CHAPTER 1

Introduction to Information Systems

Mass Customization... Revisited

• Building Impenetrable Customer Loyalty
  • "A company that aspires to give customers exactly what they want must look at the world through new lenses. It must use technology to become two things: a mass customizer that efficiently provides individually customized goods and services, and a one-to-one marketer that elicits information from its customer about his or her specific needs and preferences."
  B. Joseph Pine, II, Strategic Horizons

What is Data?

- Raw Material
- Numbers and strings of letters with no precise context or meaning
What is Information?

- Data processed with knowledge
- “Data endowed with relevance and purpose”
- “Data becomes information when its creator adds meaning”
- “An organized, meaningful, and useful interpretation of data”

What is Knowledge?

- “A body of guidelines and rules used to select, organize, and manipulate data to make it suitable for a given task”
- “An awareness and understanding of a set of information and how that information can be put to its best use”
- “Internalized information + the ability to utilize this information”

Data transformed into Information

- A collection of facts organized in such a way that they have additional value beyond the value of facts themselves.
- Guidelines and procedures used to select, organize, and manipulate data to make it suitable for a specific task.
- Raw facts
Data becomes Information

- Establishing relationships between data creates information.

Information = Data + Relationships

Characteristics of Valuable Information

- Relevant
- Complete
- Accurate
- Current/Timely
- Economical
- Accessible

Does Perfect Information Lead to Perfect Decisions?

- IBM
  - Among the first to learn that PCs were revolutionizing the computer industry.

- Wal-Mart
  - "We got big by replacing inventory with information"

Wal-Mart CIO
Determining the Value of Information

- Measurements
  - Time saved, lower costs
  - More accurate forecasts
  - Improved service
  - Often difficult to quantify
  - Payback period?

What is a System?

- Components that work together to achieve a goal by accepting input, processing it, and producing output in an organized manner.
  - e.g. a sound system

Components of a System

- **INPUTS**
  - Gathering and capturing raw data

- **PROCESSING**
  - Converting or transforming data into useful outputs

- **OUTPUTS**
  - Producing useful information, usually in the form of documents.

  Output that is used to make changes to input or processing activities

Feedback
Components of a System

![Diagram of system components]

Open vs. Closed Systems

- **Closed System**
  - Stands alone
  - No connection to other systems

- **Open System**
  - Interfaces and interacts with other systems
  - Gets information from and provides information to other systems

System Performance

- **Efficiency**
  - A measure of what is produced divided by what is consumed.

- **Effectiveness**
  - A measure of what is achieved divided by the stated goal.
System Performance Standards

Sales

Defects

System Variables and Parameters

- **System Variable**
  - A quantity or item that can be controlled by the decision maker (controllable).
  - e.g. selling price

- **System Parameter**
  - A value or quantity that cannot be controlled by the decision maker.
  - e.g. raw material costs

So, What is an Information System?

**Information**: An organized, meaningful, and useful interpretation of data

**System**: Components that work together to achieve a goal by accepting input, processing it, and producing output in an organized manner

- **Information System**: Components that work together to process data and produce information (to help companies solve problems and make decisions).
The Components of a CBIS

1) Hardware
2) Software
   - Operating systems
   - Applications
3) Databases
4) Telecommunications/Networks
5) People
6) Procedures

Types of Business Information Systems

- Transaction Processing
- E-Commerce
- Workflow
- Enterprise Resource Planning
- Management Information
- Decision Support
- Artificial Intelligence/Expert

Transaction Processing

- Transaction
  - Any business related exchange
  - Tend to be routine, labor-intensive
  - "Interactions"
Transaction Processing

- Transaction processing system (TPS)
  - The application of information technology to routine, repetitive, and usually ordinary business transactions

Transaction Processing System

E-Commerce

- E-Commerce
  - Any business transaction executed electronically between parties involving the exchange of goods and/or services
    - B2B, B2C

- Workflow
  - Rule-based
E-Commerce

- Lowering Barriers to Entry
  - Traditionally
    - Sales force
    - Advertising & promotion
    - Factories, warehouses, retail stores
  - Competing electronically
    - Increases the threat of new companies

Enterprise Resource Planning (ERP)

- Integrated programs that can manage a company’s entire set of business operations
- Often coordinate planning, inventory control, production and ordering

Management Information System (MIS)

- Management Information System
  - Used to provide routine information to help managers plan, control, and make decisions
- Characteristics
  - Focus on operational efficiency
  - Supports functional areas
  - Common database
  - Standard reports...
Management Information System

- Types of Reports
  - Scheduled
  - Demand
  - Exception

Decision Support Systems

- Decision Support Systems (DSS)
  - Used to support decision making (e.g. where to build, how much to order)
- Characteristics
  - Suggests and compares alternatives
  - Problem is complex
  - Information is voluminous

Artificial Intelligence

- Artificial Intelligence (AI)
  - A field that involves computer systems taking on the characteristics of human intelligence
    - Robotics
    - Natural language processing
    - Learning systems
    - Neural networks (patterns & trends)
Expert Systems

- Expert Systems (ES)
  - Give the computer the ability to make suggestions and act like an expert in a particular field
    - Medical diagnoses
    - Repair problems
    - Credit evaluations
    - Investment strategies

Systems Development

- Systems Development
  - The activity of creating or modifying existing business systems.
- Objectives
  - Make the process manageable
  - Achieve predictable costs and timing

Systems Development Steps

1) Systems Investigation
   - Gain a clear understanding of the problem to be solved or opportunity to be addressed.

2) Systems Analysis
   - Define the problems and opportunities of the existing system.

3) Systems Design
   - Determine how the new system will work to meet the business needs defined during systems analysis.
Systems Development Steps

4) Systems Implementation
   - Create or acquire the various system components defined in the design step, assemble them, and put the new system into operation.

5) System Maintenance and Review
   - Check and modify the system so that it continues to meet changing business needs.

CHAPTER

2

Information Systems in Organizations

Strategic Information Systems

- Strategy
  - A plan designed to help an organization gain a competitive advantage

- Strategic Information Systems
  - Information systems that help accomplish a strategy
Achieving a Competitive Advantage

- The essence of strategy is innovation, so competitive advantage often occurs when an organization tries a strategy that no one has tried before.
  - e.g. Dell was the first PC manufacturer to use the Web to take customer orders.

The Value Chain

Michael Porter

- A series or “chain” of basic activities that add value to a firm’s products or services
- Critical leverage points where information technology can enhance a firm’s competitive position

The Value-Added Process

Inputs
- Money
- Materials
- People
- Machines
- Data
- Information

Value-Added Process
- Increases the combined value of the inputs.

Outputs
- Products
- Services
- Data
- Information
The Value Chain

What value can IT add at each step in the Value Chain?

Five-Force Model

Ways to Achieve a Competitive Advantage

- Reduce costs
  - Automation of a business process
    - Transaction processing
    - Online customer service
    - Factory robotics
  - Raise barriers to entry
    - Legal protection of intellectual property
    - High cost of entry
Ways to Achieve a Competitive Advantage

- Establish high switching costs
  - Penalties for terminating contracts
  - Software re-training

- Create new products and services
  - Copyright protection
  - Continuous innovation

Ways to Achieve a Competitive Advantage

- Differentiate products and services
  - Branding
  - First to market

- Enhance products and services
  - Longer warranties, more information
  - Better service

Ways to Achieve a Competitive Advantage

- Establish alliances
  - Bundling products
  - Rewards programs
  - Outsourcing

- Lock in suppliers or customers
  - Purchasing volume
  - Create a standard
Ways to Achieve a Competitive Advantage

- Potentially winning business moves

PLUS

- Ideas for harnessing technology to implement those moves

Organizational Structures

- An organization’s structure can have an impact on how information systems are viewed and what kind are used:
  - Hierarchical
  - Project/Product
  - Team
  - Multidimensional

Traditional Organizational Structure
Project Organizational Structure

Team Organizational Structure

Multidimensional (Matrix) Organizational Structure

<table>
<thead>
<tr>
<th>Publisher, College Division</th>
<th>Marketing Group</th>
<th>Production Group</th>
<th>Finance Group</th>
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<tbody>
<tr>
<td>Publisher, Trade Division</td>
<td>Marketing Group</td>
<td>Production Group</td>
<td>Finance Group</td>
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<tr>
<td>Publisher, High School Division</td>
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<td>Production Group</td>
<td>Finance Group</td>
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Organizational Culture & Change

- Organizational Culture
  - Set of shared beliefs and assumptions
- Organizational Change
  - A process that alters the way an organization functions
  - Often associated with new IS

Organizational Change
Lewin & Schein

- Create receptive climate (there is a better way to operate)
- Learn new methods, obtain commitment
- Reinforce, reward new behavior

Reengineering

- The radical redesign of business processes to achieve a significant breakthrough in business results
  - Delivery time
  - Product & service quality
  - Costs, revenue & productivity
Reengineering

- Employee resistance
- Employees must understand benefits
- Old rules must be challenged
  Examples
  - Size of orders
  - Credit approval
  - Decision-making level

Reengineering

Examples of reengineering initiatives
- Simplifying work processes
- Combining several jobs into one
- Outsourcing ancillary processes
- Entering new business areas
- Establishing new management structures
- Renovating technology systems

Reengineering vs. Continuous Improvement

- Strong action to solve serious problems
- Top-down-driven by senior executives
- Broad in scope; cuts across organizations
- Goal is to achieve a major breakthrough

- Routine actions to make minor improvements
- Worker driven
- Narrow in scope; focus in a given area
- Goal is continuous, gradual improvement
Total Quality Management

- Company-wide effort to add more value
  - Keen awareness of customer
  - Strategic vision for quality
  - Empowerment of employees
  - Rewards for high quality

Outsourcing

- Contracting with outside professional services to meet specific business needs.
  - Focus on core business
  - Save money

Downsizing

- Reducing the number of employees to cut costs
Performance-Based Information Systems

- **Productivity**
  - A measure of the output achieved divided by the input required.
- **Return on Investment**
  - Profit or benefit as a percentage of investment
- **Earnings Growth**
- **Market Share**
- **Customer Awareness & Satisfaction**
- **Total Cost of Ownership**

Identifying Risks

- How well are requirements understood?
- Does the project require pioneering effort?
- Is there a risk of severe business repercussions?

Leading Edge vs. Bleeding Edge

- **Bleeding Edge**: When failure occurs because an organization tries to be too far out on the technological leading edge
  - Time-Warner’s Pathfinder portal
- **Leading Edge**: Let competitors test the new technology first
  - Microsoft Word, Excel, Access, IE
Justifying IS

- Tangible savings (reduced costs)
- Intangible savings (better decisions)
- Legal requirements (reports)
- Modernization (Y2K, new apps)
- Pilot project (laptops)

Roles and Functions in the IS Department

Homework

- Read articles about Buffet & Gates
- Subscribe to ListProc this week
- Study Guide by Friday
- Test on Monday