Enhancing Decision Making


Learning Objectives

• Describe different types of decisions and the decision-making process.
• Assess how information systems support the activities of managers and management decision making.
• Demonstrate how decision-support systems (DSS) differ from MIS and how they provide value to the business.
• Demonstrate how executive support systems (ESS) help senior managers make better decisions.
• Evaluate the role of information systems in helping people working in a group make decisions more efficiently.

Decision Making and Information Systems (1/3)

• Business value of improved decision making
  • Improving hundreds of thousands of “small” decisions adds up to large annual value for the business
• Types of 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

Decision Making and Information Systems (2/3)

• Senior managers:
  • Make many unstructured decisions
  • E.g., Should we enter a new market?
• Middle managers:
  • Make more structured decisions but these may include unstructured components
  • E.g., Why is order fulfillment report showing decline in Minneapolis?
• Operational managers, rank and file employees
  • Make more structured decisions
  • E.g., Does customer meet criteria for credit?
Decision Making and Information Systems (3/3)

Information Requirements of Key Decision-Making Groups in a Firm

- **Senior Management**
  - Deciding entrance or exit from markets
  - Allocating capital budget
  - Deciding long-term goals

- **Middle Management**
  - Designing a marketing plan
  - Developing a departmental budget
  - Designing a new corporate Web site
  - Determining overtime eligibility
  - Restocking inventory
  - Offering credit to customers
  - Determining special offers to customers

- **Operational Management**
  - Determining new employees and teams

- **Individual Employees and Teams**

Senior managers, middle managers, operational managers, and employees have different types of decisions and information requirements.

Figure 12-1

The Decision Making Process (2/2)

Stages in Decision Making

1. **Intelligence**
   - Discovering, identifying, and understanding the problems occurring in the organization

2. **Design**
   - Identifying and exploring solutions to the problem

3. **Choice**
   - Choosing among solution alternatives

4. **Implementation**
   - Making chosen alternative work and continuing to monitor how well solution is working

The decision-making process is broken down into four stages.

Figure 12-2

The Decision Making Process (1/2)

- **Four stages of decision making**
  1. **Intelligence**
     - Discovering, identifying, and understanding the problems occurring in the organization
  2. **Design**
     - Identifying and exploring solutions to the problem
  3. **Choice**
     - Choosing among solution alternatives
  4. **Implementation**
     - Making chosen alternative work and continuing to monitor how well solution is working

Managers and Decision Making in the Real World (1/3)

- **Information systems can only assist in some of the roles played by managers**
- **Classical model of management**
  - Five functions of managers
    - Planning, organizing, coordinating, deciding, and controlling
- **More contemporary behavioral models**
  - Actual behavior of managers appears to be less systematic, more informal, less reflective, more reactive, and less well organized than in classical model
  - Mintzberg’s behavioral model of managers defines 10 managerial roles falling into 3 categories

Figure 12-3
Managers and Decision Making in the Real World (2/3)

- Mintzberg’s 10 managerial roles
  - Interpersonal roles: Figurehead, Leader, Liaison
  - Informational roles: Nerve center, Disseminator, Spokesperson
  - Decisional roles: Entrepreneur, Disturbance handler, Resource allocator, Negotiator

Systems for Decision Support

- Four kinds of systems for decision support
  - Management information systems (MIS)
  - Decision support systems (DSS)
  - Executive support systems (ESS)
  - Group decision support systems (GDSS)

Managers and Decision Making in the Real World (3/3)

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

Management information systems

- Management information systems (MIS)
  - Help managers monitor and control business by providing information on firm’s performance and address structured problems
  - Typically produce fixed, regularly scheduled reports based on data from TPS
    - E.g., exception reports: Highlighting exceptional conditions, such as sales quotas below anticipated level
  - E.g., California Pizza Kitchen MIS
    - For each restaurant, compares amount of ingredients used per ordered menu item to predefined portion measurements and identifies restaurants with out-of-line portions
Decision Support systems (1/13)

• Decision-support systems (DSS)
  • Support unstructured and semistructured decisions
  • Model-driven DSS
    • Earliest DSS were heavily model-driven
    • E.g., voyage-estimating DSS (Chapter 2)
  • Data-driven DSS
    • Some contemporary DSS are data-driven
    • Use OLAP and data mining to analyze large pools of data
    • E.g., business intelligence applications (Chapter 6)

Decision Support systems (2/13)

• Read the Interactive Session: Management, and then discuss the following questions:
  • Is the decision support system being used by airlines to overbook flights working well? Answer from the perspective of the airlines and from the perspective of the customers.
  • What is the impact on the airlines if they are bumping too many passengers?
  • What are the inputs, processes, and outputs of this DSS?
  • What people, organization, and technology factors are responsible for excessive bumping problems?
  • How much of this is a “people” problem? Explain your answer.

Decision Support systems (3/13)

• Components of DSS
  • Database
    • Used for query and analysis
    • Current or historical data from number of applications or groups
    • May be small database or large data warehouse
  • User interface
    • Often a Web interface
  • Software system
    • With models, data mining, other analytical tools

Overview of a Decision-Support System

The main components of the DSS are the DSS database, the user interface, and the DSS software system. The DSS database may be a small database residing on a PC or a large data warehouse.
• Model:
  • Abstract representation that illustrates components or relationships of phenomenon; may be physical, mathematical, or verbal model
  • Statistical models
  • Optimization models
  • Forecasting models
  • Sensitivity analysis models

Sensitivity Analysis

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<th>Total fixed costs</th>
<th>Variable cost per unit</th>
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<tbody>
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<td>19000</td>
<td></td>
</tr>
<tr>
<td>Average sales price</td>
<td>17</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>14</td>
</tr>
<tr>
<td>Break-even point</td>
<td>1357</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sales Price</th>
<th>Variable Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1583</td>
</tr>
<tr>
<td>15</td>
<td>1583</td>
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<td>17</td>
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<tr>
<td>18</td>
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</tbody>
</table>

This table displays the results of a sensitivity analysis of the effect of changing the sales price of a necklace and the cost per unit on the product's break-even point. It answers the question, “What happens to the break-even point if the sales price and the cost to make each unit increase or decrease?”

Using spreadsheet pivot tables to support decision making

- Records of online transactions can be analyzed using Excel
  - Where do most customers come from?
  - Where are average purchases higher?
  - What time of day do people buy?
  - What kinds of ads work best?

- Pivot table:
  - Categorizes and summarizes data very quickly
  - Displays two or more dimensions of data in a convenient format

This list shows a portion of the order transactions for Online Management Training Inc. (OMT Inc.) on October 28, 2008.
A Pivot Table that Determines Regional Distribution of Customers

This PivotTable report was created using Excel 2007 to quickly produce a table showing the relationship between region and number of customers.

Figure 12-6

A Pivot Table that Examines Customer Regional Distribution and Advertising Source

In this pivot table, we are able to examine where customers come from in terms of region and advertising source. It appears nearly 30 percent of the customers respond to e-mail campaigns, and there are some regional variations.

Figure 12-7

Decision Support systems (10/13)

Decision Support systems (11/13)

• Data visualization tools:
  • Help users see patterns and relationships in large amounts of data that would be difficult to discern if data were presented as traditional lists of text

• Geographic information systems (GIS):
  • Category of DSS that use data visualization technology to analyze and display data in form of digitized maps
  • Used for decisions that require knowledge about geographic distribution of people or other resources, e.g.:
    • Helping local governments calculate emergency response times to natural disasters
    • Help retail chains identify profitable new store locations

Decision Support systems (12/13)

South Carolina used a GIS-based program called HAZUS to estimate and map the regional damage and losses resulting from an earthquake of a given location and intensity. HAZUS estimates the degree and geographic extent of earthquake damage across the state based on inputs of building use, type, and construction materials. The GIS helps the state plan for natural hazards mitigation and response.
Web-based customer decision-support systems (CDSS):
- Support decision-making process of existing or potential customer
- Use Web information resources and capabilities for interactivity and personalization to help users select products and services
  - E.g., search engines, intelligent agents, online catalogs, Web directories, newsgroup discussions, other tools
- Automobile companies that use CDSS to allow Web site visitors to configure desired car
- Financial services companies with Web-based asset-management tools for customers

Group decision support systems (Cont.):
- Enables increasing meeting size and increasing productivity
- Promotes collaborative atmosphere, guaranteeing anonymity
- Follow structured methods for organizing and evaluating ideas and preserving meeting results

Group decision support systems (GDSS):
- Interactive system to facilitate solution of unstructured problems by group of decision makers
- Hardware – computer and networking hardware, overhead projectors, display screens
- GDSS software collects, documents, ranks, edits and stores participant ideas, responses
- May require facilitator and staff

Executive support systems (ESS):
- Designed to help executives focus on important performance indications
- Balanced scorecard method:
  - Measures outcomes on four dimensions:
    - Financial
    - Business process
    - Customer
    - Learning & growth
- Key performance indicators (KPIs) measure each dimension
Executive support systems (Cont.)
- In developing an ESS, first concern is for senior executives and consultants to develop scorecard and then to automate flow of information for each KPI.

Business value of executive support systems
- Enables executive to review more data in less time with greater clarity than paper-based systems
  - Needed actions identified and carried out earlier
- Improves management performance
- Increases upper management’s span of control
  - Also enables decision making to be decentralized and take place at lower operating levels
- Increases executives’ ability to monitor activities of lower units reporting to them

Role of ESS in the firm
- Used by both executives and subordinates
- Drill-down capability: Ability to move from summary information to finer levels of detail
- Integrate data from different functional systems for firmwide view
- Incorporate external data, e.g. stock market news, competitor information, industry trends, legislative action
- Include tools for modeling and analysis
  - Primarily for status, comparison information about performance

National Life
- Markets life insurance, health insurance, and retirement/investment products executive information system
  - Executive information system:
    - Allows senior managers to access corporate databases through Web interface
    - Shows premium dollars by salesperson
    - Authorized users can drill down into these data to see product, agent, and client for each sale
    - Data can be examined by region, by product, and by broker, and accessed for monthly, quarterly, and annual time periods
Pharmacia Corporation: Global pharmaceutical firm

- Spends $2 million on research and development annually
- Balanced scorecard shows:
  - Performance of U.S. or European clinical operations in relation to corporate objectives
  - Attrition rate of new compounds under study
  - Number of patents in clinical trials
  - How funds allocated for research are being spent