

(or instantly as it's updated by others) between the various organization stakeholders. For example, the warehouse employee does not know the product sales cycle, and the customer service employee may not know the status of the shipped product. This breeds inefficiencies in the operations of an organization, which reflects poor customer service, and in the long term makes the organization ineffective in its competitive landscape. In fact, systems integration is a key issue for an organization for its growth; therefore, management needs to pay close attention to this issue. Enterprise information system plays a key role in systems integration, as discussed in this chapter. ERP systems are a major kind of enterprise information system that allows organizations to integrate the heterogeneous systems into one organization-wide application with an integrated database management system.

This chapter will trace the origins of how information systems have evolved into a heterogeneous collection of isolated systems or *silos* over the last 50 years—their relationship with an organizational structure, the value of systems integration, and the role of ERP in systems integration. Information systems have generally evolved around the needs of the organization. Before discussing evolution of IS, therefore, it is important to understand the evolution of organizations. This chapter takes a brief look at the evolution of functional silos in organizations, followed by a discussion on the evolution of IS in an organization. This is followed by a discussion on systems integration challenges, benefits of integrated systems, and the role of ERP in systems integration. The chapter will conclude with a set of challenges faced by management on systems integration and their role in resolving them.

FUNCTIONAL SILOS

According to Webster's dictionary, *silos* are an airtight pit or tower for preserving products. Silos are basically compartmentalized operating units isolated from their environment. Why have information systems and organizations evolved into functional silos? In order to understand the reasons, we first need to look at the historical evolution of modern organizations and the systems supporting their information requirements.

Horizontal Silos

Management theorists Huber and McDaniel² in their research study found that the complexity and turbulence in the organization's environment forces it to break complex tasks into smaller manageable units. If we take a closer look at the evolution of a modern organization, the early emphasis has always been on the horizontal or the functional paradigm. In the early 1900s, a management philosopher named Henry Fayol³ was the first person to divide functionalized organization into five basic areas: planning, organizing, coordinating, commanding, and controlling. Fayol's classification was extended and conceptualized in the 1930s by Luther Gulick⁴ into the functional model of POSDCORB (planning, organizing, staffing, directing, coordinating, reporting, and budgeting). The POSDCORB categorization (Figure 2-1) became very popular and led to a set of formal organization functions such as control, management,

² Huber, G., and McDaniel, R. (May 1986). The Decision-making Paradigm of Organization Design. *Management Science*, 572-589.

³ Fayol, H. (1916). *Administration Industrielle et Generale*. Paris: Dunod.

⁴ Gulick, L. (1937). Notes on the Theory of Organization. In: *Papers on the Science of Administration*. Columbia University Press.

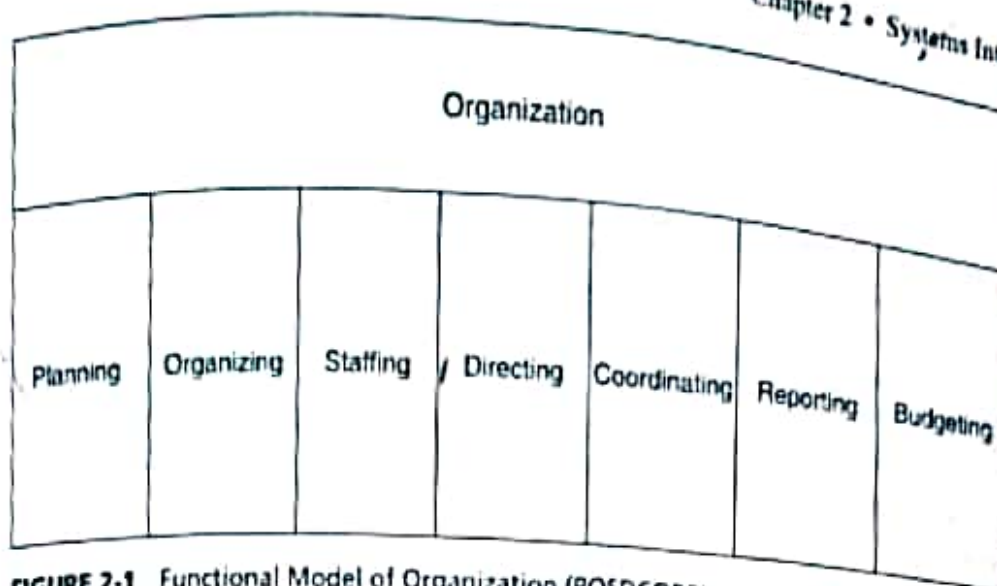


FIGURE 2-1 Functional Model of Organization (POSDCORB) Source: Adapted from Bernard, C. (1938). *The Functions of the Executive*. Cambridge: Harvard University Press.

supervision, and administration starting in late 1930s.⁵ Over the next 50 years the terminology of functions in organizations has changed, say from planning to management to strategy, but the concept of categorizing complex activities into organized functions has remained for control and coordination reasons. The current classification of organizations into divisions or departments like Accounting, Human Resources, Marketing, Management, and others reflects this evolution in organizations of breaking complex tasks into smaller manageable tasks that could be assigned to a group of people who could then be held responsible.

Vertical Silos

In addition to the functional or horizontal division, organizations have also seen a vertical or hierarchical layering of management functions. In the late 1960s, Robert Anthony,⁶ an organizational researcher, at Harvard University, found that organizations also divided responsibility in hierarchical layers from strategic planning to management control and operation control. For example, most organizations have their top-level management like CEOs and presidents to plan the long-term strategy of organizations, whereas midlevel management (e.g., vice presidents or general managers) focuses on tactical issues and the execution of organizational policy to ensure that the company is accomplishing its strategic objectives. The lower-level management (e.g., supervisors) task is to focus on the day-to-day operations of the company. This vertical categorization, even though not discrete organizational functions, does involve a distinctive set of activities. The functional silos typically follow the scientific model for business and usually have hierarchical or multilayered reporting structures, formal leadership, management positions, or both with final authority on decision making. In this traditional functional (or silo) organization, maintaining command and control is usually critical for the overall functioning of the business organization. Thus, when organizations get big and complex they tend to break functions into smaller units and assign one or more staff the responsibility for these activities. This allows the organization to manage complexity as well as the staff to specialize in those activities that enhance

⁵ Barnard, C. (1938). *The Functions of the Executive*. Cambridge: Harvard University Press.

⁶ Anthony, R. (1965). *Planning and Control Systems: A Framework for Analysis*. Boston, MA: Harvard University Graduate School of Business Press.



FIGURE 2-2 Hierarchical Model of Organization

productivity and efficiency. Work groups or teams with formal leadership or supervisors are part of this organizational structure as well. The quality of the products and services goes up, but the organization is divided into compartmentalized units that know very little of each other. Sharing of information occurs only at higher levels of management.

Despite attempts to break them, functional silos are alive and doing well. According to a survey by *Purchasing* magazine,⁷ 96 percent of the respondents said their organization still maintains a functional structure but 86 percent also said they agree with their firm's decision to promote teamwork and integration of the functional areas in their organization. One reason for this is that information sharing and communications problems get worse as an organization spreads geographically and gets more virtual. The original purpose of functional division (i.e., efficiency and effectiveness) is defeated. The lack of information sharing at all levels of an organization often leads to problems with inventory management, such as overproduction of goods, when the sales department is not sharing current data on projected sales with the production department, or poor customer service, when a customer service representative does not know the status of shipped goods. The inefficiencies can creep from operations control all the way to the strategic planning level of the organization. With global competition and virtual organizations, the traditional functional organizational structure must change to process-oriented structure to allow easy integration of information and more flexibility for an organization to realign with its environment. In order to compete in a globalized economy, companies must take a business process view and utilize IT to integrate that business process.

BUSINESS PROCESS AND...