Managing the Decision Making Process

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Outline

- Manager’s decision making process
- Modeling and models
- Management support systems
- Decision support systems
- Group decision support systems
- Managing data
- Data warehouses
- Data marts
- Data, text and web mining
- Artificial intelligence
Managers and Decision Making

- Management is a process by which organizational goals are achieved through the use of resources (people, money, energy, materials, space, time)
- These resources are considered to be inputs, and the attainment of the goals is viewed as the output of the process
- Managers oversee this process in an attempt to optimize it
Manager’s Decision Making Process
Manager’s Decision Making Process

Intelligence Phase
- Organizational Objectives
- Search and Scanning Procedures
- Data Collection
- Problem Identification
- Problem Classification
- Problem Statement

Design Phase
- Formulate a Model (Assumptions)
- Set Criteria for Choice
- Search for Alternatives
- Predict and Measure Outcomes

Choice Phase
- Solution to the Model
- Sensitivity Analysis
- Selection of Best (Good) Alternative
- Plan for Implementation (Action)
- Design of a Control System

REALITY → Examination → Validation of the Model → SUCCESS

SUCCESS → Verification, Testing of Proposed Solution → Implementation of Solution

FAILURE → Realization of the Model → Intelligence Phase

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Modeling and models

- A model (in decision making) is a simplified representation or abstraction of reality
- With modeling, one can perform virtual experiments and an analysis on a model of reality, rather than on reality itself
Why Managers need IT?

- Making decisions while processing information manually is growing increasingly difficult due to the following trends:
  - Number of alternatives to be considered is ever increasing
  - Many decisions must be made under time pressure
  - Due to increased fluctuations and uncertainty in the decision environment, it is frequently necessary to conduct a sophisticated analysis to make a good decision
  - It is often necessary to access remote information, consult with experts, or have a group decision-making session
Four major information technologies have been successfully used to support managers:

- DSSs - provide support primarily to analytical, quantitative types of decisions
- Executive (enterprise) support systems - support the informational roles of executives
- Group decision support systems - support managers working in groups
- Intelligent systems - provide multifunctional support
Structured problems

- All phases—intelligence, design, and choice—are structured and the procedures for obtaining the best solution are known.

Unstructured problems

- None of the three phases (intelligence, design, or choice) is structured, and human intuition is frequently the basis for decision making.

Semistructured problems

- Requires a combination of standard solution procedures and individual judgment.
Framework for IT-based Decisions

- **Strategic planning**
  - long-range goals and policies for resource allocation

- **Management control**
  - acquisition and efficient utilization of resources in the accomplishment of organizational goals

- **Operational control**
  - efficient and effective execution of specific tasks
Decision Support Systems (DSS)

- Decision Support System (DSS) is a computer-based information system that combines models and data in an attempt to solve semistructure problems with extensive user involvement.

- DSS, like the terms MIS and MSS, means different things to different people.
Characteristics of DSS

- Provides support for decision makers at all management levels, whether individuals or groups, by bringing together human judgment and objective information.
- Supports several interdependent and/or sequential decisions.
- Supports all phases of the decision-making process—intelligence, design, choice, and implementation—as well as a variety of decision-making processes and styles.
- Is adaptable by the user over time to deal with changing conditions.
DSS Components

- **Data Management Subsystem**
  - contains all the necessary data that flow from several sources and are extracted prior to their entry to a DSS database

- **Model Management Subsystem**
  - contains completed models and models’ building blocks necessary to develop DSS applications including standard software with financial, statistical, management science, or other quantitative models

- **Model Base Management System (MBMS)**
  - creates DSS models easily and quickly, either from scratch, existing models, or building blocks
DSS Model
Group Decision Support Systems (GDSS)

- GDSS are interactive computer-based systems that facilitate the solution of semistructured and unstructured problems by a group of decision makers.

- The goal of GDSS is to improve the productivity of decision-making meetings, either by speeding up the decision-making process or by improving the quality of the resulting decisions, or both.

- The first generation of GDSS was designed to support face-to-face meetings in what is called a decision room.
  - GDSS is composed of hardware, software, people, and procedures + 1 Chauffeur.
Characteristics of EIS

- Drill down capability enables users to get details of any given information
- Critical success factors (CSFs) and key performance indicators are identified
- Trend analysis can be done using forecasting models, which are included in many ESS/EIS
- Executive support systems provide for ad hoc analysis capabilities, in which executives can make specific requests for data analysis as needed
Examples of DSS

- PriceWaterhouseCoopers offers online DSSs in retailing, financial services.

- Microsoft’s Office Small Business edition contains “what-if” wizards that can be used to view the financial impacts of decisions, such as price and inventory decisions.

- IBM offers many tools ranging from market-basket analysis to financial and manufacturing decision support.
Difficulties of Managing Data

- The amount of data increases exponentially
- Data are scattered throughout organizations and are collected by many individuals using several methods and devices
- Only small portions of an organization’s data are relevant for any specific decision
- An ever-increasing amount of external data needs to be considered in making organizational decisions
- Data are frequently stored in several servers and locations in an organization
  - Internet
  - External
  - Personal
  - Formal/informal
Data Warehouses

- The purpose of a data warehouse is to establish a data repository that makes operational data accessible in a form readily acceptable for analytical processing activities.

- Data warehouses include a companion called metadata, meaning data about data:
  - Ability to reach data quickly, as they are located in one place.
  - Ability to reach data easily, frequently by end-users themselves, using web browsers.
Data Warehouses
Characteristics of Data Warehouses

- Organization:
  - Data are organized by detailed subjects

- Consistency
  - Data in different operational databases may be encoded differently. In the warehouse they will be coded in a consistent manner

- Time variant
  - Data are kept for 5 to 10 years so they can be used for trends, forecasting, and comparisons over time

- Non-volatile
  - Once entered into the warehouse, data are not updated

- Relational
  - Data warehouse uses a relational structure

- Client/server
  - Data warehouse uses the client/server to provide the end user an easy access to its data
Data Warehouse Suitability

- Large amounts of data need to be accessed by end-users
- The operational data are stored in different systems
- An information-based approach to management is in use
- There is a large and diverse customer base
- Same data are represented differently in different systems
- Data are stored in highly technical formats that are difficult to decipher
- Extensive end-user computing is performed
Data Marts

- Data marts are an alternative used by many other firms is creation of a lower cost, scaled-down version of a data warehouse
Data Mining

- Data mining derives its name from the similarities between searching for valuable business information in a large database
  - Government
  - Marketing
  - Airlines
  - Retailing and sales
  - Banking
  - Manufacturing and production
Text and Web Mining

- Text mining is the application of data mining to non-structured or less structured text files
  - Text mining helps find the “hidden” content of documents, including additional useful relationships
  - Group documents by common themes.
- Web Mining refers to mining tools used to analyze a large amount of data on the Web
Data Visualization

- It refers to the presentation of data by technologies such as digital images, geographical information systems, graphical user interfaces, multidimensional tables and graphs, virtual reality, three-dimensional presentations, and animation.
Knowledge and Artificial Intelligence

- AI is frequently associated with the concept of knowledge
  - Knowledge consists of facts, concepts, theories, procedures, and relationships
- Knowledge Base represents an organized and stored collection of knowledge related to a specific problem (or an opportunity) to be used in an intelligent system
- Organizational Knowledge Base is the collection of knowledge related to the operation of an organization
Expert Systems

- Expert systems (ES) are an attempt to imitate human experts
- Expert systems can either support decision makers or completely replace them
- Expert systems are the most widely applied and commercially successful AI technology
Expertise and Knowledge

- Expertise is the extensive, task-specific knowledge acquired from training, reading, and experience.

- The transfer of expertise from an expert to a computer and then to the user involves four activities:
  - Knowledge acquisition from experts or other sources
  - Knowledge representation in the computer
  - Knowledge inferencing, resulting in a recommendation for novices
  - Knowledge transfer to the user
Components of Expert Systems

- The knowledge base contains knowledge necessary for understanding, formulating, and solving problems.
- The “brain” of the ES is the inference engine, a computer program that provides a methodology for reasoning and formulating conclusions.
- The user interface allows for user-computer dialogue, which can be best carried out in a natural language, usually presented in a Q&As format and sometimes supplemented by graphics.
- The explanation subsystem can trace responsibility and explain the ES’s behavior by interactively answering questions.
- A knowledge-refining system enables the system to analyze its performance, learn from it, and improve it for future consultations.