ACCOUNTING INFORMATION SYSTEMS AND DATA ANALYTICS: A GLOBAL PERSPECTIVE

Prof. Aida R. Lozada, Ph.D, CPA
University of Puerto Rico
&
Prof. Carolina Cubero, CPA, CISA
University of Puerto Rico

Learning Objectives

After studying this Module, students should:

1. Define an accounting information system (AIS).
2. Understand the global evolution of information systems.
3. Explain the role of accountants in AIS.
4. Define Big Data and Data Analytics.
5. Describe the benefits of using data analytics.
6. Understand the impact of data analytics on accounting.
7. Recognize accounting information systems used globally.
8. Recognize current tools used by multinational companies (MNC) for data analysis and data visualization.

This presentation contains information, in addition to the material prepared and provided by the professor, from:

1. Elizabeth A. Gordon, Temple University, Jana S. Raedy, University of North Carolina, Alexander J. Sannella, Rutgers Business School, ©2016, Pearson | ISBN13: 9780132162302
2. Donald E. Kieso, Jerry J. Weygandt, Terry D. Warfield, Intermediate Accounting, 16th Edition
3. March 2016, ©2016
4. Doupnik T. and Perera H. INTERNATIONAL ACCOUNTING- CONT4029 (Custom Edition by Prof. Aida Lozada and Prof. Carmen Ríos. McGraw-Hill, 2014. ISBN 9781308235059.
5. Thimothy, D., Finn M., Gotti, G. and Perera, H. 5ed. INTERNATIONAL ACCOUNTING. Mc Graw Hill 2020, New York.
6. J. David Spiceland, James Sepe, Mark Nelson, Intermeiate Accounting, 6th edition, McGraw-Hill, 2014. ISBN-13: 978-0077614065 ISBN-10: 0077614062
7. Other: Official Websites

ACCOUNTING INFORMATION SYSTEM AND DATA ANALYTICS

The environment in which meters operate is changing at an accelerating rate. As the complexity in the market has increased, the set of knowledge required for accountants is essential to stay competitive. For example: if we compare the profession in 2020 with the decade of the 80.

❖ today there are three times as many pages in the Revenue Code Internal
❖ four times more accounting standards
❖ five times more accounting standards audit
❖ procedures historically performed by accountants are being automated
❖ accountants are performing more tasks that require deeper critical thinking, problem solving, and professional judgment
❖ today accountants need a deeper understanding of data systems, controls, and analytics to execute their responsibilities.
❖ more information systems
❖ new tools: Big Data
❖ global stakeholders

ACCOUNTING INFORMATION SYSTEM AND DATA ANALYTICS

GLOBAL CREDENTIALS

ISACA

➢ **ISACA is a global association that provides IT professionals knowledges, credentials, education and community to advance their career and transform the organizations.**

CISA

➢ Certified Information Systems Auditor (CISA) certification, is world-renowned as the standard of achievement for those who audit, control, monitor and assess an organization's information technology and business systems.

https://www.isaca.org/

Changing Roles of Accountants in Business

The environment in which businesses operate is rapidly changing. As the complexity in the market has increased, the role of accountants has changed. If we compare the profession in 2020 with the decade 1980, we note that:

- procedures historically performed by accountants are being automated;
- accountants are performing more tasks that require deeper critical thinking, problem solving skills, and professional judgment;
- accountants need to decide what information is needed, then build an information system to gather the necessary information and finally analyze that information to offer helpful advice to management; and, therefore,
- accountants need a deeper understanding of information systems, controls, and analytics to execute their responsibilities.

Changing Roles of Accountants in Business

To prepare for their changing roles accountants must:

- Understand the business and how it collects, summarizes, and communicates business information;
- Understand how the business delivers value to its customers;
- Understand the risks that the business faces and the internal controls in place to mitigate those risks; and
- Understand how accounting information systems collect, summarize, and report business process information.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The need to be "financially bilingual" US GAAP vs IFRS

Global Perspective

#1 Walmart Inc. (WMT): USA
Revenue (TTM): $542.0 billion
Net Income (TTM): $17.9 billion
Market Cap: $392.8 billion
1-Year Trailing Total Return: 22.4%
Exchange: New York Stock Exchange

#2 China Petroleum & Chemical Corp. (SNP): China
Revenue (TTM): $355.8 billion
Net Income (TTM): $486.6 million
Market Cap: $53.5 billion
1-Year Trailing Total Return: -21.7%
Exchange: New York Stock Exchange

#3 Amazon.com Inc. (AMZN): USA
Revenue (TTM): $321.8 billion
Net Income (TTM): $13.2 billion
Market Cap: $1.6 trillion
1-Year Trailing Total Return: 78.5%
Exchange: NASDAQ

#4 PetroChina Co. Ltd. (PTR): China
Revenue (TTM): $320.0 billion
Net Income (TTM): -$1.8 billion
Market Cap: $59.2 billion
1-Year Trailing Total Return: -34.8%
Exchange: New York Stock Exchange

#5 Apple Inc. (AAPL): USA
Revenue (TTM): $273.9 billion
Net Income (TTM): $58.4 billion
Market Cap: $2.0 trillion
1-Year Trailing Total Return: 121.3%
Exchange: NASDAQ

#6 CVS Health Corp. (CVS): USA
Revenue (TTM): $264.0 billion
Net Income (TTM): $8.3 billion
Market Cap: $77.2 billion
1-Year Trailing Total Return: -3.6%
Exchange: New York Stock Exchange

#7 Royal Dutch Shell PLC (RDS.A): Netherlands
Revenue (TTM): $263.1 billion
Net Income (TTM): -$11.3 billion
Market Cap: $110.1 billion
1-Year Trailing Total Return: -46.5%
Exchange: New York Stock Exchange

#8 Berkshire Hathaway Inc. (BRK.A): USA
Revenue (TTM): $260.5 billion
Net Income (TTM): $22.2 billion
Market Cap: $520.9 billion
1-Year Trailing Total Return: 6.5%
Exchange: New York Stock Exchange

#9 Toyota Motor Corp. (TM): Japan
Revenue (TTM): $248.6 billion
Net Income (TTM): $14.4 billion
Market Cap: $182.7 billion
1-Year Trailing Total Return: 1.8%
Exchange: New York Stock Exchange

#10 Volkswagen AG (VWAGY): Germany
Revenue (TTM): $247.4 billion
Net Income (TTM): $6.4 billion
Market Cap: $94.8 billion
1-Year Trailing Total Return: 11.2%
Exchange: OTC

10 Biggest Companies in the World (by revenues)
https://www.investopedia.com/articles/active-trading/111115/why-all-worlds-top-10-companies-are-american.asp

Data vs. Information

- Data are raw facts that describe an event and have little meaning on their own.

- **Information** is defined as being data organized in a meaningful way to be useful to the user. Data serves as an input.

For example, the sales prices of a particular toy might be considered data. However, after subtracting the cost of goods sold from the sales price to compute the margin would only be considered information if it helps a retailer decide whether to carry that particular toy in its inventory.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Attributes of useful information

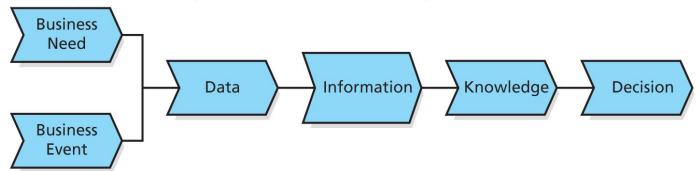To be useful information must have these attributes:
- Relevant – information that is capable of making a difference in a decision
  - Predictive Value
  - Feedback Value
  - Timely
- Reliable – information that is free from bias and error
  - Verifiable
  - Representational Faithfulness
  - Neutrality

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Information Value Chain

The transformation from a business need and business event to the collection of data and information to an ultimate decision is called the information value chain.

FIGURE 1.2
Information Value Chain

Business Need → Business Event → Data → Information → Knowledge → Decision

Statements on Management Accounting, Institute of Management Accountants, 2008.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.
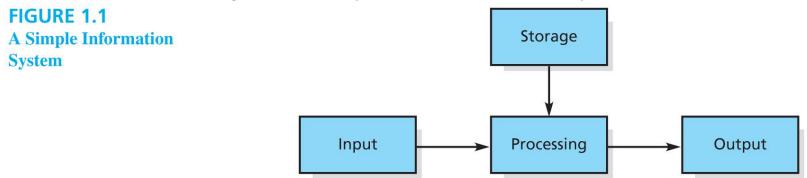
Accounting Information Systems

An accounting information system (AIS) is defined as a <u>system that records, processes and reports</u> on transactions to provide financial and non-financial information to make decisions and have appropriate levels of internal controls (security measures to protect sensitive data) for those transactions.

An AIS is important because it provides information that companies are required to have and also information that can be used to make important decisions, such as, the most effective way to allocate resources such as talent, capital, and expense dollars.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

A Simple Information System

FIGURE 1.1
A Simple Information System

Possible Input: Sales at Starbucks

Possible Storage: Database of all Sales at Starbucks

Possible Processing: Queries of What Sells Best at Night

Possible Output: Reports of What Sells Best at Night

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

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IT Strategic Role

What role does IT have for the organization?

- **Automate**, i.e., replacing human labor in automating business processes
- **Informate-up**, i.e., provide information about business activities to senior management
- **Informate-down**, i.e., provide information about business activities to employees across the firm
- **Transform**, i.e., fundamentally redefine business processes and relationships

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Why study AIS?

- It's fundamental to accounting.
- Accounting is an information providing activity, so accountants need to understand:
    - o How the system that provides that information is design, implemented, and used;
    - o How financial information is reported; and
    - o How information is used to make decisions

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Why study AIS?

Specific questions accountants might be able to address by using AIS include business opportunities as whether to:

- outsource a business function to India; or
- promote a product over another based on which is most profitable.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

What can AIS do?

- Imagine Starbucks' system, which can track a variety of things.
  - The number of hours worked by employees all over the world.
  - The amount of sales taxes to be paid by one store.
- Wal-Mart also has an extensive information system.
  - Tracks purchases.
  - Reports purchases to its key suppliers to help them establish demand for their products to assist them in planning.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.v

Role of Accountants in AIS

The International Federation of Accountants (IFAC) notes:

"IT has grown (and will continue to grow) in importance at such a rapid pace and with such far reaching effects that it can no longer be considered a discipline peripheral to accounting. Rather, professional accounting has merged and developed wit IT to such extent that one can hardly conceive of accounting independent from IT."

Role of Accountants in AIS

- Designer, System Analyst
- Implementer, Database Administrator
- User, Record Journal Entries
- Evaluator, Auditor
- Manager, Controller or CFO

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Certifications

Richardson, V. J., Chang, C.,
& Smith, R. (2018).
*Accounting Information
Systems.* New York: McGraw-
Hill Education.

FIGURE 1.3 Certifications in Accounting Information Systems

Name	Certifying Body	Who They Are and What They Do	How to Qualify
Certified Information Systems Auditor (CISA)	Information Systems Audit and Control Association (ISACA) www.isaca.org	The CISA designation identifies those professionals possessing IT audit, control, and security skills. Generally, CISAs will perform IT audits to evaluate the accounting information system's internal control design and effectiveness.	To qualify as a CISA, a candidate must take an examination and obtain specialized work experience.
Certified Information Technology Professional (CITP)	American Institute of Certified Public Accountants (AICPA) www.aicpa.org	The CITP designation identifies accountants (CPAs) with a broad range of technology knowledge and experience. The CITP designation demonstrates the accountant's ability to leverage technology to effectively and efficiently manage information while ensuring the data's reliability, security, accessibility, and relevance. CITPs may help devise a more efficient financial reporting system, help the accounting function go paperless, or consult on how an IT function may transform the business.	A CPA can earn a CITP designation with a combination of business experience, lifelong learning, and an optional exam.
Certified Internal Auditor (CIA)	Institute of Internal Auditors (IIA) http://www.theiia.org/	The CIA designation is the only globally accepted certification for internal auditors and is the standard to demonstrate their competency and professionalism in the internal auditing field.	An individual can earn a CIA designation by having the required education, professional experience, and character references; the individual must also pass the CIA examination.

AIS and Internal Business Processes

- AIS usually serves as the foundation for the enterprise (or ERP) system.
- The enterprise system is a centralized database that collects data from throughout the company including orders, customers, sales, inventory, and employees. Examples of global ERP systems:
    - o Oracle
    - o SAP
- Information across the whole business is thus available to everyone within the company in a useful and timely way.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Use of an Enterprise System

• The enterprise system can take an order from a customer, fill the order, ship it, and then create an invoice to bill the customer. Examples of its use might include:
  o Used to check customer's credit.
  o Check the inventory levels in the warehouse.
  o Determine when it can be shipped.
• Everyone throughout the entire process can view and update the information.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Supply Chain Management

• Supply Chain Management software can be used to optimize processes within the supply chain.

  o Determine levels of inventory in stock and the amount to be ordered.

  o Determine timing to transferring inventory.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

Customer Relationship Management

- This software is used to manage interactions with customers and may include the following:
  - o Track customer purchases
  - o Ensure customer satisfaction
  - o Product placement

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The Effect of AIS on the Income Statement

FIGURE 1.8
The Potential Effect of AIS on an Income Statement

Income Statement	Effect of AIS on Income Statement
Revenues	Customer relationship management (CRM) techniques could attract new customers, generating additional sales revenue.
Less: Cost of Goods Sold	Supply chain management (SCM) software allows firms to carry the right inventory and have it in the right place at the right time. This, in turn, will lower obsolescence as well as logistics and procurement costs.
Gross Margin	
Less: Selling, General, and Administrative Expenses (SG&A)	An efficient enterprise system can significantly lower the cost of support processes included in sales, general, and administrative expenses.
Less: Interest Expense	SCM software allows the firm to carry less inventory. Less inventory leaves less assets to finance and may possibly reduce debt and its related interest.
Net Income	All combined, a well-designed and well-functioning AIS with investments in enterprise systems, SCM and/or CRM may be expected to improve net income.

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Big Data

- Big Data is defined as datasets that are too large and complex for businesses' existing systems to handle using their traditional capabilities to capture, store, manage and analyze these data sets.
- The three Vs—volume, velocity, and variety—are often used to represent the defining features of Big Data.
  - *Volume* refers to the massive amount of data involved.
  - *Velocity* refers to the fact that the data comes in at quick speeds or in real time, such as streaming videos and news feeds.
  - *Variety* refers to unstructured and unprocessed data, such as comments in social media, emails, global positioning system (GPS) measurements, etc.

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Data Analytics

- **Data Analytics** is defined as the science of examining raw data, removing excess noise and organizing the data with the purpose of drawing conclusions for decision making.
- Data analytics often involves the technologies, systems, practices, methodologies, databases, and applications used to analyze diverse business data to help organizations make sound and timely business decisions.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The impact of Data Analytics in Accounting

According to the results of 18th Annual Global CEO Survey conducted by PricewaterhouseCoopers (PwC), many CEOs express that they put a high value on data analytics and 80% of them place data mining and analysis as the second-most important strategic technology for CEOs.

data mining – process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data analysis.

The impact of Data Analytics in Accounting

Many financial statement accounts are just estimates. Data Analytics can assist financial accountants to answer questions such like:
- How much of the accounts receivable balance will be collected?
- Is any of our inventory obsolete? Are customers still interested in it? Should inventory be valued al market or cost?
- Other questions related to items such as, goodwill write-down, warranty claims, etc.

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The impact of Data Analytics in Accounting

- Data analytics plays a critical role in the future of audit. By using data analytics, auditors are able to spend less time looking for evidence, which will allow more time for presenting their findings and making judgments.
- Data analytics also expands auditors' capabilities in services such as testing for fraudulent transactions and automating compliance-monitoring activities (e.g., filing financial reports with the SEC or IRS).

Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The impact of Data Analytics in Accounting

- Continuous auditing – method, usually technology-driven, used by auditors to perform audit-related activities on a continual basis in order to automate error checking and data verification in real-time.
- Data analytics will also allow auditors to vastly expand sampling beyond current traditional sample sizes and, in many cases, may be able to test the full population of transactions.
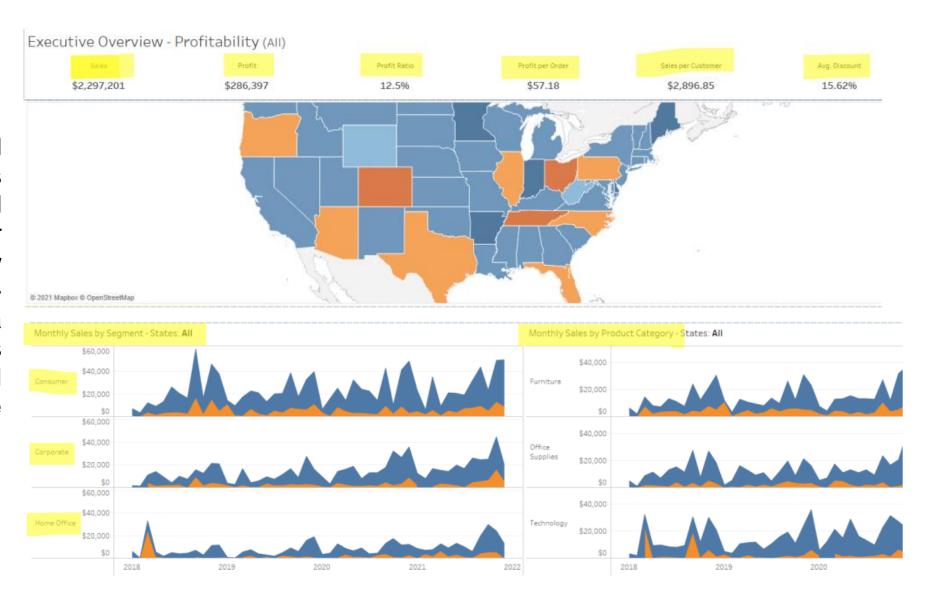
Richardson, V. J., Chang, C., & Smith, R. (2018). *Accounting Information Systems.* New York: McGraw-Hill Education.

The impact of Data Analytics in Accounting

- Management accountants will use data analytics to support value creation, which can be through increasing efficiency, and improving profitability and cash flow. Examples of areas in which management accountants can use data analytics include:
    - o Inventory management
    - o Production planning
    - o Logistics
    - o Price optimization

The need to be "financially bilingual" US GAAP vs IFRS

TABLEAU

It is a data analysis and visualization tool that aims to help people see and understand data. In other words, it converts the raw data into a very easy-to-understand format. Data analysis is excellent as it is a powerful visualization tool in the business intelligence industry.
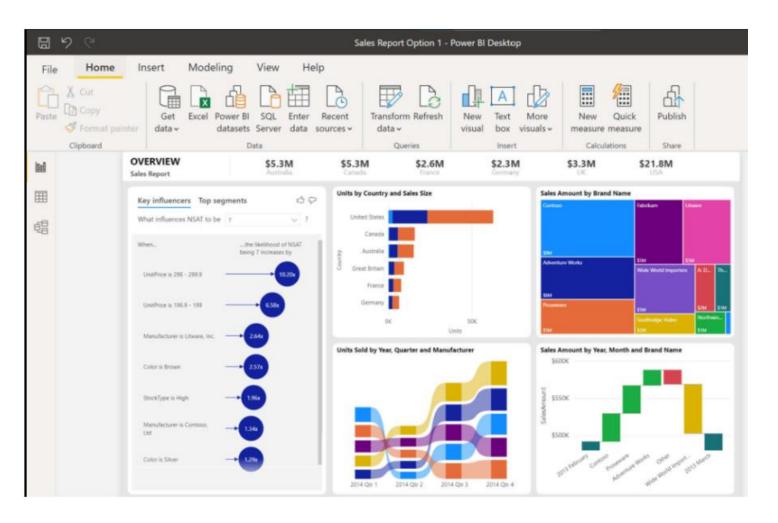
Extracted from:
https://www.tableau.com/

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POWER BI

Power BI is a business analysis service from Microsoft. The goal is provided interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards. Can be use it to extract data from a wide range of cloud and cloud systems installations and create dashboards that track the metrics that matter most to you, or dig deep and (literally) ask questions about your data.
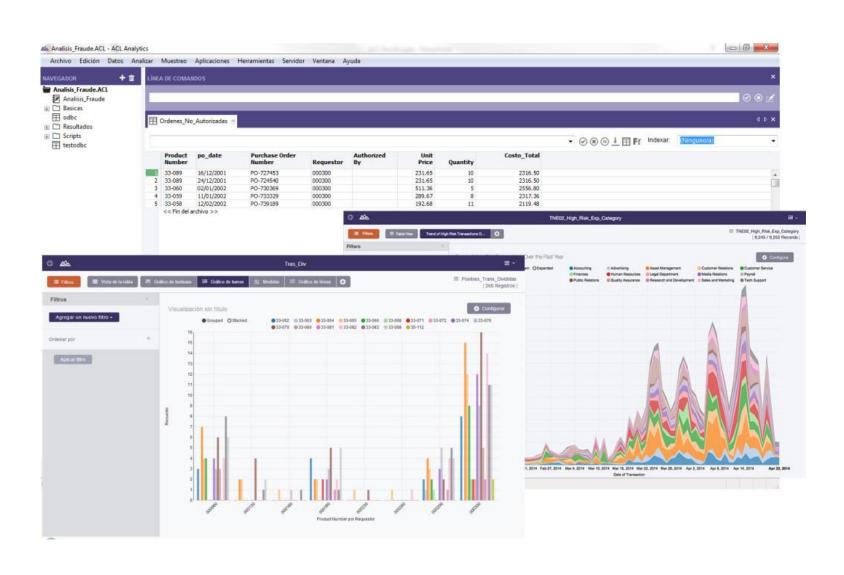

Extracted from:
https://powerbi.microsoft.com/en-us/

Audit Control Language (ACL)

An industry-standard computer-assisted audit tool for data extraction and analysis that assist auditors in fraud detection and prevention, and risk management. It samples large data sets to find irregularities or patterns in transactions that could indicate control weaknesses or fraud.

Extracted from:
https://www.oit.va.gov/Services/TRM/ToolPage.aspx?tid=6681

How can it be integrated into International Accounting courses?

Comparative reports by: countries, regions, cities, territories, jurisdictions, etc.

- Sales Reports
- Financial data comparisons
- Projections and Budgets
- Cost comparison
- Units sold report
- Product revenue

¡Muchas gracias por su atención!

Aida R. Lozada
aida.lozada@upr.edu

Carolina Cubero Rivera
carolina.ccubero@upr.edu