit			

Le Grind Continuing Case: Integrate Critical Thinking and the Data Analysis Process

Visit Wiley's online learning platform for the case background, additional questions, data, and more details about the continuing case.

Students can work through the data analysis process for Le Grind Coffee Distributors throughout the course. The case is designed so students can perform each step in the data analysis process to help Le Grind analyze gross profit. Besides the continuing gross profit analysis, each chapter provides additional questions to encourage deeper exploration of Le Grind's operations.

