

Business Information Systems

Chapters 10 & 11

Decision Making and Problem Solving





FIGURE 10.1
How Decision Making Relates to Problem Solving
The three stages of decision making—intelligence, design, and choice—are augmented by implementation and monitoring to result in problem solving.

Programmed versus Nonprogrammed Decisions

- ◆ Programmed decisions
 - Structured situations with well defined relationships
 - Quantifiable
 - Management information system

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Programmed versus Nonprogrammed Decisions

- ◆ Nonprogrammed decisions
 - Ill-structured situations with vague or changing relationships between variables
 - Not easily quantifiable in advance
 - Decision support systems

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Problem Solving Approaches

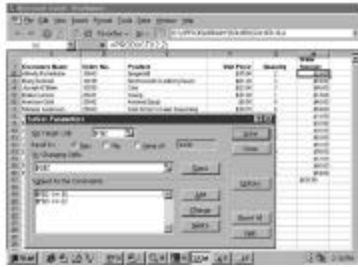
- ◆ Optimization: find the best solution
- ◆ Satisficing: find a good solution
- ◆ Heuristics: use rules of thumb

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FIGURE 10.2
 Some spreadsheet programs, such as Excel, have optimizing routines. This figure shows Solver, which can find an optimal solution given certain constraints.



An Overview of Management Information Systems



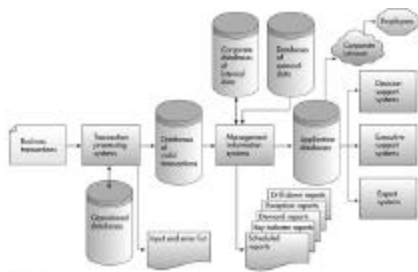


FIGURE 10.3
 Sources of Managerial Information.
 The MIS is just one of many sources of managerial information. Decision support systems, executive support systems, and expert systems also assist in decision making.

FIGURE 10.4

Reports Generated by an MIS

The five types of reports are:

(a) scheduled, (b) top indicators,

(c) demand, (d) exception, and

(e) drill-down or a DWR.

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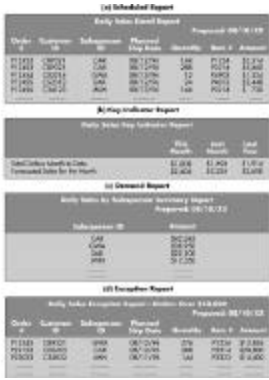


FIGURE 10.4 (continued)

Reports Generated by an MIS

(a) Manager sees actual sales

exceed forecast by 8.8 percent

for 2nd quarter 1999.

(b) Manager views sales and

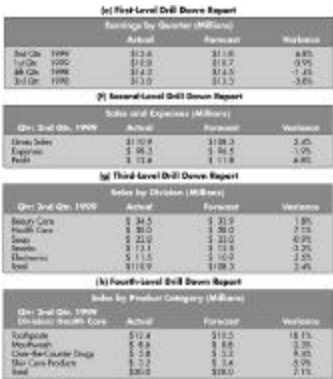
expenses for 2nd quarter 1999.

(c) Manager views sales by

division. (d) Manager views

sales for the Health Care

division.



Characteristics of an MIS

- ◆ Fixed format, standard reports
- ◆ Hard-copy or soft-copy reports
- ◆ Uses internal data
- ◆ User-developed reports
- ◆ Users must request formal reports from IS department

Functional Aspects of the MIS



Functional MIS Systems

- ◆ Manufacturing
- ◆ Marketing
- ◆ Human Resources
- ◆ Accounting
- ◆ GIS

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An Overview of Decision Support Systems



Characteristics of Decision Support Systems

- Handle lots of data from various sources
- Support drill down analysis
- Complex analysis, statistics, and forecasting
- Optimization, satisficing, heuristics
 - Simulation
 - What-if analysis
 - Goal-seeking analysis

FIGURE 10.14

With a spreadsheet program, a manager can enter a goal, use the spreadsheet tool, determine the needed input to achieve the goal.

Source: Galletta et al. (2004), Development Corporation.



Examples of a DSS

- Meal Planning
- Web-Based Decision Support

Components of a DSS





FIGURE 10.7-6
A Conceptual Model of a DSS
With components include:
- user (user interface)
- data (data base)
- models (analysis engine)
- information (information system)
- user interface (user interface)
- analysis engine (analysis engine)
- information (information system)
- user (user interface)

The Model Base

- Financial models
 - Cash flow
 - Internal rate of return
- Statistical analysis models
 - Averages, standard deviations
 - Correlations
 - Regression analysis
- Graphical models
- Project management models

Group Decision Support Systems





Characteristics of a GDSS

- ◆ Ease of use
- ◆ Flexibility
- ◆ Decision-making support
- ◆ Anonymous input
- ◆ Reduction of negative group behavior
- ◆ Parallel communication
- ◆ Automated record keeping

FIGURE 10.18

GDSS Alternatives

This figure demonstrates that the decision room may be the best alternative for group members who are located physically close together and who need to make infrequent decisions as a group. By the same token, group members who are situated at distant locations and who frequently make decisions together may require a wide area decision network to accomplish their goals.

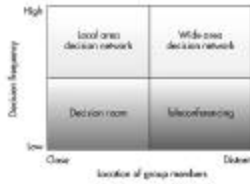
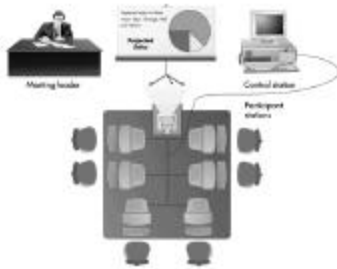


FIGURE 10.19

The GDSS Decision Room

For group members located in the same physical location, the decision room is an optimal GDSS alternative. By use of networked computers and computer devices, such as project screens and printers, the meeting leader can pose questions to the group, instantly collect their feedback, and, with the help of the governing software located on the control station, process & a feedback into meaningful information to add in the decision-making process.



Executive Support Systems



Executive Support Systems (ESS) in Perspective

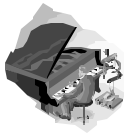
- ◆ Tailored to individual executives
- ◆ Easy to use
- ◆ Drill down capabilities
- ◆ Access to external data
- ◆ Can help when uncertainty is high

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An Overview of Artificial Intelligence



The Nature of Intelligence

- ◆ Learn from experience & apply the knowledge
- ◆ Handle complex situations
- ◆ Solve problems when important information is missing
- ◆ Determine what is important

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The Nature of Intelligence

- ◆ React quickly & correctly to new situations
- ◆ Understand visual images
- ◆ Process & manipulate symbols
- ◆ Be creative & imaginative
- ◆ Use heuristics

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FIGURE 1.5.3

Computers like Deep Blue attempt to learn from past chess moves. The powerful supercomputer logic system was able to calculate the ramifications of up to 100 billion chess moves within the allotted time for each move.

(Source: Photo courtesy of the Association for Computing Machinery.)

TABLE 1.5.3

A Comparison of Natural and Artificial Intelligence

Attributes	Natural Intelligence (Human)	Artificial Intelligence (Machine)
The ability to use senses (eyes, ears, touch, smell)	High	Low
The ability to be creative and imaginative	High	Low
The ability to learn from experience	High	Low
The ability to be subjective	High	Low
The ability to afford the cost of acquiring intelligence	High	Low
The ability to use a variety of information sources	High	High
The ability to acquire a large amount of external information	High	High
The ability to make complex calculations	Low	High
The ability to transfer information	Low	High
The ability to make a series of calculations rapidly and accurately	Low	High

The Major Branches of Artificial Intelligence

- ◆ Vision systems
- ◆ Natural Language Processing
- ◆ Learning systems
- ◆ Neural networks
- ◆ Robotics

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An Overview of Expert Systems



Characteristics of an Expert System

- ◆ Can explain reasoning
- ◆ Can provide portable knowledge
- ◆ Can display “intelligent” behavior
- ◆ Can draw conclusions from complex relationships
- ◆ Can deal with uncertainty

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Limitations of Expert Systems

- ❖ Limited to narrow problems
- ❖ Hard to use
- ❖ Cannot easily deal with "mixed" knowledge
- ❖ Cannot refine own knowledge base
- ❖ Hard to maintain
- ❖ Possible high development costs
- ❖ Raise legal & ethical concerns

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When to Use Expert Systems

- ❖ High payoff
- ❖ Preserve scarce expertise
- ❖ Distribute expertise
- ❖ Provide more consistency than humans
- ❖ Faster solutions than humans
- ❖ Training expertise

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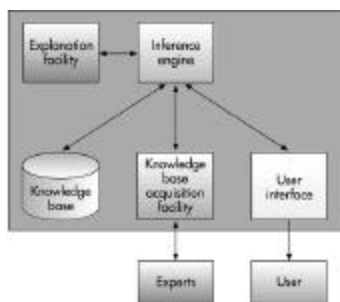


FIGURE 11.7
Components of an Expert System

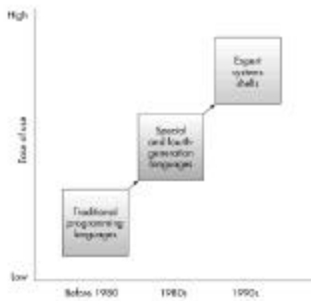
Components of Expert Systems

- ◆ The Knowledge Base
 - Rules
 - Cases
- ◆ Fuzzy Logic
- ◆ Inference Engines
 - Backward chaining
 - Forward chaining

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Advantages of Expert Systems Shells and Products

- ◆ Easy to develop & modify
- ◆ Use of satisficing
- ◆ Use of heuristics
- ◆ Development by knowledge engineers & users

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Applications of Expert Systems & AI

- ◆ Credit granting
- ◆ Shipping
- ◆ Information management & retrieval
- ◆ Embedded systems
- ◆ Help desks & assistance
- ◆ Medical diagnosis
- ◆ Whale Identification

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