Chapter 1

DECISION SUPPORT SYSTEMS AND BUSINESS INTELLIGENCE
Learning Objectives

• Understand today’s turbulent business environment and describe how organizations survive and even excel in such an environment
• Understand the need for computerized support of managerial decision making
• Understand an early framework for managerial decision making
• Learn the conceptual foundations of the decision support systems (DSS) methodology
Learning Objectives

• Describe the business intelligence (BI) methodology and concepts and relate them to DSS
• Describe the concept of work systems and its relationship to decision support
• List the major tools of computerized decision support
• Understand the major issues in implementing computerized support systems
Changing Business Environments and Computerized Decision Support

• The business pressures-responses-support model
  – The business environment
  – Organizational responses: be reactive, anticipative, adaptive, and proactive
  – Computerized support
Managerial Decision Making

• The nature of managers’ work
  – Interpersonal
  – Informational
  – Decisional
Managerial Decision Making

**Figure 1.1** The Business Pressures—Responses—Support Model

- **Business Environmental Factors**
  - Globalization, consumer demands, government regulations, markets and competition etc.

- **Organization Responses**
  - Strategy, partners' collaboration, real-time response, agility, increased productivity, new vendors, new business models, etc.

- **Decisions and Support**
  - Analysis, decisions, predictions
    - Integrated computerized decision support
    - Business intelligence
Managerial Decision Making

• The process of decision making
  1. Defining the problem (a decision situation that may deal with some difficulty or with an opportunity)
  2. Constructing a model that describes the real-world problem
  3. Identifying possible solutions to the modeled problem and evaluating the solutions
  4. Comparing, choosing, and recommending a potential solution to the problem
Managerial Decision Making

• Decision support systems (DSS)
A conceptual framework for a process of supporting managerial decision-making, usually by modeling problems and employing quantitative models for solution analysis
Computerized Support for Decision Making

• Why use computerized decision support systems
  – Speedy computations
  – Improved communication and collaboration
  – Increased productivity of group members
  – Improved data management
  – Managing giant data warehouses
Computerized Support for Decision Making

• Why use computerized decision support systems
  – Quality support
  – Agility support
  – Overcoming cognitive limits in processing and storing information
  – Using the Web
  – Anywhere, anytime support
Computerized Support for Decision Making

• Cognitive limits
  The limitations of the human mind related to processing information
An Early Framework for Computerized Decision Support

<table>
<thead>
<tr>
<th>Type of Decision</th>
<th>Operational Control</th>
<th>Managerial Control</th>
<th>Strategic Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td>Accounts receivable, accounts payable, order entry</td>
<td>Budget analysis, short-term forecasting, personnel reports, make-or-buy</td>
<td>Financial management (investment), warehouse location, distribution systems</td>
</tr>
<tr>
<td>Semistructured</td>
<td>Production scheduling, inventory control</td>
<td>Credit evaluation, budget preparation, plant layout, project scheduling, reward system design, inventory categorization</td>
<td>Building new plant, mergers and acquisitions, new product planning, compensation planning, quality assurance planning, HR policies, inventory planning</td>
</tr>
<tr>
<td>Unstructured</td>
<td>Selecting a cover for a magazine, buying software, approving loans, help desk</td>
<td>Negotiating, recruiting an executive, buying hardware, lobbying</td>
<td>R &amp; D planning, new technology development, social responsibility planning</td>
</tr>
</tbody>
</table>
An Early Framework for Computerized Decision Support

– Degree of structuredness
  • Four-phase decision making process
    – Intelligence
    – Design
    – Choice
    – Implementation
An Early Framework for Computerized Decision Support

**FIGURE 1.3 The Steps of Decision Support**

- **Problem or opportunity**
  - Environment, scanning reports, queries, and comparisons

- **Implementation**
  - Put solution into action

- **Comparand select**

- **Choice**

- **Intelligence**
  - Creativity; find alternatives and solutions
An Early Framework for Computerized Decision Support

– Types of control in all managerial activities
  - Strategic planning
  - Management control
  - Operational control

– The decision support matrix
  - For *semistructured decisions* and *unstructured decisions*, conventional MIS and MS tools are insufficient
  - Decision support systems (DSS) are used
An Early Framework for Computerized Decision Support

- Computer support for structured decisions
  - Management science (MS) or operations research (OR)

The application of a scientific approach and mathematical models to the analysis and solution of managerial decision situations (e.g., problems, opportunities)
An Early Framework for Computerized Decision Support

• Computer support for structured decisions
  – Automated decision systems (ADS)
    A business rules-based system that uses intelligence to recommend solutions to repetitive decisions (such as pricing)
An Early Framework for Computerized Decision Support

**FIGURE 1.4** Automated Decision-Making Framework

- **Foundations and Sources**
  - Technology
  - DSS theories
  - Artificial intelligence
  - Business processes

- **Business decision rules**
  - Automated decision-making systems

- **Types**
  - Customized
  - Standard
An Early Framework for Computerized Decision Support

- Computer support for unstructured decisions
  - Customized solutions
  - Intuition and judgment
  - Computerized communication and collaboration technologies
  - Knowledge management
An Early Framework for Computerized Decision Support

• Computer support for semistructured problems
  – A combination of both standard solution procedures and human judgment
  – Management Science can provide models for the structured portion
  – For the unstructured portion, a DSS can improve the quality of the information on which the decision is based by providing a range of alternative solutions along with their potential impacts
An Early Framework for Computerized Decision Support

• The benefits of computerized decision support
  – Companies work in an unstable or rapidly changing economy.
  – There are difficulties in tracking the numerous business operations.
  – Competition has increased especially global competition.
  – Electronic commerce is changing the ways business is done.
  – Existing information systems do not fully support decision making.
An Early Framework for Computerized Decision Support

• The benefits of computerized decision support
  – The Information systems department is too busy to address all of management’s inquiries.
  – Special analysis of profitability and efficiency is needed.
  – Accurate information is needed.
  – Computerized support is viewed as an organizational winner.
  – New information is needed.
An Early Framework for Computerized Decision Support

• The benefits of computerized decision support
  – Management mandates computerized decision support.
  – Higher decision quality is needed.
  – Improved communication.
  – Improved customer and employee satisfaction.
  – Timely information is provided.
  – Cost reduction is achieved.
  – Employees’ productivity has been improved.
The Concept of Decision Support Systems (DSS)

• DSS as an Umbrella term: Describes any computerized system that supports decision making in an organization
  – DSS as a specific application
  – The architecture of DSS
    • Data
    • Models manipulate data as related to a specific situation
    • Knowledge component
    • Users
    • User interface
The Concept of Decision Support Systems (DSS)
The Concept of Decision Support Systems (DSS)

- Types of DSS
  - *model-oriented DSS*: quantitative models used to generate a recommended solution to a problem
  - *data-oriented DSS*: support ad-hoc reporting and queries
A Framework for Business Intelligence (BI)

• Business intelligence (BI)
  An umbrella term that combines architectures, tools, databases, applications, and methodologies

• Evolution of BI
A Framework for Business Intelligence (BI)
A Framework for Business Intelligence (BI)

• BI architecture
  – Data warehouse
  – Business analytics
  – Performance management (BPM)
A Framework for Business Intelligence (BI)
A Framework for Business Intelligence (BI)

- Data warehouse
  - Originally, included historical data that were organized and summarize, so end users could easily view or manipulate data and information
  - Today, some data warehouses include current data as well, so they can provide real time decision support
A Framework for Business Intelligence (BI)

• Business analytics
  – Reporting and queries
  – Advanced analytics
  – Data, text and Web mining and other sophisticated mathematical and statistical tools
A Framework for Business Intelligence (BI)

• Data mining

A process of searching for unknown relationships or information in large databases or data warehouses, using intelligent tools such as neural computing, predictive analytics techniques, or advanced statistical methods.
A Framework for Business Intelligence (BI)

• Business performance management (BPM)
  An advanced performance measurement and analysis approach that embraces planning and strategy
  – BPM extends the monitoring, measuring, and comparing of sales, profit, cost, profitability, and other performance indicators by introducing the concept of “management and feedback
  – BPM provides a top-down enforcement of corporate-wide strategy
A Framework for Business Intelligence (BI)

• Business performance management
  – User interface
  – Dashboard
    A visual presentation of critical data for executives to view. It allows executives to see hot spots in seconds and explore the situation
  – Dashboards integrate information from multiple business areas
    • Visualization tools
A Framework for Business Intelligence (BI)

- Styles of BI
  1. Report Delivery and Alerting
  2. Enterprise Reporting (dashboard, scorecard)
  3. Cube Analysis (Slice and Dice Analysis)
  4. Ad-hoc Query
  5. Statistics and Data Mining
A Framework for Business Intelligence (BI)

• Benefits of BI
  – Faster, more accurate reporting
  – Improved decision making
  – Improved customer service
  – Increased revenue
A Framework for Business Intelligence (BI)

• The DSS-BI connection
  1. The architecture is very similar since BI evolved from DSS
  2. DSS are constructed to directly support specific decision making; BI systems are geared to provide accurate and timely information (indirect support)
  3. BI has an executive and strategy orientation while DSS has been oriented toward analysts
A Framework for Business Intelligence (BI)

• The DSS-BI connection

4. BI systems are constructed with commercially available tools and components that are fitted to the needs of organizations; DSS more programming is used to construct custom solutions to very unstructured problems.

5. DSS were developed mostly in the academic world; BI were developed mostly by software companies.

6. Many tools used by BI are also considered DSS tools (e.g., data mining and predictive analysis).
A Framework for Business Intelligence (BI)

• Management support systems (MSS)
  A system that applies any type of decision support tool or technique to managerial decision-making
A Work System

View of Decision Support

• Work system

A system in which human participants and/or machines perform a business process using information, technology, and other resources to produce products and/or services for internal or external customers.
A Work System View of Decision Support

- Nine elements of a work system
  1. Business process
  2. Participants
  3. Information
  4. Technology
  5. Product and services
  6. Customers
  7. Infrastructure
  8. Environment
  9. Strategy
The Major Tools and Techniques of Managerial Decision Support

Computerized Tools for Decision Support

- Data management
- Reporting status tracking
- Visualization
- Business analytics
- Strategy and performance management
- Communication and collaboration
- Knowledge management
- Intelligent systems
- Enterprise systems
The Major Tools and Techniques of Managerial Decision Support

• Tools-Web connection
  – All of these tools are available in both web-based and non web-based formats

• Hybrid (integrated) support systems
  A support system that uses several tools and techniques to assist management in solving managerial or organizational problems and assess opportunities and strategies
Implementing Computer-Based Managerial Decision Support Systems

- Developing or acquiring support systems
- Justification and cost-benefit analysis
- Security and protection of privacy
- Integration of systems and applications
- The Web in DSS/BI implementation
  - Information portals and MSS