Management Information Systems

Chapter 1: Information Systems

Learning Objectives

By the end of this chapter the learner shall be able to;

i. Explain why information systems are so important today for business and management.
ii. Evaluate the role of information systems in today's competitive business environment.
iii. Define an information system from both a technical and business perspective.

1.1 Definition of a system

A system can be broadly defined as an integrated set of elements that accomplish a defined objective. People from different engineering disciplines have different perspectives of what a "system" is. For example, software engineers often refer to an integrated set of computer programs as a "system." Electrical engineers might refer to complex integrated circuits or an integrated set of electrical units as a "system." As can be seen, "system" depends on one's perspective, and the .integrated set of elements that accomplish a defined objective is an appropriate definition.

1.2. Information System

Information is a *critical resource* in the operation and management of organizations. Timely availability of relevant information is vital for effective performance of managerial functions such as planning, organizing, leading, and control. An information system in an organization is like the nervous system in the human body: it is the link that connects all the organization's components together and provides for better operation and survival in a competitive environment. Indeed, today's organizations run on information.

The term *information system* usually refers to a computer-based system, one that is designed to support the operations, management, and decision functions of an organization. Information systems in organizations thus provide information support for decision makers. Information systems encompass transaction processing systems, management information systems, decision support systems, and strategic information systems.

Information consists of data that have been processed and are meaningful to a user. A system is a set of components that operate together to achieve a common purpose. Thus a management information system collects, transmits, processes, and stores data on an organization's resources, programmes, and accomplishments. The system makes possible the conversion of these data into management information for use by decision makers within the organization. A management information system, therefore, produces information that supports the management functions of an organization.

Definition

An information system can be defined as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination and control, an information system also help managers and workers analyze problems and visualization in an organization.

Information systems contain information about significant people, places and things within the organization or in the environment surrounding it.

1.2.1. Data & Information

Data, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use. E.g. supermarket checkout data Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, visualize complex subjects and create new products or services. These activities are input, processing, and output.

- Input: the capture or collection of raw data from within the organization or from its external environment for processing in an organization.

- Processing: the conversion, manipulation and analysis of raw input into a form that is more meaningful to humans.
- Output: The distribution of processed information to the people who will use it or to the activities for which it will be used.

Information is data that has been shaped into a form that is meaningful and useful to human beings.
The characteristics of good information are; relevance, timeliness, accuracy, cost-effectiveness, reliability, usability, exhaustiveness, and aggregation level. Information is relevant if it leads to improved decision making

Information Quality
Dimensions of Information that impacts on quality

Time	Content	Form	Additional characteristics
Timeliness	Accuracy	Clarity	Confidence in source
Currency	Relevance	Detail	Reliability
Frequency	Completeness	Order	Appropriateness
Time period	Conciseness	Presentation	Received by correct person
	Scope	Media	Sent by correct channels

Value of Information
Information has a great impact on decision making, and hence its *value is* closely tied to the decisions that result from its use. Information does not have an absolute universal value. Its value is related to those who use it, when it is used, and in what situation it is used. In this sense, information is similar to other commodities

Information systems also require feedback, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage

1.2.2. Information Management Challenges
Information management' is an umbrella term that encompasses all the systems and processes within an organisation for the creation and use of corporate information. Information management therefore encompasses:
 people, process, technology, content

Common information management problems include:
a) Large number of disparate information management systems.
b) Little integration or coordination between information systems.
c) Range of legacy systems requiring upgrading or replacement.
d) Direct competition between information management systems.
e) No clear strategic direction for the overall technology environment.
f) Limited and patchy adoption of existing information systems by staff.
g) Poor quality of information, including lack of consistency, duplication, and out of date information.
h) Little recognition and support of information management by senior management.
i) Limited resources for deploying, managing or improving information systems.
j) Lack of enterprise-wide definitions for information types and values (no corporate-wide taxonomy).
k) Large number of diverse business needs and issues to be addressed.
l) Lack of clarity around broader organisational strategies and directions.
m) Difficulties in changing working practices and processes of staff.
n) Internal politics impacting on the ability to coordinate activities enterprise-wide.

1.3. Categories of information systems
- Informal information systems example office gossip.
- Formal information systems which could be manual or computer -based

1.4 Dimensions of information systems

Information systems are more than computers. Using information systems effectively requires an understanding of the organization, management and information technology shaping the systems. Thus an information systems can be described as organizational and management solutions to challenges posed by the environment.

- Organization Involves the organization's hierarchy, functional specialties, business processes, culture, and political interest groups. Information systems are an integral part of the organizations . The key elements of an organization includes; its people, structure, business processes, politics and culture. Information systems helps automate business processes and in some cases the organization's culture is embedded in its information systems.
- Management: leadership, strategy, and management behavior. Information systems can help managers in design and delivery of new products and services, and redirecting and redesigning the organizations.
- Technology: computer hardware, software, data management technology, and networking/telecommunications technology (including the Internet).The internet has created a new 'Universal" technology platform on which to build new products, services, strategies and business models.

1.5 Why information systems

We are in the midst of a swiftly moving river of technology and business innovations that is transforming the global business landscape. An entirely new Internet business culture is emerging with profound implications for the conduct of business. You can see this every day by observing how businesspeople work using high-speed Internet connections for e-mail and information gathering, portable computers connected to wireless networks, cellular telephones connected to the Internet, and hybrid handheld devices delivering phone, Internet, and computing power to an increasingly mobile and global workforce.

The emerging Internet business culture is a set of expectations that we all share. We have all come to expect online services for purchasing goods and services, we expect our business colleagues to be available by e-mail and cell phone, and we expect to be able to communicate with our vendors, customers, and employees any time of day or night over the Internet. We even expect our business partners around the world to be fully connected. Internet culture is global.

Information systems are the foundation for conducting business today. In many industries, survival and the ability to achieve strategic business goals are difficulty without extensive use of information technology. Business today use information systems to achieve six major objectives:

- Operational excellence: business continuously seek to improve the efficiency of their operations in order to achieve higher profitability;
- New products, services and business models; Information systems and technologies are a major enabling tools for organizations to create new products and services as well as entirely new business models. A **business model** describes how an organization produces, delivers and sells a product or service to create wealth.
- Customer/supplier intimacy: Information systems are used to improve on customer's relationship management (CRM) and customer profiling.
- Improved decision making: Information systems and technology have made it possible for managers to use real-time data from the marketplace when making decisions.
- Competitive advantage: By improving the operations, facilitating the creation of new products, services and business models, improving on Customers relationship management and improving on decision making, information systems helps an organizations achieve competitive advantage.
- Day-to-day survival: organizations invest in information systems and technologies because they are necessities of doing business.

1.6. Information Systems Success

Information systems are successfuly only if they are used. There are six dimensions of IS success are proposed by Delone and McLean IS success model, and this includes; information, system and service quality, (intention to) use, user satisfaction, and net benefits. It is anticipated that information quality, system quality, and service quality

influence the use or intention to use and user satisfaction. As a result of using the system, certain benefits will be achieved, which its net benefits will either positively or negatively influence user satisfaction and further use of the information system.
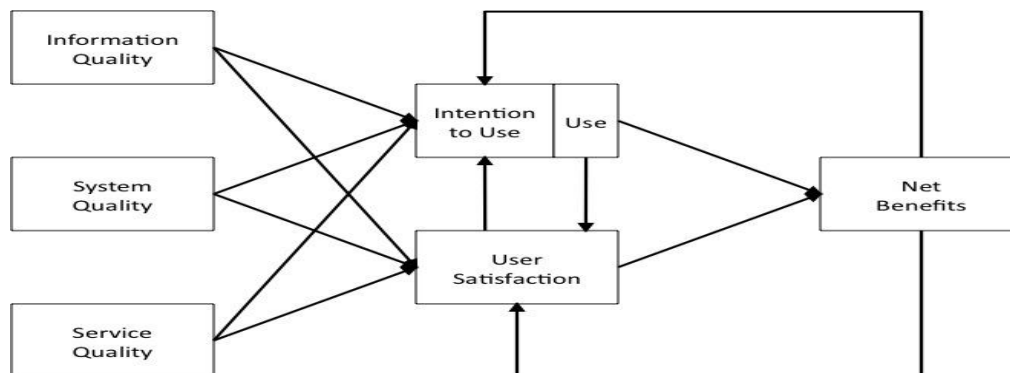
- *System Quality*: measure of the information processing system itself
- *Information Quality*: measure of information system output
- *Information Use*: measure of recipient consumption of the output of an information system
- *User Satisfaction*: measure of recipient response to the use of the output of an information system
- *Individual Impact*: measure of the effect of information on the recipient
- *Organizational Impact*: measure of the effect of information on organizational performance.

1.7 Why information systems matter
A business perspective on information system
Managers and business firms invest in information technology and information systems because they provide real economic value to the business. In a business perspective an information system creates value to the firm through increasing revenue by providing information that help managers make better decisions or improving the execution of business processes.. Every business has an information **value chain** in which raw information is systematically acquired and then transformed through various stages that add value to that information. The value of an information system to a business, as well as the decision to invest in any new information systems is in part determined by the extent to which the system will lead to better management decisions, more efficient business processes and higher firm profitability.

- ***Value Chain****: primary and supporting activities that add value to an organization's products and services to achieve competitive advantage*

While many managers are familiar with the reasons why managing their typical resources such as equipment and people are important, it is worthwhile to take a moment to examine four reasons why managing information systems and technology are just as important.

a). Capital Management
As the text states, "Investment in information technology has doubled as a percentage of total business investment since 1980, and now accounts for more than one-third of all capital invested in the United States…" That's a lot of money that businesses are spending on a relatively new component of many organizations. The business world has come a long way very rapidly in the last twenty years in terms of the amount of dollars spent on technology. Unfortunately, many companies haven't made the same advances in learning how to properly manage all these new corporate assets.

b). Foundation of Doing Business
Take a look around you and see if you can find a business that does not depend on information technology in one form or another. The local restaurant probably manages their lunch-time crowds using hand-held devices that allow

the waiter or waitress to communicate menu orders directly to the kitchen. The rental car company uses information technology to track not only customer orders but may also use global positioning systems that relay the exact position of every car wherever it is. Your local drycleaners may also use information technology to keep track of all their chemical processes to ensure regulatory compliance. In short, there are very few businesses and organizations that do not currently use some form of information technology.

c). Productivity
Simply put, effectively managing your organization's information technology and resources will increase the productivity and effectiveness of your company. With the right technology workers can increase the amount of work they are able to accomplish in less time than ever before.

d). Strategic Opportunity and Advantage
Businesses and organizations simply can't stick their heads in the sand and ignore all of the improvements and inventions that are available nowadays. If they choose to do so, chances are their competition won't. It's not just the improvements in current processes that are available but the opportunities for new products or services that businesses can take advantage of with information technology.

1.8 Why IT Now? Digital Convergence and the Changing Business Environment
The Internet and Technology Convergence
Businesses are rushing to the Internet in an effort to keep up with the competition or to create whole new businesses. Now organizations struggle with such issues as how to design and develop a Web site or how to determine a fair e-mail policy for employees. Electronic market systems are allowing businesses to take advantage of technology to create new methods of buying and selling.

Transformation of the Business Enterprise
Technology, to a large extent, has driven organizations to change the way they operate and that includes the way they manage. We're going to take an in-depth look at how organizations work and how they've been transformed by technology.

Globalization
Next time you purchase a product, any product, look at the fine print and see where it's made. It could be China, or the Philippines, or a South American company, or even in the United States. IT and Information systems have enabled globalization of Organizations

Rise of the Information Economy
In a knowledge and information-based economy, knowledge and information are key ingredients in creating wealth.

1.9. Information Systems (IS) Structure
The structure if an information systems can be describes in terms of four separate but related aspects;-
- Operating elements
- Decision support
- Management activity
- Organizational function

1.9.1. Operating elements of an information system
The operating elements include; the physical components, processing functions and outputs to the users

Physical elements
The physical components required for an business / organizational information system are
- Hardware: Physical computer equipment and associated devices. Hardware must provide for the five major functions;- Input, Output, Secondary storage for data and programs, Central processor and communication
- Software: instructions that direct the operations of the computer i.e. systems software and application software

- Database: storage facility of the data and computer programs
- Procedures: formal operating procedures for the various system users. Three major types; user instructions, data preparation instructions, and system operating instructions.
- Operations Personnel: Information system users.

Processing functions

The major processing functions include;
- Process transactions; data entry, process, report, confirm or explain the performance and communicate the report.
- Produce reports: produce schedule and ad hoc reports
- Process enquiries: respond to database enquiries
- Process interactive support applications: support planning, analysis and decision making

Output to Users

Outputs can be classified into;
- Transaction documents or screens
- Preplanned reports
- Preplanned inquiry responses
- Ad hoc reports and inquiry responses
- User-machine dialog results.

Reports, inquiry responses and dialog results provide four types of information;
- Monitoring information; information that confirms that an action have been taken and reports status in financial or other terms.
- Problem finding information; information presented in a format that promotes identification of problems
- Action information; the information presented with action specified or implied.
- Decision support; report oriented to performing analysis and making decisions.

1.9.2. Information systems to support Decision making

Information systems differ depends on the type of decision supported.
- Structured, Programmable Decisions: this type of decisions can be pre-specified and can be completely automated. IS to support structured decisions are clear and unambiguous procedures for entering the required data, validating procedures to ensure correct and complete input, processing of the output using decision logic and output of the programmed decision in a form that is useful for action.
- Unstructured, Non-programmable Decisions: have no pre-established decision procedures either because the decision is too infrequent to justify development of such procedures, or the decision process is not well understood, or to dynamic to allow for a development of stable pre-established procedures. Data requirement are not known in advance and thus the system must allow for ad-hoc data retrieval requests.

1.9.3. IS Structure based on the Management Activity

Information system structure based on the hierarchy of management planning and control i.e. the three levels of management

Level	Comments \ functions
Strategic Planning	Definition of goals, policies and general guidelines charting course of organization. Determination of organization's objectives
Management control and tactical planning	Acquisition of resources, Acquisition of tactics, new products Establishment and monitoring of budgets
Operational planning and Control	Effective and efficient use of existing facilities and resources to carry out activities with budget constraints

1.9.3. Information system for management control

Management control information is required by managers to measure performance, decide on control actions, formulate new decision rules to be applied by operational personnel and allocate resources.

Summary information is required and this type of information includes;
- Planned performance
- Variances from planned performance
- Reasons for variances
- Analysis of possible decisions or courses of action

The processing requirements to support management control activities are;
- Planning and budget models to assist managers in finding problems in direction and preparing and revising plans and budgets
- Variance reports programs to process scheduled reports showing performance and variances from planned performance or other standards such as competitor's performance.
- Problem analysis models to analyze data to provide input for decision making.
- Decision models to analyse a problem situation and provide possible solutions for management evaluation

1.9.4. IS Structure based on Organizational Function

Based on the organization function which use information. Example;
- Sales and marketing subsystem
- Production sub-system
- Logistics sub-system
- Personnel Sub-system
- Finance and Accounting Sub-system
- Information processing Sub-system
- Top Management Sub-system

Issues on IS structure.
- Extent of formal and non-formal information systems
  - Public Formal structured and Public Informal unstructured systems
  - Private Formal and Private informal information systems
  - Management resistance to formal information systems
- The extent of integration of files and processing
- The extent of user-machine interactions
- Generalized versus individualized systems.

Chapter Review Questions?
1. Why are information systems so essential for running and managing a business today?
2. What exactly is an information system? How does it work? What are its management, organization and technology components?
3. List and explain four reasons why information systems are so important for business today
4. Describe five technology and business trends that have enhanced the role of information systems in today's competitive business environment.
5. What are some of the new roles information systems are playing in organizations?
6. Discuss the changes in the business environment brought about by technology in the last five years.

Reference
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