Chapter 21: Organizational and Societal Impacts of Management Support Systems

21.1 Opening Vignette: Police Department Uses Neural Networks to Assess Employees

- Chicago Police Internal Affairs used ***neural network*** software to predict whether an officer might act improperly
- Model trained comparing characteristics of all officers to 200 officers who did or might have acted improperly
- Matches classified as ***heading for trouble***

- **Application - Fairly accurate**
- **Software created major debate**
- **The Chicago Police Dept. says - Can't manually check all officers**
- **Early detection helps**
- **Leads to a counseling program to fix the situation**

- **Computer program can screen many people periodically**
- **Cannot be biased**
- **Neural networks are helpful in similar tasks**

BUT

- Labor union unhappy
- "System is *unethical*
- It was a tactic to *avoid managing* the officers
- Neural networks are a black box: How do they work?
- It's *not* fair!

- Software Developer: "Users don't need to know what the software is doing--they only need to know whether it works." The Chicago Police Department believes that the computer program works *very well*

21.2 Introduction

Opening Vignette Demonstrates that an MSS

1. Can radically change the decision making process
2. There is resistance to new technology
3. The value of technology is debatable
4. Introduction of an MSS application may have multiple impacts

MSS

- **MSS are important enablers of the *Information Revolution***
- **Unlike slower revolutions (Industrial Revolution)**
  - **Much faster**
  - **Affecting our entire lives**
- **Many *managerial* and *social problems***
  - **Impact on organizational structure**
  - **Resistance to change**
  - **Possible *rapid* increased unemployment levels**
  - **etc.**
- **MSS - Maybe 30% of the IT market by 2000**

- **Hard to separate the impact of MSS from other computerized system**
  - **Trend to integrate MSS with other CBIS**
  - **Little published information about MSS impacts**
- **Techniques are so new**
- **E.g., First: The Internet**
- **Now: The World Wide Web**
- **What Next ???**

MSS Impacts

- **MSS can have both micro- and macro-implications**
- **MSS can affect**
  - **Particular individuals and jobs**
  - **The work structure of departments**
  - **Units within the organization**
- **MSS can have significant long-term effects on**
  - **Total organizational structures**
  - **Entire industries**
  - **Communities**
  - **Society as a whole.**
- ***Complete* Management System Framework (Figure 21.1)**

TABLE 21.1 Organizational Impacts of Computer Technology.

Area of Impact	Section in This Chapter
Reengineering and restructuring	21.4
Span of control	21.4
Centralization versus decentralization	21.4
Authority, power and status	21.4
New organizational units	21.4
Organizational culture	21.4
Job content and roles	21.6
Career ladder	21.6
Supervision	21.6
Individuals	21.7
Productivity and competitiveness	21.8
Decision making and the manager's job	21.9
Organizational intelligence	21.10
Issues of legality, ethics and privacy	21.11

Movements of Major Changes

- **Organization Transformation**
- **Business Process Reengineering (BPR)**

- **The support of IT to BPR was voted as the *most important issue* of information management in 1994/1995 ((Brancheau et al. [1996])**

- **Information technology is an *enabler* of BPR (Hammer and Champy [1993])**

21.3 Overview of Impacts

- General Categories: *Organizational* and *Societal*
- Organizational Impacts (Table 21.1)
- Social Impacts (Table 21.2)
- Computer technology has already changed our world
- *Much more change is anticipated*

TABLE 21.2 Social Impacts of Computer Technology.

Area of Impact	Section in This Chapter
Research and development	21.11
Employment levels	21.12
Work in hazardous environments	21.13
Opportunities for the disabled	21.13
Changing role of women	21.13
Telecommuting (working at home)	21.13
Consumers	21.13
Quality of life	21.13
Computer crime	21.13
Social responsibility	21.14
Electronic community	21.14

21.4 Organization Structure and Related Areas

- Structure
- Degree of Centralization of Authority
- Distribution of Power and Status
- New Organizational Units
- Organizational Culture

Structure

- **Flatter Organizational Hierarchies**
- **Staff-to-Line Ratio Increasing**

Centralization of Authority

- **Difficult to establish a clear pattern of IT influence on authority and power**
- **IT can support either centralization or decentralization (DSS In Focus 21.1)**

DSS In Focus 21.1: Huber's Propositions about Computers' Impacts on Organizations

The use of MSS and other computer-assisted communication technologies lead to the following organizational changes:

1. A large number and variety of people participating as decision sources
2. A decrease in the number and variety of people participating in traditional face-to-face communication
3. Less time in meetings
4. Better chance that a particular organizational level will make a particular decision
5. Greater variation across the organization in the levels at which a particular type of decision is made
6. Fewer organizational levels involved in authorizing actions
7. Fewer intermediate information nodes within the organizational information processing network
8. Fewer levels involved in processing messages
9. More frequent development and use of databases
10. More rapid and more accurate identification of problems and opportunities
11. Organizational intelligence (e.g., scanning, monitoring) that is more accurate, comprehensive, timely and available
12. Higher-quality decisions
13. Shorter time required to authorize actions
14. Shorter time required to make decisions

(*Source*: Condensed from Huber [1990].)

Power and Status

- **Knowledge is power**
- **Developments in IS are changing the power structure within organizations**
- **Who will control the computers and information resources?**

New Organizational Units

- **DSS Department**
- **Management Support Department**
- **AI Department (AIS In Action 21.3)**
- **Knowledge Management Department (Headed by a Chief Knowledge Officer (CKO))**

Organizational Culture

- Can impact the diffusion rate of technology
- Can be influenced by it

- Some dissolution of organizational structure due to technology

- Virtual teams can meet anytime / anyplace
- Individuals can join a virtual team as needed

21.5 MSS Support to Business Process Reengineering

- Business Process Reengineering (BPR)
- Major Innovation
- Changing the way organizations conduct business
- Involves Changes in
  - Structure
  - Organizational Culture
  - Processes

- **BPR Creates**
  - **Management realignments**
  - **Mergers**
  - **Consolidations**
  - **Operational integrations**
  - **Reoriented distribution practices**
- **BPR greatly changes *organizational structure***
  - **Team-based organizations**
  - **Mass customization**
  - **Empowerment**
  - **Telecommuting**
- **MSS is an *enabler***

MSS

(Especially ES, DSS and EIS)

- Allows business to be conducted in different locations
- Provides flexibility in manufacturing
- Permits quicker delivery to customers
- Supports rapid and paperless transactions
- ES enable organizational changes by providing expertise to nonexperts (Figure 21.2)
- Simulation, Modeling and BPR (Case

21.6 Personnel Management Issues

- **Role of Employees and Managers**
  - Many role definitions will be changed
  - New jobs (knowledge engineers)
  - Some jobs will disappear
  - Top management support staff moving to *information specialists*
  - Interesting changes in the jobs of experts supported by ES (AIS In Action 21.5)
- **Job Content**
- **Role Ambiguity and Conflict**
- **Employee Career Ladders**
- **Changes in Supervision**

Continue

Other Considerations

- Impacts of MSS
  - On job qualifications?
  - On training requirements?
  - On worker satisfaction?
- How can jobs be designed to be a challenge?
- How might MSS be used to personalize or enrich jobs?
- What can be done so MSS does not demean jobs or has other negative impacts?
- How to allocate functions to people and machines?
- Should cost or efficiency be the major criterion for such allocation?
- What is the role of the Human Resources Department in a Virtual Organization?

21.7 Impact on Individuals

- Job Satisfaction
- Inflexibility and Dehumanization
- Cooperation of Experts

21.8 Productivity, Quality, and Competitiveness

Major MSS Benefits Leading to Competitive Advantage

- Increased productivity
- Increase in quality
- Cost reduction
- Timely production
- Faster time to market
- Fast training of employees
- Increased production (service) capacity
- Unique services
- Enable BPR and organization transformation
- Enhance other computer systems

21.9 Decision Making and the Manager's Job

- Impact on the manager's job since the 1960s
- Until now mainly at lower- and middle-levels
- Now MSS impact at top manager's job
- MSS can change how managers make decisions
- So, MSS can change managers' jobs

Impacts of MSS on Decision Making

- Automation of routine decisions or decision making phases
- Less expertise (experience) required for many decisions
- Faster-made decisions
- Less reliance on experts to provide support to top executives
- Power redistribution among managers
- Support to complex decisions, making them faster and of better quality

Continue

- **Provide information for high-level decision making**
- **MSS frees managers from routine tasks and decision making**
- **AI technologies can improve environmental scanning of information**
- **Change in leadership requirements**
- **Methods that managers use to do their jobs will change**

21.10 Institutional Information Bases, Knowledge Bases, and Knowledge Management

- **Possible development of very large and complex information and knowledge bases that require trained expertise to maintain and use**
- ***Organizational intelligence* will become a critical issue**
- **Knowledge stored in knowledge bases is accumulating fast**
- **Intelligent agents could help**

Some Questions For Successful Implementation

- **How will the availability of knowledge affect strategic plans?**
- **How will the communication stream be affected?**
- **Will results of decisions be as readily communicated to peers, subordinates, and superiors by managers, who may assume that these people *have* and *take advantage* of the access to information bases?**
- **How will managers be trained to make *effective* use of these new tools?**
- **What needs to be done to assess the current competency of managers and to match the tools of these competencies?**

Knowledge Management

- Companies collect large amounts of knowledge about problem solving, treating customers, working with the government, etc.
- This knowledge, if properly stored and organized, can be *shared* for the benefit of the organization and its members
- Can view an organization as a *human community* - collective wisdom gives a distinctive edge against competitors
- Best way is called knowledge management
- Technologies that support it are the Intranet, Internet, data warehousing, groupware, and data access and mining tools
- Technology tools that support knowledge management: *know-ware* tools: DecisionSuite, WINCITE, KnowledgeShare, SolutionBuilder and grapeVINE.

Continue

- **To help the knowledge worker be more effective, companies creating formal knowledge bases that contain**
  - **Lists of experts**
  - **Information maps**
  - **Corporate yellow pages**
  - **Custom desktop applications**
  - **Other systems**
- **KM related to *THE LEARNING ORGANIZATION***
- **Reuters: global knowledge development and reuse project in developing and deploying a global knowledge organization**
- **Also, see DSS In Action 21.6**

The Learning Organization

- **Implies an organizational memory and a means to save, represent and share it**
- **Organizational learning is the development of new knowledge and insights that have the potential to influence behavior**
- **Intelligent agents and interfaces, and hypermedia, especially via the Web, have the capacity to transform organizations**

For Organization Learning to be Successful, Important Critical Success Factors

- **Orientation of the developers toward organizational issues**
- **Development focus that favors process over product**
- **Development paradigm based on kernels from social science theories**
- **View of expertise in its organizational context by the developers**
- **Good developer expert interaction**
- **IT is playing an ever important role in organizational learning**

Organizational Computing

- **Emerging field of study**
- **Could have profound socioeconomic implications for organizations and individuals**
- ***Knowledge Warehouse*: Like data warehouse with OLAP**

21.11 Issues of Legality, Privacy, and Ethics

Legality

- Liability for the actions of intelligent machines are just
- A computer as a form of unfair competition in business (airline reservation systems)

Some Legal Questions

- Who is liable if an enterprise finds itself bankrupt as a result of using the advice of ES?
- Will the enterprise itself be held responsible for not testing such systems adequately before entrusting them with sensitive issues?
- Will auditing and accounting firms, share the liability for failing to apply adequate auditing tests?
- Will the manufacturers of intelligent systems be jointly liable?

Specific Legal Issues

- What is the value of an expert opinion in court when the expertise is encoded in a computer?
- Who is liable for wrong advice (or information) provided by an ES?
- What happens if a manager enters an incorrect judgment value into an MSS and the result is damage or a disaster?
- Who owns the knowledge in a knowledge base?
- Should royalties be paid to experts who provide the knowledge to ES, and if so how much?
- Can management force experts to contribute their expertise?

Representative Issues in Ethics

- Computer abuse and misuse
- Electronic surveillance
- Software piracy
- Invasion of individuals' privacy
- Use of proprietary databases
- Exposure of employees to unsafe environments related to computers
- Computer accessibility for workers with disabilities
- Accuracy
- Accessibility to information
- Liability of programmers and other IS employees
- Use of corporate computers for private purposes
- How much decision making to delegate to computers

Personal Values

- Major factor in ethical decision making
- Ethical issues in MSS is complex (multidimensionality)

Four Topics of Ethics (Figure 21.3)

- Accuracy
- Property
- Accessibility
- Privacy

Mason et al. [1995]

Table 21.3 A Framework for Ethical Issues

Privacy	*Accuracy*
• What information about oneself should an individual be required to reveal to others? • What kind of surveillance can an employer use on its employees? • What things can people keep to themselves and not be forced to reveal to others? • What information about individuals should be kept in databases and how secure is the information there?	• Who is responsible for the authenticity, fidelity and accuracy of information collected? • How can we ensure that information will be processed properly and presented accurately to users? • How can we ensure that errors in databases, data transmissions and data processing are accidental and not intentional? • Who is to be held accountable for errors in information, and how is the injured party compensated?

Property	*Accessibility*
• Who owns the information? • What are the just and fair prices for its exchange? • Who owns the channels of information? • How should one handle software piracy (copying copyrighted software)? • Under what circumstances can one use proprietary databases? • Can corporate computers be used for private purposes? • How should experts who contribute their knowledge to create expert systems be compensated? • How should access to information channels be allocated?	• Who is allowed to access information? • How much should be charged for permitting access to information? • How can accessibility to computers be provided for employees with disabilities? • Who will be provided with equipment needed for accessing information? • What information does a person or an organization have a right or a privilege to obtain--under what conditions and with what safeguards?

Source: Turban et al. [1998], compiled from Mason et al. [1995].

Privacy

- New computer systems can affect privacy rights
- Confidential information can be misused
- Can result in invasion of privacy and other injustices
- Cookies - New Issue (DSS In Focus 21.7)
- Law Enforcement - Use of AI technologies
- Other AI implications

21.12 Intelligent Systems and Employment Levels

- Intelligent systems / MSS can affect productivity and employment
- AI (and ES and ANN) will increase the productivity of knowledge workers
- Impact on the aggregate employment level?
  - Massive unemployment? (Wassily Leontief)
  - Increased employment? (Herbert Simon)

Massive Unemployment

1. The need for human labor will be reduced significantly

2. The skill levels of people performing jobs with the help of AI will be low

3. AI will affect both blue- and white-collar employees in all sectors

4. In the past few years (in 1991) several industries have laid off many employees

5. Industry, government and services already have a lot of hidden unemployment

6. Unemployment levels have grown steadily in the past decade in spite of increased computerization

7. The per capita amount of goods and services that people can consume is limited - may stop growing

Increased Employment Levels

1. Historically, automation has always resulted in increased employment, by creating new occupations (AIS In Focus 21.9)

2. Unemployment is worse in unindustrialized countries.

3. Work, especially professional and managerial, can always be expanded

4. The task of converting to automated factories and offices is complex - may take several generations

5. Many tasks cannot be fully automated

Continue

6. Machines and people can be fully employed, each where appropriate

7. Real wages may be reduced, however, because people will have income from other sources; people will have enough money to spend to create more jobs

8. The cost of goods and services will be so low that demand will increase significantly (automation will never catch up with increased demand)

AIS In Focus 21.9: Intelligent Systems-related Jobs

- AI computer lawyer
- AI headhunter
- AI project manager
- AI hardware architecture specialist
- AI venture capitalist
- AI user training specialist
- Expert system shell developer and vendor
- Industrial robotics supervisor/manager
- Knowledge acquisition and maintenance specialist
- Robotic maintenance engineer.
- System Integrator
- ANN software developer
- Software agents developers and vendors
- Chief Knowledge Officer (CKO)

Other Questions

- **Is some unemployment really socially desirable?**
- **Should the government intervene more in the distribution of income and in the determination of the employment level?**
- **Can the "invisible hand" in the economy continue to be successful in the future?**
- **Will AI make most of us idle but wealthy? (AIS In Action 21.10)**
- **Should the income issue be completely separate from employment?**

21.13 Other (Potential) Societal Impacts

Positive Effects

- Work in Hazardous Environments
- Opportunities for the Disabled
- Changing Role of Women.
- Working at Home (Telecommuting)
- Improvements in Health
- Aids for the Consumer
- Quality of Life
- Law Enforcement

Negative Effects

- **Unemployment**
- **Creation of large economic gaps**
- **Other negative situations**

Computer Crime: Fraud and Embezzlement

- Losses as much as US $ 45 billion / year
- ES can deliberately provide bad advice
- DSS, ES and neural computing to detect and prevent computer crimes
- Neural computing : Detect stolen credit cards and cellular phones almost instantaneously

- Too Much Power
- Blaming the Computer Phenomenon

21.14 Managerial Implications and Social Responsibilities

- What can management do?
- How to anticipate the broad societal effects of MSS?
- What to do to ensure that people's attitudes toward MSS are well founded and that their expectations are reasonable?
- How to determine potential positive and negative beforehand?

Key Issues

- Social Responsibility
- Public Pressure
- Computer and Staff Resources
- Planning
- Electronic Community
  - Related to electronic commerce
  - Electronic communities will change the nature of corporate strategy and how business is done

MSS Summary and Conclusions

- **MSS are having far reaching and dramatic impacts on society and organizations**
- **Impacts**
  - **Providing rapid information access**
  - **Instantaneous communication**
  - **Artificial intelligence assisting and replacing human effort**
- **Revolution of Technology**

Summary

- MSS can affect organizations in many ways
- Flatter organizational hierarchies
- The impact of MSS on the degree of centralization of power and authority is inconclusive.
- MSS could cause a power redistribution
- Special intelligent systems units and departments may appear
- Many jobs will require fewer skills

Continue

- **The job of the surviving expert will become more important: custodian of the ES and the knowledge base**
- **MSS could reduce the need for supervision**
- **The impact of MSS on individuals is unclear; may be either positive or negative**
- **Organizational data and knowledge bases will be critical issues**
- **Serious legal issues may develop with AI: liability and privacy**
- **One view, intelligent systems will cause massive unemployment**

Continue

- **Another view, intelligent systems will increase employment levels**
- **Many positive social implications can be expected**
- **Quality of life, both at work and at home, is likely to improve**
- **Electronic (virtual) communities are evolving**
- **Managers need to plan for the MSS of the future to be ready to make the most of them**

Questions for the Opening Vignette

1. Is this another example where the needs of the society are in conflict with the rights of the individual?

2. Is using the neural network computer program ethical? What if a statistical approach were used? Is that ethical?

3. If you were an officer being evaluated, would you object to such a program? Why?

4. Is it fair for the Police Department to use the neural network program to screen new applicants? If so, what is the problem with using such a program retroactively?

5. As a citizen, would you want your police department to use the program? Why or why not?

Group Exercise
Knowledge Management Exercise

Debate
Effectiveness of Information Systems and Ethical Issues

Case Application 21.1: Xerox Re-engineers its $3 Billion Purchasing Process with Graphical Modeling and Simulation

Case Questions

1. Why is it so important to reduce cycle time in organizational processes?

2. What were the benefits of using simulation to model and test the proposed plan?

3. How did the visual nature of the simulation help the decision makers?

4. What other MSS tools might be combined with the simulator to make the decision making more effective?