Management information system

(MIS)

Management Information Systems (MIS) are information systems, typically computer-based, that are used within an organization. WordNet describes an information system as "a system consisting of the network of all communication channels used within an organization". A management information system may also be defined as "a system that collects and processes data (information) and provides it to managers at all levels who use it for decision making, planning, program implementation, and control." An information system is comprised of all the components that collect, manipulate, and disseminate data or information. It usually includes hardware, software, people, communications systems such as telephone lines, and the data itself. The activities involved include inputting data, processing of data into information, storage of data and information, and the production of outputs such as management reports.

As an area of study it is commonly referred to as *information technology management*. The study of information systems is usually a commerce and business administration discipline, and frequently involves software engineering, but also distinguishes itself by concentrating on the integration of computer systems with the aims of the organization. The area of study should not be confused with [Computer Science] which is more theoretical in nature and deals mainly with software creation, or [Computer Engineering], which focuses more on the design of computer hardware.

In business, information systems support business processes and operations, decision-making, and competitive strategies.

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The functional support role

The business processes and operations support function is the most basic. It involves collecting, recording, storing, and basic processing of data. Information systems support business processes and operations by:

- recording and storing sales data, purchase data, investment data, payroll data and other accounting records
- processing these accounting records into income statements, balance sheets, ledgers, management reports, and other forms of financial information
- recording and storing inventory data, work in process data, equipment repair and maintenance data, supply chain data, and other production/operations records

- processing these operations records into production schedules, production controllers, inventory systems, and production monitoring systems
- recording and storing personnel data, salary data, employment histories, and other human resources records
- processing these human resources records into employee expense reports, and performance based reports
- recording and storing market data, customer profiles, customer purchase histories, marketing research data, advertising data, and other marketing records
- processing these marketing records into advertising elasticity reports, marketing plans, and sales activity reports
- recording and storing business intelligence data, competitor analysis data, industry data, corporate objectives, and other strategic management records
- processing these strategic management records into industry trends reports, market share reports, mission statements, and portfolio models
- use of all the above to implement, control, and monitor plans, strategies, tactics, new products, new business models or new business ventures.

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The decision support role

The business decision making support function goes one step further. It is an integral part of making decisions. It allows users to ask "What if…?" questions: *What if we increase the price by 5%? What if we increase price by 10%? What if we decrease price by 5%? What if we increase price by 10% now, then decrease it by 5% in three months?* It also allows users to deal with contingencies: *If inflation increases by 5% (instead of 2% as we are assuming), then what do we do? What do we do if we are faced with a strike or a new competitive threat?*

The most basic and most versatile business decision making tool is the spreadsheet, but spreadsheets are not user friendly. More sophisticated programs often seamlessly incorporate statistical decision making tools like sensitivity analysis, Monte Carlo analysis, risk analysis, break even analysis and Bayesian analysis. If, for example, you are using the information system to decide about a new product introduction, the program should incorporate tools like logit analysis, B.C.G. Analysis, conjoint analysis, contribution margin analysis, multi dimensional scaling, G.E. Multi Factoral analysis, factor analysis, cluster analysis, discriminant analysis, Quality Function Deployment, preference regressions, and preference-rank translations.

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The communication decision support system role

Information systems can support a company's competitive positioning. Here are three levels of analysis:

1. The supports for help in piloting the chain of internal value. They are the most recent and the most pragmatic systems within the reach of the manager. They are the solutions to reductions of costs and management of performance. They are typically named "Business Workflow Analysis" (BWA) or of "Business Management Systems p2p". Tool networks, they ensure control over piloting the set functions of a company. The real-time mastery in the costs of dysfunctions cause distances from accounts, evaluation and accounting that are presented in the evaluation and qualitative reports.

2. All successful companies have one (or two) business functions that they do better than the competition. These are called core competencies. If a company's core competency gives it a long term advantage in the marketplace, it is referred to as a sustainable competitive advantage. For a core competency to become a sustainable competitive advantage it must be difficult to mimic, unique, sustainable, superior to the competition, and applicable to multiple situations. Examples of company characteristics that could constitute a sustainable competitive advantage include: superior product quality, extensive distribution contracts, accumulated brand equity and positive company reputation, low cost production techniques, patents and copyrights, government protected monopoly, and superior employees and management team. The list of potential sustainable competitive advantage characteristics is very long. However, some experts hold that in today's changing and competitive world, no advantage can be sustained in the long run. They argue that the only truly sustainable competitive advantage is to build an organization that is so alert and so agile that it will always be able to find an advantage, no matter what changes occur.

3. Information systems often support and occasionally constitute these competitive advantages. The rapid change has made access to timely and current information critical in a competitive environment. Information systems, like business environmental scanning systems, support almost all sustainable competitive advantages. Occasionally, the information system itself is the competitive advantage. One example is Wal-Mart. They used an extranet to integrate their whole supply chain. This use of information systems gave Sam Walton a competitive advantage for two decades. Another example is Dell Computer. They used the internet to market custom assembled PC's. Michael Dell is still benefitting from this low-cost promotion and distribution technique. Other examples are eBay, Amazon.com, Federal Express, and Business Workflow Analysis Oberon-bwa.

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The performance monitoring role

MIS are not just statistics and data analysis. They have to be used as an MBO (Management by Objectives) tool. They help:

- to establish relevant and measurable objectives
- to monitor results and performances (reach ratios)
- to send alerts, in some cases daily, to managers at each level of the organisation, on all **deviations** between results and pre-established objectives and budgets.

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MIS as an elastic anomaly

There are numerous ways that a company that has invested in information technology can leverage this investment to create, grow, or maintain elasticity of the anomaly.

1. Leverage IT investment that supports their core competency. Successful firms tend to have one or two core competencies that they can do better than their competitors. It may be anything from new product development to customer service. Information technology is often an important input into this core competency. This IT investment in a company's core competency can be a significant barrier to entry for other companies.
2. Leverage IT investment in supply chain networks. Firms that are a part of an integrated supply chain system have established relationships of trust with suppliers. This

usually ensures quicker deliver times, problem-free delivery and an assured supply. It can also entail price discounts and other preferential treatment. The inability of new entrants to get onto a supply chain/inventory management system can be a major barrier to entry.

3. Leverage IT investment in distribution channel management. As with supplier networks, investment in distribution channel management systems can ensure quicker delivery times, problem free delivery, and preferential treatments. The investment in this technology, and the experience gained in learning how to use it, can be an important barrier to entry. When the distribution channel management system is exclusive, it may give you some control over access to the retailers involved.

4. Leverage IT investment in brand equity. Often firms have invested large sums of money in brand advertising. This is facilitated by investment in marketing information systems and customer relationship management system. An indomitable brand name is a formidable barrier to entry.

5. Leverage IT investment in production processes (1). Information systems have become a necessity in managing large production runs. Automated systems are the most cost efficient way of organizing large scale production processes. These firms can obtain economies of scale in promotion, purchasing, and production; economies of scope in distribution and promotion; reduced overhead allocation per unit; and shorter break-even times more easily.

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This absolute cost advantage can be an important barrier to entry.

6. Leverage IT investment in production processes (2). Investment in IT allows a company flexibility in their overall output level. [Michael Porter](#) claims that economies of scale are a barrier to entry, aside from the absolute cost advantages they provide. This is because, a company producing at a point on the long-run average cost curve where economies of scale exist has the potential to obtain cost savings in the future, and this potential is a barrier to entry.

7. Leverage learning curve advantages from experience with IT. As a company gains experience using IT systems, they become familiar with a set of best practices that are more or less known to other firms in the industry. Firms outside the industry are generally not familiar with the industry specific aspects of using these systems. New entrants will be at a disadvantage unless they can redefine the industries best practices and leap-frog existing firms.

8. Leverage IT investment in [mass customization](#) production processes. IT controlled production technology can facilitate collaborative, adaptive, transparent, or cosmetic customization. This flexibility can increase margins, increase customer satisfaction, and be a significant barrier to entry.

9. Leverage IT investment in computer aided design (1). CAD systems facilitate the speedy development and introduction of new products.

This can create proprietary product differences. [Product differentiation](#) can be a barrier to entry.

10. Leverage IT investment in computer aided design (2). CAD systems facilitate the speedy development and introduction of new products. Proprietary product differences can be used to create incompatibilities between competing products (as every computer user knows). These incompatibilities increase consumers' switching costs. High customer switching costs is a very valuable barrier to entry (Just ask Bill Gates.).

11. Leverage IT investment in E-commerce. Company web sites can be personalized to each customers interests, expectations, and commercial needs. They can also be used to create a sense of community. Both of these tend to increase customer loyalty. Customer loyalty is an important barrier to entry.

12. Leverage IT investment in stability. Technologically sophisticated firms with multiple electronic points of contact with customers, suppliers, and others appear to be more stable. This monumental appearance of stability can be a barrier to entry. This is particularly true in financial services.

13. The simple fact that IT investment requires funds make it a barrier to entry. Anything that increases capital requirements is a barrier to entry.

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Historical development

The role of business information systems has changed and expanded over the last four decades.

In the incipient decade (1950s and '60s), **"electronic data processing systems"** could be afforded by only the largest organizations. They were used to record and store bookkeeping data such as journal entries, specialized journals, and ledger accounts. This was strictly an operations support role.

By the 1960s **"management information systems"** were used to generate a limited range of predefined reports, including income statements (they were called P & L's back then), balance sheets and sales reports. They were trying to perform a decision making support role, but they were not up to the task.

By the 1970s **"decision support systems"** were introduced. They were interactive in the sense that they allowed the user to choose between numerous options and configurations. Not only was the user allowed to customize outputs, they also could configure the programs to their specific needs. There was a cost though. As part of your mainframe leasing agreement, you typically had to pay to have an IBM system developer permanently on site.

The main development in the 1980s was the introduction of **decentralized computing**. Instead of having one large mainframe computer for the entire enterprise, numerous PC's were spread around the organization. This meant that instead of submitting a job to the computer department for [batch processing](#) and waiting for the experts to perform the procedure, each user had their own computer that they could customize for their own purposes. Many poor souls fought with the vagaries of DOS protocols, BIOS functions, and DOS batch programming.

As people became comfortable with their new skills, they discovered all the things their system was capable of. Computers, instead of creating a paperless society, as was expected, produced mountains of paper, most of it valueless. Mounds of reports were generated just because it was possible to do so. This information overload was mitigated somewhat in the 1980s with the introduction of **"executive information**

systems". They streamlined the process, giving the executive exactly what they wanted, and only what they wanted.

The 1980s also saw the first commercial application of artificial intelligence techniques in the form of **"expert systems"**. These programs could give advice within a very limited subject area. The promise of decision making support, first attempted in management information systems back in the 1960s, had step-by-step, come to fruition.

The 1990s saw the introduction of **"strategic information systems"**. This was largely because of developments in the subject of strategic management by scholars like M. Porter, T Peters, J. Reise, C. Markides, and J. Barney in the 1980s. Competitive advantage became a hot management topic and software developers were happy to provide the tools.

The role of business information systems had now expanded to include strategic support. The latest step was the commercialization of the Internet, and the growth of intranets and extranets at the turn of the century.

http://en.wikipedia.org/wiki/Management_Information_Systems