Research in Computing

Chapter 2:

Information Systems And Knowledge Management

Information, Data, and Intelligence

- **Data -** simply facts or recorded measures of certain phenomena (values, things or events), may be in a formatted or unformatted form.
- **Information** is data formatted (structured) in a way to support decision making or define the relationship between two facts.
- **Business intelligence** is the subset of data and information that has some explanatory power enabling effective managerial decisions to be made.
- So, there is more data than information, and more information than intelligence.

The Characteristics of Valuable Information

- ***Useful*** data has the potential to become Information OR Intelligence
- Four characteristics help determine how useful data may be:
  - Relevance,
  - Quality,
  - Timeliness and
  - Completeness

- **Relevance**: Reflects how appropriate these particular facts are to the situation at hand.
- Put another way, whether the facts are logically connected to the situation.
- Relevant data are facts about things that can be changed, and if they are changed, it will materially alter the situation.
- Will a change in the data coincide with a change in some important outcome?

- **Quality**
- Data quality is the degree to which the available data represents the true situation.
- High-quality data are accurate, valid, and reliable.
- High-quality data represent reality without any bias.
- Sometimes, researchers will try to obtain the same data from multiple data sources as one check on its quality.

- **Timeliness**
- Business is a dynamic field in which out-of-date information can lead to poor decisions.
- Business information must be timely—that is, provided at the right time.
- Computerized information systems can record events and dispense relevant information soon after the event.
- A great deal of business information becomes available almost at the moment that a transaction occurs.
- Timeliness means that the data are current enough to still be relevant.

- **Completeness**
- Information completeness refers to having the right amount of information.
- Managers must have sufficient information about all aspects of their decisions.
- Often incomplete information leads decision makers to conduct their own business research.

Knowledge Management

- From an individual’s perspective, knowledge is simply what you have stored in memory. It helps you make decisions about a variety of things in your life.

E.g.: Where should I order Chinese food from?

- Organizations can use knowledge in a similar way.
- Knowledge is accumulated not just from a single individual, but from many sources.
- Financial managers, human resource managers, sales managers, customer reports, economic forecasts, and custom-ordered research all contribute to an organization’s knowledge base.
- All this data forms the organization’s memory.
- It provides a framework that can be thoughtfully applied when assessing a business problem.

- Business researchers and decision makers use this knowledge to help create solutions to strategic and tactical problems.
- Thus, knowledge is a key resource and a potential competitive advantage.
- Definition of Knowledge*: A blend of previous observations, insight from situations, and data that forms organizational memory.*
- Definition of Knowledge Management*: The process of creating an inclusive, comprehensive organizational memory which is reliable, easily and timely accessible, and which is often called the organization's intellectual capital.*
- The purpose of knowledge management is to organize the intellectual capital of an organization in a formally structured way for easy use.
- Knowledge is presented in a way that helps managers comprehend and act on that information and make better decisions in all areas of business.

- Knowledge management systems are particularly useful in making data available across all the functional areas of the firm.
- Thus, marketing, management, and financial knowledge can be integrated.
- Knowledge management systems are particularly useful in new product development and introduction.

Global Information Systems

- An organized collection of

Computer hardware, *software*, *data* and *personnel*

designed to

capture, *store*, *update*, *manipulate*, *analyse*, and *immediately display information*

about worldwide business activity.

- It is a tool for providing past, present, and projected information on internal operations and external activity.
- Using satellite communications, high-speed microcomputers, electronic data interchanges, fibre optics, data storage devices, and other technological advances in interactive media, global information systems are changing the nature of business.

Decision Support Systems

- **A decision support system (DSS)** is a system that helps decision makers confront problems through direct interaction with computerized databases and analytical software programs.
- The purpose of a decision support system is to store data and transform them into organized information that is easily accessible to managers.
- Business research can be described in many ways. One way is to categorize research based on the four possible functions it serves in business: Foundational, Testing, Issues and Performance

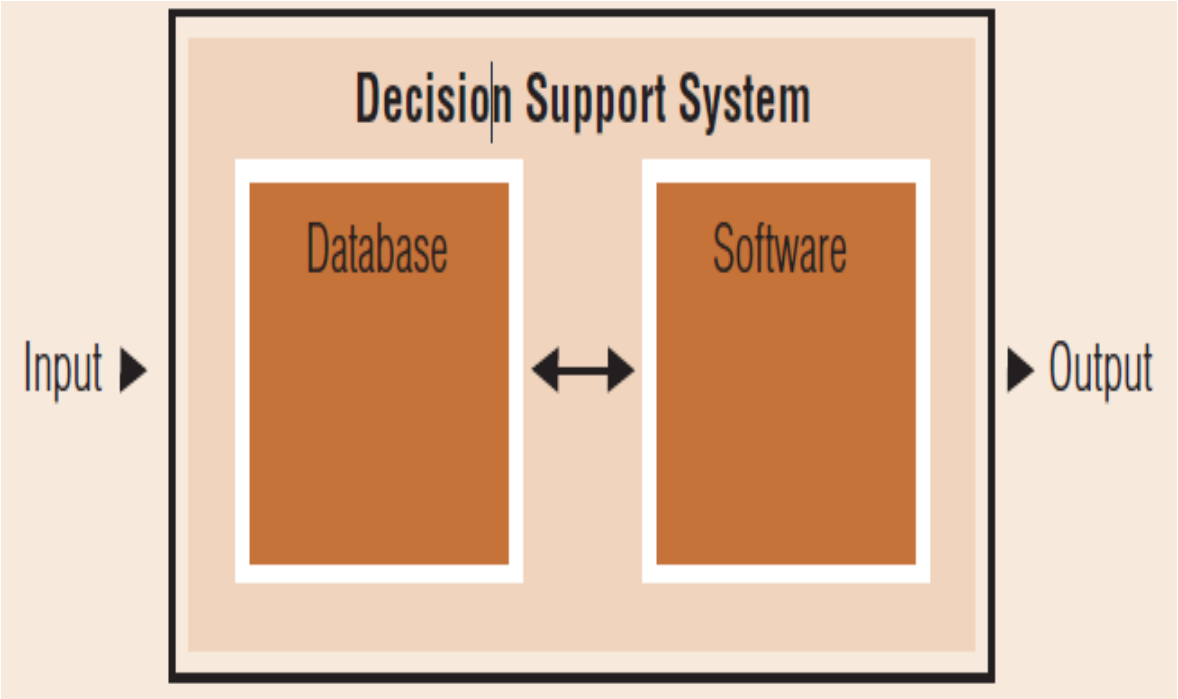
1. Foundational—answers basic questions like *What business should we be in?*

2. Testing—addresses things like new product concepts or promotional ideas like *How effective will they be?*

3. Issues—examines how specific issues impact the firm like *How does organizational structure impact employee job satisfaction and turnover?*

4. Performance—monitors specific metrics including financial statistics like profitability and delivery times. They are critical in real-time management and in "what-if" types of analyses examining the potential impact of a change in policy.

- Of these, it is the performance category that is of most interest to a DSS.
- The metrics that are monitored can be fed into automated decision-making systems, or they can trigger reports that are delivered to managers.
- These form the basis of a decision support system and best typify the way business research assists managers with day-to-day operational decisions.



Modern decision support systems greatly facilitate customer relationship management (CRM).

- Raw, un-summarized data are input to the DSS.
- Data collected in business research projects are a major source of this input, but the data may be purchased or collected by accountants, financial officers, sales managers, production managers, or company employees other than business researchers.
- Effective businesses spend a great deal of time and effort collecting information for input into the decision support system.
- Useful information is the output of a DSS.
- A decision support system requires both databases and software.
- For firms operating across national borders, the DSS becomes part of its Global Information System.

- A **CRM system** is the part of the DSS that addresses exchanges between the firm and its customers.
- It brings together information about customers including sales data, market trends, marketing promotions and the way consumers respond to them, customer preferences, and more.
- A CRM system describes customer relationships in sufficient detail so that financial directors, marketing managers, salespeople, customer service representatives, and perhaps the customers themselves can access information directly, match customer needs with satisfying product offerings, remind customers of service requirements, and know what other products a customer has purchased.

Databases and Data Warehousing

- **Database:** A collection of raw data arranged logically and organized in a form that can be stored and processed by a computer.
- Modern computer technology makes both, the storage and retrieval of this information, easy and convenient.
- **Data Warehousing:** The process allowing important day-to-day operational data to be stored and organized for simplified access.
- More specifically, a data warehouse is the multitiered computer storehouse of current and historical data.
- **Data warehouse management** requires that the detailed data from operational systems be extracted, transformed, placed into logical partitions (for example, daily data, weekly data, etc.), and stored in a consistent manner.

- Managing a data warehouse effectively requires considerable computing power and expertise.
- As a result, data warehouse companies exist that provide this service for companies in return for a fee.
- Data warehousing allows for sophisticated analysis, such as data mining.

Input Management

- Input includes all the numerical, text, voice, and image data that enter the DSS.
- Systematic accumulation of pertinent, timely, and accurate data is essential to the success of a decision support system.
- DSS managers, systems analysts, and programmers are responsible for the decision support system, but many functions within an organization provide input data.
- Business researchers, accountants, corporate librarians, personnel directors, salespeople, production managers, and many others within the organization help to collect data and provide input for the DSS.
- Input data can also come from external sources.

- There are five major sources of data input which can provide valuable input:

Internal Records

Proprietary Business Research

Salesperson Input

Behavioural Tracking

Outside Vendors and External distributors of data.

a. Internal Records

- Internal records, such as accounting reports of production costs and sales figures, provide considerable data that may become useful information.
- An effective data collection system establishes orderly procedures to ensure that data about aspects of regular operations (costs, shipments, inventory, sales etc) are routinely collected and entered into the computer.

b. Proprietary Business Research

- It emphasizes the company's gathering of new data.
- Research projects conducted to study specific company problems generate data; this is proprietary business research.
- Providing managers with non-routine data that otherwise would not be available is a major function of proprietary business research.
- Proprietary research often involves either the testing and/or issues types of research.

c. Salesperson Input

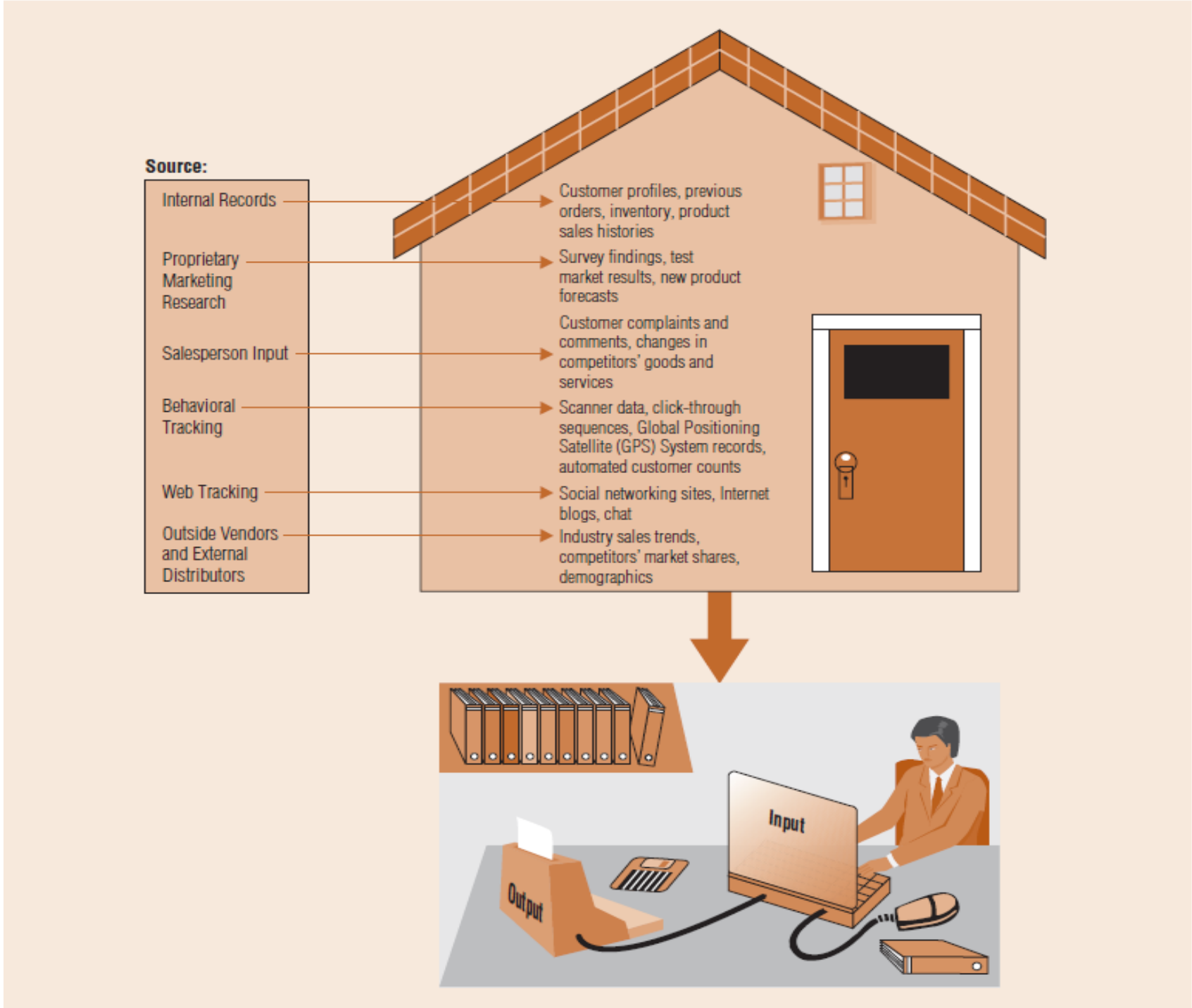
- Salespeople are typically a business's boundary spanners, the link between the organization and the external environments.
- Since they are in touch with these outside entities, they commonly provide essential business data.
- Sales representatives' reports frequently alert managers to changes in competitors' prices and new product offerings.
- It also may involve the types of complaints salespeople are hearing from customers.
- As trends become evident, this data may become business intelligence, leading to a change in product design or service delivery.

d. Behavioural Tracking

- Modern technology provides new ways of tracking human behavior.
- Global positioning satellite (GPS) systems allow management to track the whereabouts of delivery personnel at all times.
- This is the same system that provides directions through an automobile's navigation system.
- Technology also allows firms to track actual customer behavior.
- While it's true that GPS tracking data of customers is also sometimes possible, the Internet also greatly facilitates customer behavior tracking.
- Purchase behavior can also be tracked at the point of sale.
- Scanner data refers to the accumulated records resulting from point-of-sale data recordings.
- In other words, each time products are scanned at a checkout counter, the information can be stored.
- The term single-source data refers to a system's ability to gather several types of interrelated data, such as type of purchase, use of a sales promotion, or advertising frequency data, from a single source in a format that will facilitate integration, comparison, and analysis.

e. Outside Vendors And External Distributors

- Outside vendors and external distributors market information as their products.
- Many organizations specialize in the collection and publication of high-quality information.
- Other vendors specialize in the distribution of information.
- Public libraries have always purchased information, traditionally in the form of books, and they have served as distributors of this information.
- Media representatives often provide useful demographic and lifestyle data about their audiences.
- Business-oriented publications are important sources of information.
- These publications keep managers up-to-date about the economy, competitors' activities, and other aspects of the business environment.
- Companies called data specialists record and store certain business information.
- Computer technology has changed the way many of these organizations supply data, favoring the development of computerized databases


Source:
Internal Records
Proprietary Marketing Research
Salesperson Input
Behavioral Tracking
Web Tracking
Outside Vendors and External Distributors
Customer profiles, previous orders, inventory, product sales histories
Survey findings, test market results, new product forecasts
Customer complaints and comments, changes in competitors' goods and services
Scanner data, click-through sequences, Global Positioning Satellite (GPS) System records, automated customer counts
Social networking sites, Internet blogs, chat
Industry sales trends, competitors' market shares, demographics
Input
Output

Topics for self-study/Presentation

#Computerized Data Archives (Statistical Databases, Financial Databases, Video Databases)

#Networks And Electronic Data Interchange

#The Internet And Research

What Exactly Is The Internet? (Internet, Host)

How Is The Internet Useful In Research? (Accessing Available Data, Collecting Data)

Navigating The Internet (World Wide Web (WWW), Content Providers, Uniform Resource Locator (URL), Search Engine, Keyword Search)

#Interactive Media And Environmental Scanning

#Information Technology (Pull Technology, Push Technology, Smart Agent Software, Cookies)

#Intranet

#Internet2