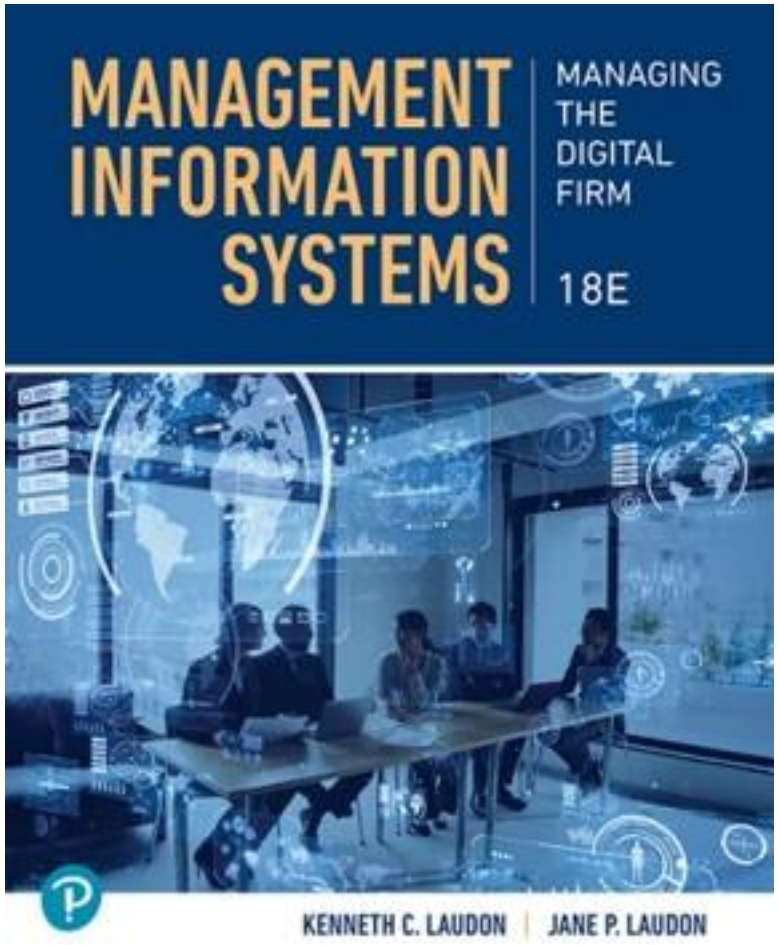
Management Information Systems: Managing the Digital Firm

Eighteenth Edition



Chapter 12

Enhancing Decision Making with Data Analytics and Business Intelligence

Learning Objectives (1 of 2)

12.1 Describe the different types of business decisions.

12.2 Describe the decision-making process.

12.3 Describe the different roles managers play.

12.4 Understand the value of improved decision making.

12.5 Understand why information systems do not always result in better decisions.

Learning Objectives (2 of 2)

12.6 Discuss how data analytics, BI and AI support decision making.

12.7 Describe the capabilities of BI systems.

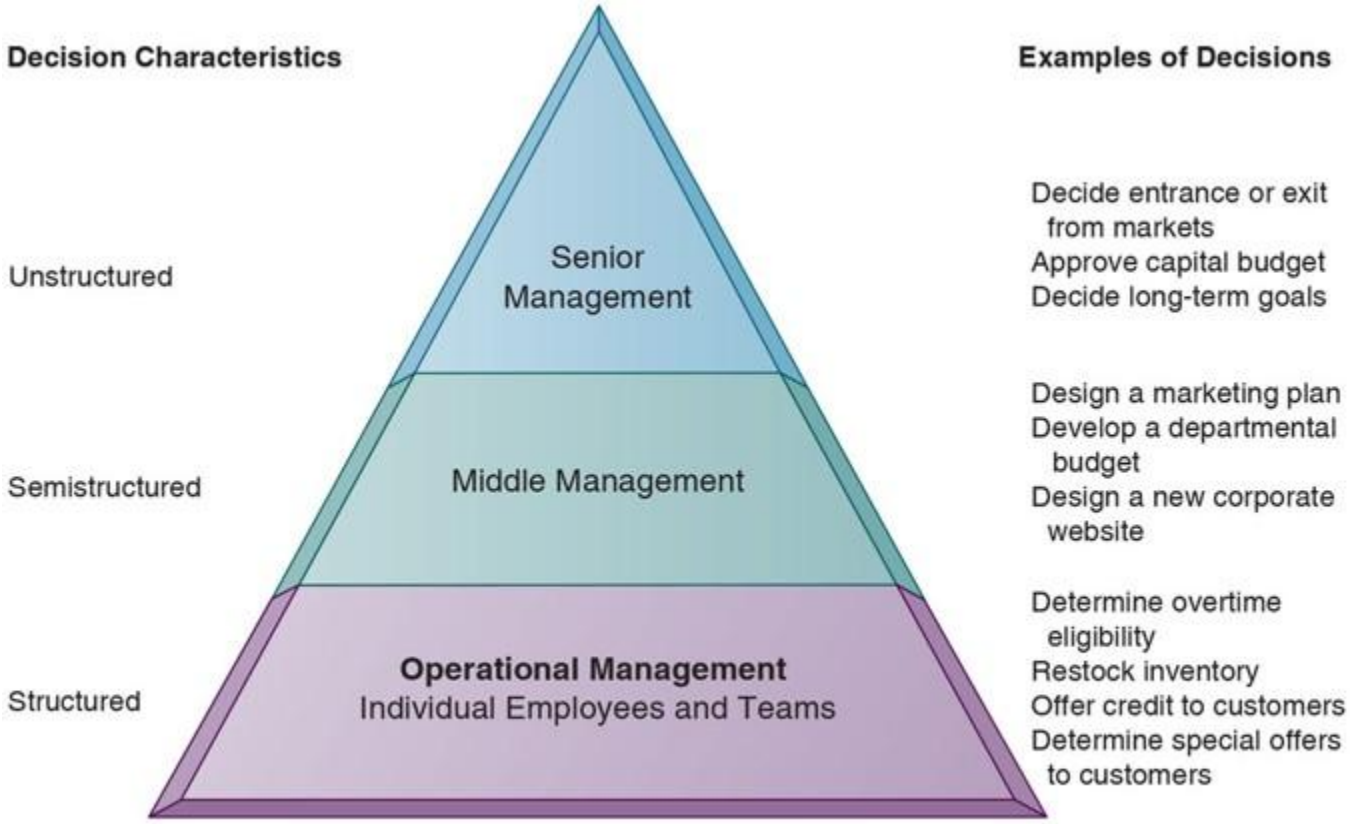
12.8 Understand the different types of BI users.

12.9 Understand how the information in this chapter can help your career.

Describe the Different Types of Business Decisions (1 of 2)

- Types of business decisions
  - Unstructured
    - Decision maker must provide judgment, evaluation, and insight to solve problem
  - Structured
    - Repetitive and routine; involve definite procedure for handling so they do not have to be treated each time as new
  - Semistructured
    - Only part of problem has clear-cut answer provided by accepted procedure

Figure 12.1 Information Requirements of Key Decision-Making Groups in a Firm



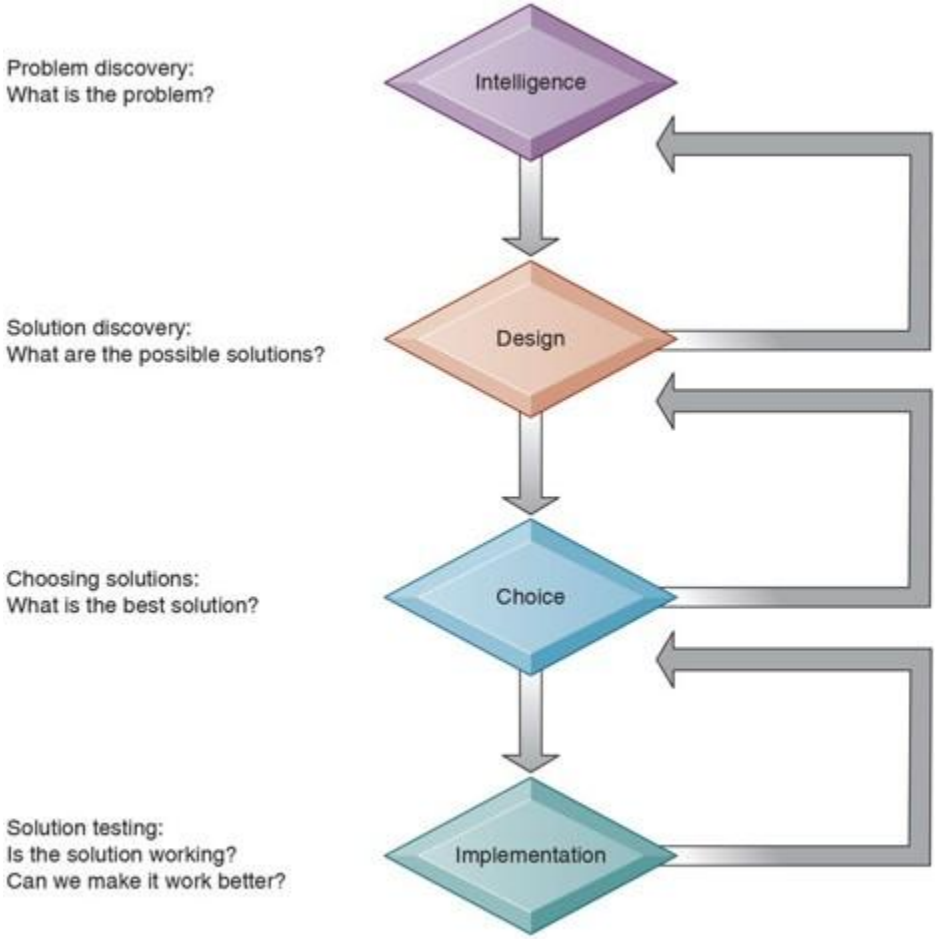
Describe the Decision-Making Process (1 of 2)

- Making a decision is a multistep process
- Simon (1960) described four different stages in decision making: intelligence, design, choice, and implementation

Describe the Decision-Making Process (2 of 2)

- Intelligence
  - Discovering, identifying, and understanding the problems occurring in the organization
- Design
  - Identifying and exploring solutions to the problem
- Choice
  - Choosing among solution alternatives
- Implementation
  - Making chosen alternative work and continuing to monitor how well solution is working

Figure 12.2 Stages in Decision Making



Describe the Different Roles Managers Play (1 of 3)

- Systems to support decision making produce
  - Better decision making by managers and employees
  - Above-average returns on investment for the firm
  - Ultimately, higher profitability

Describe the Different Roles Managers Play (2 of 3)

- Classical model of management: five functions
  - Planning, organizing, coordinating, deciding, and controlling
- Behavioral model of management
  - Argues that the actual behavior of managers appears to be less systematic, more informal, less reflective, more reactive, and less well organized than the classical model would have us believe

Describe the Different Roles Managers Play (3 of 3)

- Managerial roles
  - Expectations of the activities that managers should perform in an organization
- Mintzberg found that these managerial roles fell into three categories
  - Interpersonal
  - Informational
  - Decisional

Mintzberg's 10 Managerial Roles (1 of 2)

- Interpersonal roles
  - Figurehead
  - Leader
  - Liaison
- Informational roles
  - Nerve center
  - Disseminator
  - Spokesperson

Mintzberg's 10 Managerial Roles (2 of 2)

- Decisional roles
  - Entrepreneur
  - Disturbance handler
  - Resource allocator
  - Negotiator

Understand the Value of Improved Decision Making

- One of the main contributions of information systems has been to improve decision making for both individuals and groups
- What does it mean to a business to make better decisions?
- What is the monetary value of improved decision making?

Understand Why Information Systems Do Not Always Result in Better Decisions

- Three main reasons why investments in I T do not always produce positive results
  - Information quality
    - High-quality decisions require high-quality information
  - Management filters
    - Managers have selective attention and have variety of biases that reject information that does not conform to prior conceptions
  - Organizational inertia and politics
    - Strong forces within organizations resist making decisions calling for major change

High-Velocity Automated Decision Making

- Made possible through computer algorithms precisely defining steps for a highly structured decision
  - Humans taken out of decision
- For example: High-speed computer trading programs
  - Trades executed in nanoseconds
- Require safeguards to ensure proper operation and regulation

Risks Introduced by Using AI in Decision Making

- Using AI for management decision making presents a number of challenges
- Risks include the potential for
  - Ingrained bias
  - Concerns about the data upon which the decisions are being based
  - Accuracy
  - Lack of transparency as to how decisions are arrived at
  - Potential ethical issues

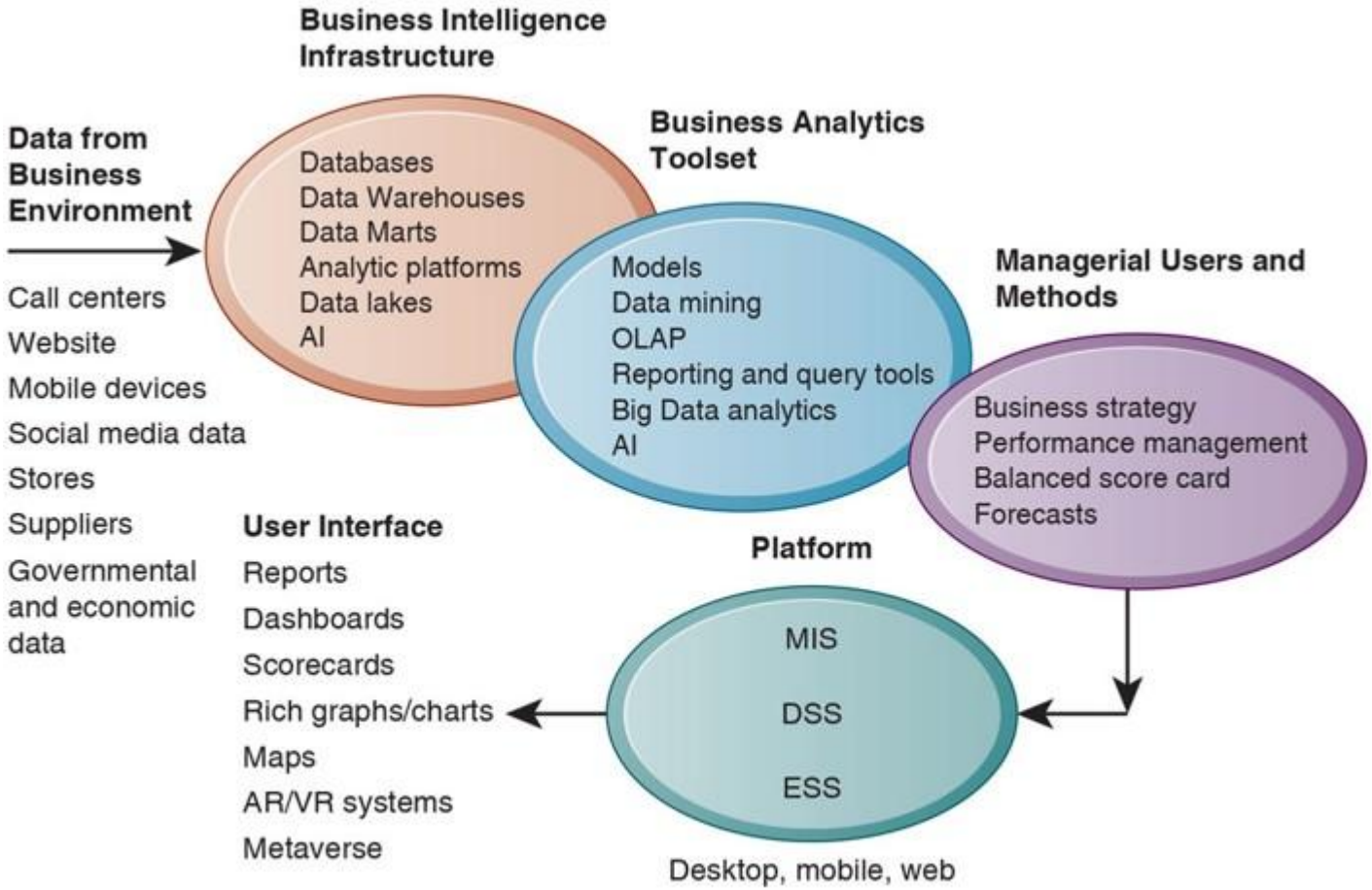
Discuss How Data Analytics, BI, and AI Support Decision Making (1 of 4)

- Data analytics
  - Involves collecting, storing, inspecting, cleaning, modeling, and querying data
- Business intelligence (BI)
  - Infrastructure for collecting, storing, and analyzing data produced by business
  - Databases, data warehouses, data marts, Hadoop, analytic platforms

Discuss How Data Analytics, BI, and AI Support Decision Making (2 of 4)

- Business analytics (BA)
  - Tools and techniques for analyzing data
  - O L A P, statistics, models, data mining

Figure 12.3 BI and Analytics for Decision Support



Discuss How Data Analytics, BI, and AI Support Decision Making (3 of 4)

- Six elements in the business intelligence environment
  - Data from the business environment
  - BI infrastructure
  - BI and BA toolsets
  - Managerial users and methods
  - Delivery platform—M I S, D S S, E S S
  - User interface
    - Data visualization
      - Helps users see patterns and relationships in large amounts of data by presenting the data in graphical form

Discuss How Data Analytics, BI, and AI Support Decision Making (4 of 4)

- BI software
  - Tableau Software is a leading BI and data visualization tool
- Virtual reality (VR)
  - Powerful capabilities for three-dimensional data visualization
  - VR systems use interactive graphics software and hardware
    - Creates computer-generated simulations that close to reality that users almost believe they are participating in a real-world situation
- Augmented reality (AR)
  - A related technology for enhancing visualization by overlaying digital data and images onto a physical real-world environment

Describe the Capabilities of BI Systems

- Goal is to deliver accurate real-time information to decision makers
- Main analytic functionalities of B I systems
  - Production reports
  - Parameterized reports
  - Dashboards/scorecards
  - Ad hoc query/search/report creation
  - Drill down
  - Forecasts, scenarios, models

Predictive and Prescriptive Analytics

- Predictive analytics
  - Uses statistical analysis, data mining techniques, historical data, and assumptions about future conditions to predict future trends and behavior patterns
- Prescriptive analytics
  - Differs from predictive analytics in not only predicting future outcomes but also recommending actions or decisions to achieve desired outcomes or prevent undesirable ones

Big Data Analytics

- Big data: Massive datasets collected from social media, online and in-store customer data, and so on
- Help create real-time, personalized shopping experiences for major online retailers
- Smart cities in the public sector
  - Public record data
  - Sensors, location data from smartphones
  - Ability to evaluate effect of one service change on system

Operational Intelligence and Analytics

- Operational intelligence
  - A form of BI and BA that can be used to deliver insights about activities inside and outside the organization from these streams of big data as they are generated in real time
- Collection and use of data generated by sensors
- Internet of Things (IoT)
  - Creating huge streams of data from web activities, sensors, and other monitoring devices
- Software for operational intelligence and analytics enable companies to analyze their big data

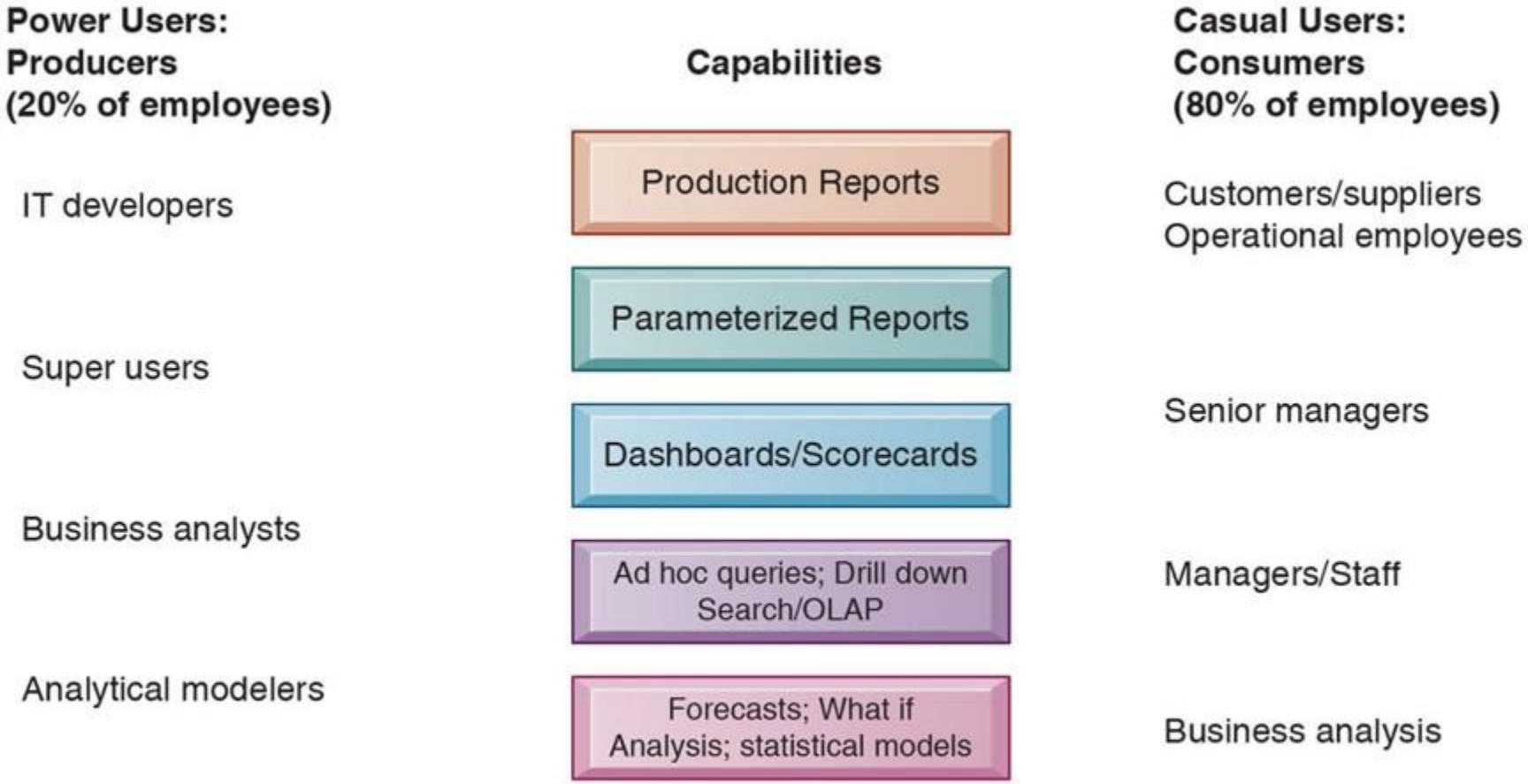
Location Analytics and Geographic Information Systems

- Location analytics
  - Ability to gain business insight from the location (geographic) component of data
    - Mobile devices
    - Output from sensors, scanning devices
    - Map data
- Geographic information systems (G I S)
  - Ties location-related data to maps
  - Example: For helping local governments calculate response times to disasters

Understand the Different Types of BI Users

- Senior executives use BI to monitor firm activities using visual interfaces like dashboards and scorecards
- Middle managers and analysts are more likely to be immersed in the data and software, entering queries and slicing and dicing the data along different dimensions
- Operational employees will, along with customers and suppliers, be looking mostly at prepackaged reports

Figure 12.4 BI Users



Support for Semistructured Decisions (1 of 2)

- Decision-support systems
  - Support for semistructured decisions
  - Use mathematical or analytical models

Support for Semistructured Decisions (2 of 2)

- Decision-support systems allow varied types of analysis
  - "What-if" analysis
  - Sensitivity analysis
    - A form of modeling that involves asking what-if questions repeatedly to predict a range of outcomes when one or more variables are changed multiple times
  - Backward sensitivity analysis
  - Multidimensional analysis / O L A P
    - For example: pivot tables

Figure 12.5 Sensitivity Analysis

Total fixed costs	**19000**					
Variable cost per unit	**3**					
Average sales price	**17**					
Contribution margin	**14**					
Break-even point	**1357**					
		Variable Cost per Unit				
Sales	**1357**	**2**	**3**	**4**	**5**	**6**
Price	**14**	1583	1727	1900	2111	2375
	15	1462	1583	1727	1900	2111
	16	1357	1462	1583	1727	1900
	17	1267	1357	1462	1583	1727
	18	1188	1267	1357	1462	1583

Decision Support for Senior Management: Balanced Scorecard and Business Performance Management Methods (1 of 3)

- E S S: decision support for senior management
  - Help executives focus on important performance information
- Balanced scorecard method
  - Measures outcomes on four dimensions
    - Financial
    - Business process
    - Customer
    - Learning and growth
  - Key performance indicators (K P I s) measure each dimension

Figure 12.7 The Balanced Scorecard Framework

Decision Support for Senior Management: Balanced Scorecard and Business Performance Management Methods (2 of 3)

- Key performance indicators (KPIs)
  - Measures proposed by senior management for understanding how well the firm is performing along any given dimension
- Business performance management (B P M)
  - Translates firm's strategies (e.g., differentiation, low-cost producer, scope of operation) into operational targets

Decision Support for Senior Management: Balanced Scorecard and Business Performance Management Methods (3 of 3)

- Data for a firm's ESS are supplied by the firm's existing enterprise applications:
  - Enterprise resource planning
  - Supply chain management
  - Customer relationship management

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