The Expanding Roles of Information Systems

In Chapter 1, we stressed that information systems play three fundamental roles in the business success of an enterprise:

- Support of its business operations.
- Support of decision making by its managers.
- Support of its strategies for competitive advantage.

In this section, you will see that these vital roles are implemented by many different types of information systems. You will also see that the roles given to the information systems function have expanded significantly over the years. Figure 2.12 summarizes these changes.

Until the 1960s, the role of information systems was simple: transaction processing, record-keeping, accounting, and other electronic data processing (EDP) applications. Then another role was added, as the concept of management information systems (MIS) was conceived. This new role focused on providing managerial end users with predefined management reports that would give managers the information they needed for decision-making purposes.

By the 1970s, it was evident that the prespecified information products produced by such management information systems were not adequately meeting many of the decision-making needs of management. So the concept of decision support systems (DSS) was born. The new role for information systems was to provide managerial end users with ad hoc and interactive support of their decision-making processes. This support would be tailored to the unique decision-making styles of managers as they confronted specific types of problems in the real world.

**Figure 2.12**
The expanding roles of information systems. Note how the roles of computer-based information systems have expanded over time. Also, note the impact of these changes on the end users and managers of an organization.
In the 1980s, several new roles for information systems appeared. First, the rapid development of microcomputer processing power, application software packages, and telecommunication networks gave birth to the phenomenon of end user computing. Now, end users can use their own computing resources (and networks of workgroup and corporate resources) to support their job requirements, instead of waiting for the indirect support of corporate information services departments.

Next, it became evident that most top corporate executives did not directly use either the reports of management information systems or the analytical modeling capabilities of decision support systems, so the concept of executive information systems (EIS) was developed. These information systems attempt to give top executives an easy way to get the critical information they want, when they want it, tailored to the formats they prefer.

Third, breakthroughs were made in the development and application of artificial intelligence (AI) techniques to business information systems. Expert systems (ES) and other knowledge-based systems forged a new role for information systems. Today, expert systems can serve as consultants to users by providing expert advice in limited subject areas.

Finally, an important new role for information systems appeared in the 1980s and continues into the 1990s. This is the concept of a strategic role for information systems, sometimes called strategic information systems (SIS). In this concept, information systems are expected to play a direct role in achieving competitive advantages for a firm. This places a new responsibility on the information systems function of a business. No longer is IS merely an information utility, a service group providing information processing services to end user departments within the firm. Now it must become a producer of information-based products and services that earn profits for the firm and also give it a competitive advantage in the marketplace.

All these changes have increased the importance of the information systems function to the success of a firm. However, as we will see in this text, they also present new challenges to managers and end users to effectively capitalize on the potential benefits of information technology.
FIGURE 2.13
Operations and management classifications of information systems. Note how this conceptual overview emphasizes the main purpose of information systems that support business operations and managerial decision making.

Support of Business Operations

Transaction Processing Systems

Process Control Systems

Office Automation Systems

Support of Managerial Decision Making

Management Information Systems

Decision Support Systems

Executive Information Systems

Operations Support Systems

Prespecified Reporting for Managers

Interactive Decision Support

Information Tailored for Executives

Transaction Processing Systems

Operations support systems include the major category of transaction processing systems (TPS). Transaction processing systems record and process data resulting from business transactions. Typical examples are information systems that process sales, purchases, and inventory changes. The results of such processing are used to update customer, inventory, and other organizational databases. These databases then provide the data resources that can be processed and used by information reporting systems, decision support systems, and executive information systems.

Transaction processing systems also produce a variety of information products for internal or external use. For example, they produce customer statements, employee paychecks, sales receipts, purchase orders, dividend checks, tax forms, and financial statements. Transaction processing systems process transactions in two basic ways. In batch processing, transactions data is accumulated over a period of time and processed periodically. In realtime (or online) processing, data is processed immediately after a transaction occurs. For example, point-of-sale (POS) systems at retail stores may use electronic cash register terminals to capture and transmit sales data over telecommunications links to regional computer centers for immediate (realtime) or nightly (batch) processing. See Figure 2.15. We will discuss transaction processing systems in more detail in Chapter 9.

Process Control Systems

Operations support systems also make routine decisions that control operational processes. Examples are automatic inventory reorder decisions and production control decisions. This includes a category of information systems called process control systems (PCS), in which decisions adjusting a physical production process are...
automatically made by computers. For example, petroleum refineries and the assembly lines of automated factories use such systems. They monitor a physical process, capture and process data detected by sensors, and make realtime adjustments to a process. We will discuss process control systems further in Chapter 9.

Another major role of operations support systems is the transformation of traditional manual office methods and paper communications media. **Office automation systems** (OAS) collect, process, store, and transmit information in the form of electronic office communications. These automated systems rely on text processing, telecommunications, and other information systems technologies to enhance office communications and productivity. For example, a business may use word processing for office correspondence, electronic mail to send and receive electronic messages, desktop publishing to produce a company newsletter, and teleconferencing to hold electronic meetings. We will discuss office automation systems in detail in Chapter 8.
Management Support Systems

When information systems focus on providing information and support for effective decision making by managers, they can be called management support systems (MSS). Management support systems began when the concept of management information systems (MIS) originated in the 1960s. MIS became the byword (and the buzzword) of almost all attempts to relate computer technology and systems theory to data processing in organizations. At that time, it became evident that computers were being applied to the solution of business problems in a piecemeal fashion, focusing almost entirely on the computerization of clerical and record-keeping tasks. The concept of management information systems was developed to counteract such inefficient development and ineffective use of computers. Though tarnished by early failures, the MIS concept is still recognized as vital to efficient and effective information systems in organizations for two major reasons:

- It emphasizes the management orientation of information technology in business. A major goal of computer-based information systems should be the support of management decision making, not merely the processing of data generated by business operations.
- It emphasizes that a systems framework should be used for organizing information systems applications. Business applications of information technology should be viewed as interrelated and integrated computer-based information systems and not as independent data processing jobs.

Figure 2.16 illustrates the relationship of management support systems and operations support systems to business operations and management. Management

FIGURE 2.16
The relationship of management support systems and operations support systems to business operations and the levels of management.