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Information Technology
and Organizational Structure

67.1 Introduction

The first commercial uses of computers—for applications such as accounting, insurance claims processing, and airline reservations—date from the early 1950s. It was not long afterward that futurists began to speculate about the effects of computer use on the form and functioning of organizations. In 1958, Leavitt and Whisler—coiners of the term “information technology”—predicted that IT would have “definite and far-reaching impact on managerial organization” in large- and medium-sized business firms (Leavitt and Whisler, 1958, p. 41).

Leavitt and Whisler made four specific predictions. First, occupational specialization would increase: Business planning work would be taken from mid-level line managers and given to a new class of specialists such as operations researchers, who would develop tools and standardized routines for their work. Second, large organizations would re-centralize, with top managers taking over much of the planning and innovating work that they had formerly delegated to middle managers. Third, while the new specialist functions would increase in status and compensation, many middle management jobs would be downgraded or eliminated; instead of the traditional pyramid shape, the organization of the future might look more like “a football [the top staff organization] balanced on the point of a church bell” (p. 47). Fourth, the invisible line separating the top of the organization and the middle would become more distinct and impenetrable.

For years, these hypotheses about the effects of IT on organizational structure appeared to be as infamously wrong as Thomas Watson’s (then IBM’s Chairman) 1943 prediction about the world market for computers (“maybe five”). But 30 years later, scholars called Leavitt and Whisler’s predictions...
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“downright visionary” (Applegate et al. 1991, p. 128). However, the futurists of the late 1980s noted effects of IT on organizational structure that Leavitt and Whisler had not envisioned; they argued that the adoption of microcomputers would enable increased decentralization of decision making at the same time that IT also enabled downsizing, restructuring, and improved centralized control. These paradoxical impacts of IT would make large organizations as flexible, dynamic, and innovative as small firms (Applegate et al., 1991).

This, in a nutshell, is the debate over the impacts of IT on organizational structure, which stimulated much empirical research and theorizing in a number of fields and subfields, including the social issues and impacts of computing, information systems, organization theory, organizational communication, strategic management, international business, sociology, and economics. Although the theories, evidence, and implications are all contested, research about whether and how IT affects organizational structure is important for theoretical and practical reasons.

Theoretically, the concept of organizational structure—loosely, the anatomy of an organization, its skeleton and organs, as opposed to its physiology or metabolism—is central to a number of prominent organizational theories such as the information processing theory of organizations and the strategy–structure–performance paradigm. Although some theorists argue that organizational culture and processes are more important for organizational performance than organizational structure is, others counter that organizational structure shapes (but does not determine) information flows and pathways of organizational communication and helps focus the attention of managers, thus influencing organizational behavior. From this point of view, the hypothesis that IT affects organizational structure is important, because it establishes IT as a key factor in organizational performance. In addition, research about the effects of IT on organizational structure is a prominent manifestation of ongoing academic debates about technological determinism versus idealism, that is, about whether and how human behavior is affected by the material aspects of the world versus by people’s ideas and beliefs about the world.

Practically, research and theorizing about IT’s effects on organizational structure is important for at least two reasons. First, this body of knowledge suggests that, in order to perform well, organizations need information systems that match their organizational structures and strategies. Briefly, organizational structures have been observed to vary not only in degree (e.g., how centralized they are) but also in type (e.g., whether they are organized according to customers, products, or both) even among apparently similar firms (e.g., consumer product manufacturers). A line of argument uniting the strategy–structure–performance paradigm with the IT-affects-organizational-structure hypothesis implies that effective organizations will employ information systems with features that are closely aligned with their structures and strategies. For example, Croteau and Bergeron (2001) found that organizations with information systems matched to their business strategies had higher performance than organizations without such a match. Similarly, Strikwerda and Stoelhorst (2009) observed that organizations with multidimensional structures (i.e., organizations structured to emphasize customers, products, and functions simultaneously) needed to, and typically did, employ centralized information systems that can identify and summarize transactions and forecasts in flexible combinations of customers, products, and functions, whereas organizations with multidivisional structures (i.e., decentralized organizations with business units for particular product–market combinations) did not require or employ such systems. Conversely, the body of knowledge on IT and organizational structure suggests that organizations with information system features inappropriate for their strategies or structures will fail to accomplish their objectives and will perform poorly (Bergeron et al., 2004; Chan and Reich, 2007a,b; Soh et al., 2000; Strong and Volkoff, 2010).

A second practical implication of research on IT and organizational structure concerns the provisions that large and complex organizations make for managing their IT. The body of knowledge on IT and organizational structure suggests that effective strategies for managing IT in organizations will vary with organizational structures. Even if an organization relies heavily on external IT service providers, its managers face numerous choices about how to structure IT support. For instance, should they manage IT centrally or allow each major organizational subunit to manage its own IT? Application of research
and theorizing on IT and organizational structure suggests that structure should be a major consideration in the design of IT management arrangements.

This chapter aims to survey key concepts, theories, findings, and implications of research on IT and organizational structure. Section 67.2 examines how organizational structure has been conceptualized and discusses findings about the relationship between IT and organizational structure. Section 67.3 elaborates on the practical implications of this body of knowledge. Section 67.4 explores promising directions for future research on IT and organizational structure.

67.2 Underlying Principles

Organizational structure has been studied over many years by scholars in several fields—including sociology, economics, organization theory, business history, strategic management, and organizational communication and information systems—with varied theoretical interests and research questions. Consequently, any attempt to review this vast literature will necessarily oversimplify and risk offending through its categorizations, (mis)characterizations, and omissions. That said, it is important to have at least a cursory appreciation for the ways that organizational structure has been understood before considering its possible relationships with information technology.

67.2.1 Organization Structure: Definitions, Theories, and Questions

Most theories of organizational structure trace their roots to Max Weber’s (1864–1920) theory of bureaucracy, which emphasized a hierarchy of authority, written rules, and officials with expert training and career advancement based on technical qualifications. Among other foundational scholars were Nobel laureate Herbert Simon (1916–2001), a major contributor to computer science whose 1947 *Administrative Behavior* became the foundation of American administrative and management sciences, and sociologist Peter M. Blau (1918–2002), whose major empirical studies of organizational structure and technology extended Weber’s theory of bureaucracy and its role in society. Research based on the work of these seminal thinkers went in two general directions—focusing on structural characteristics or on configurations of design characteristics—although there was considerable overlap and mutual influence between them.

67.2.1.1 Organizational Characteristics

Shortly after World War II, scholars at the Tavistock Institute in the United Kingdom observed that formal and informal work group structure varied with the nature of coal-mining technology. Others generalized this “sociotechnical systems theory”: Woodward (1958) concluded that differences in production technology (e.g., mass production versus process control technology) offered the best explanation for differences in organizational structure. In an influential program of empirical research in the 1960s, known as the Aston studies (e.g., Hickson et al., 1969), researchers focused on dimensions of organizational structure such as role specialization, standardization of procedures, centralization of decision making, and direct supervision versus impersonal control (i.e., written procedures). One finding of the Aston studies was that organizational structure was related to organizational size; larger organizations were more specialized, more formalized, more standardized, but less centralized. A second key conclusion was that of a compensatory relationship between decentralization (delegation of decision making) and structuring in the form of bureaucratic rules and procedures. In other words, organizations can “centralize” decision making either by means of direct supervision or by decentralizing decision-making authority within the limits set by “impersonal” rules (Donaldson et al., 1975).

Aston researchers also found that the effects of production technology on organization structure were moderated by organizational size, contradicting Woodward’s main conclusion. (Research about the relationship between organizational size and structure is relevant to questions about IT, because...
one of the major ways in which IT is said to affect organizations is by reducing organizational size; for example, automation replaces workers, enabling downsizing.) Research by Blau and his colleagues (Blau, 1970; Blau et al., 1976) generally confirmed the Aston researchers’ findings about the importance of organizational size and the role of technology in organizational structure. From a large-scale empirical study of Employment Security Offices in the United States, Blau (1970) concluded that as organizations increased in size, they increased in differentiation (number of different types of positions), although the rate of increase in differentiation decreased with size. He also found that the size of the administrative component of organizations (the fraction of employees not directly engaged in production) decreased as organizational size increased. In a study of both production technology and computerization of administrative support functions in U.S. manufacturing plants, Blau et al. (1976) found that, whereas mass production technology routinized work and simplified administrative procedures and thereby promoted decentralization, process control technology (e.g., chemical processing) reversed those trends, leading to the development of specialized skills, “a complex administrative apparatus,” and a more centralized structure (p. 24).

Some subsequent research has aimed to analyze, model, and classify organizations with detailed attention to their structural characteristics (Burton et al., 2006; McKelvey, 1982). Generally, however, most other organizational scholars have tended to focus less on the fine-grained structural characteristics of organizations and more on a few ideal organizational types, often called configurations or archetypes (Miles and Snow, 1996; Mintzberg, 1979, 1983). Organizational configurations are conceptualized as bundles of interrelated characteristics (Meyer et al., 1993). In addition to structural characteristics, organizational configurations often include nonstructural elements such as organizational strategies, organizational environments, and organizational cultures or informal interaction patterns. Researchers often use the terms “organizational design” or “organizational form” instead of “organizational structure,” when they want to refer to configurations of structural and nonstructural characteristics.

### 67.2.1.2 Organizational Configurations

At about the same time as the Aston studies, Chandler (1962) published a highly influential historical study of structural change in leading American companies such as Standard Oil, General Motors, DuPont, and Sears Roebuck. Whereas Blau was interested in the interplay between the formal structural characteristics and informal patterns of communication and social interaction within organizations, Chandler was interested in differences across organizational configurations or forms. Chandler used the term “organizational structure,” but he defined it much more broadly than scholars like Blau. Chandler included in his notion of structure both formal and informal lines of authority and communication, as well as the information and data that flowed through those lines (Whittington, 2002). As a result, Chandler can be considered a configuration theorist.

Chandler documented and offered a historical explanation for the emergence, around 1920, of a new organizational form, called the multidivisional organization. The multidivisional form represented a change in the “basis of organization” in large enterprises. Loosely put, “basis of organization” refers to the boxes on an organizational chart at the level just below that of the chief executive. Prior to the 1920s, most organizations of any size were structured on the basis of “functions,” that is, units devoted to activities such as marketing, sales, engineering, and manufacturing (as well as support functions, such as accounting/finance, human resources, and—much more recently—IT). This form of organization is variously called “centralized,” “functional,” or “unitary” (or “U-form”). The U-form is understood as a “centralized” organizational form, because, for any decision that cuts across functions (such as a decision about a new product to be offered or a new market to be entered), no one functional unit head is able to make a good decision without input from other functional unit heads, and therefore, the final decision must be made at the top. By contrast, M-form (multidivisional) organizations are structured on the basis of “business units,” which in the classic definition (Porter, 1980) are organizational units...
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with profit-and-loss responsibility for particular product–market combinations, such as “Asia-Pacific semiconductors” or “International chemicals” or “North American generic drugs.” The M-form is understood to be a “decentralized” organizational form. The reason is that, whereas in the U-form chief executives make key decisions about products and markets, in the M-form these decisions are made by business unit managers that report to chief executives. In other words, chief executives delegate some decisions to business unit heads. However, top managers in M-forms generally retain cross-business unit decisions such as which product–markets to enter and how much to invest in each.

Chandler argued that organizations began adopting decentralized forms of organization in the 1920s for two reasons. First, improvements in transportation and communication technology (railroads and telegraphs) had enabled organizations to enter new markets. Second, increased scale of operations and exposure to new markets encouraged organizations to develop and offer new products and services (Chandler, 1962). In the field of strategic management, both developments are understood as strategies of diversification, and these strategies are believed to strain the decision-making capacity of top managers. Spurred by the problems created by diversification, in Chandler’s analysis, organizations responded by innovating in their administrative structures and procedures. By decentralizing their structures, large diversified organizations were able to improve their performance.

Chandler’s pioneering work stimulated numerous streams of research relevant to the question of IT’s relationship with organizational structure. One influence can be seen in the development of the information processing theory of organizations (also powerfully shaped by the work of Herbert Simon and his colleagues), of which Jay Galbraith is a leading proponent (Galbraith, 1977). According to information processing theory, organizational designs (structures plus lateral relationships, including informal ones) are seen as tools for channeling information, communication, and managerial attention. Galbraith is notable for his highly naturalistic, yet holistic, characterizations of organizational design in terms of their primary and secondary “bases of organization.” His writings are filled with detailed organizational charts. By looking at the allocation of responsibilities to the most senior executives in these organizational charts, one can easily see each company’s strategic priorities.

Galbraith is one of the several prominent authors who studied the internationalization of business and the evolution of multinational enterprises. Other international business scholars such as Bartlett and Ghoshal (1989) and Goold and Campbell (2002) have studied the changing organizational forms of companies with worldwide operations. Today, some observers (Strikwerda and Stoelhorst, 2009) posit the emergence of a new form, the “multidimensional organization,” with distinctly different characteristics and management systems than M-form organizations.

Perhaps the most influential program of research stimulated by Chandler’s work has been Oliver Williamson’s (1985) theory of markets and hierarchies, also known under the shorthand of organizational economics. Williamson viewed the M-form as the most significant organizational innovation of the twentieth century (King, 2011) and developed a theory to explain how, when, and why firms (hierarchical authority systems) differ from, and emerge instead of, arm’s-length market arrangements. This theory was subsequently expanded to accommodate hybrid or “network” organizational forms involving close partnerships among organizations, such as joint ventures and major “outsourcing” relationships (e.g., contract manufacturing). Theory and empirical research on networked and virtual organizations was, of course, fueled by growing awareness of the pervasiveness of organizational IT.

The many empirical studies in the strategy–structure–performance paradigm of the strategic management field are among the legacy of Chandler’s historical research. Although empirical results in this tradition have been mixed (Whittington, 2002), almost all subsequent research on organizational design and new organizational forms owes a debt to Chandler’s influence.

**67.2.1.3 Summary: Organizational Structures and Configurations**

Simplifying greatly, in the years leading up to Leavitt and Whisler’s predictions about the effects of IT on organizational structure, some scholars had attempted to explain the detailed formal structural
characteristics of organizations and to explore their interactions with informal patterns of behavior and communication. Researchers in this tradition highlighted organizational size and production technology as important determinants of organizational structure. Other scholars tended to focus on organization “designs” or “forms,” that is, packages or configurations of elements including structure, strategy, environment, and informal social interactions that commonly occur together. Those researchers emphasized the emergence of new organizational forms and the consequences of organizational forms for performance. Both research streams continue to evolve, influencing research on IT and organizational structure, although the second stream is more active today. The study of organizations includes many other intellectual traditions in addition to the ones reviewed here (including a few discussed later), but those two are the most relevant for understanding research on the links between IT and organizational structure, described more fully next.

67.2.2 Links between IT and Organizational Structure

One of the most interesting aspects of the research on IT and organizational structure is that much theory and research suggest that IT has “dual outcomes” (Pool, 1978), that is, apparently opposite effects nearly simultaneously or coterminously. For example, use of the telephone was said to have promoted the construction of skyscrapers, leading to increased urban density, at the same time that it contributed to urban sprawl (Pool, 1983). Similarly, IT has been argued and found (1) to promote both centralization and decentralization of decision making, (2) to lead both to smaller and larger organizations, and (3) to foster both new horizontal organizational forms and new bureaucratic forms of organization. Each of these three main areas of research is discussed briefly in the following.

67.2.2.1 IT and Centralization/Decentralization

Much of the earliest work on IT and organizational structure concerned structural characteristics. The term “centralization” has multiple meanings (King, 1983), many of which are relevant here. First, the descriptor “centralized” is used by some scholars to refer to a particular organizational design or form—the functional or U-form discussed earlier. Section 67.2.2.3 summarizes literature related to IT and new organizational forms.

A second meaning of the term centralization concerns physical location of organizational activities—concentrated in one geographic location versus dispersed in space and time. Theoretical arguments and empirical examples can be found to link information and communication technology to either increased geographic concentration or greater geographic dispersion. For instance, through the use of telecommunications, some organizations have geographically (and structurally) concentrated organizational support services such as accounting, human resources management, and IT help desks into regional “shared services centers,” eliminating the smaller local groups of support personnel dispersed among individual offices or factories (Sia et al., 2010). At the same time, IT is also being used to enable geographically and organizationally dispersed individuals to work together as if they shared geographic location and company affiliation (Ahuja and Carley, 1998; Argyres, 1999; Majchrzak et al., 2000).

Most commonly, the term centralization is used to refer to the level in an organization at which decisions are made. When decisions are made at the top, decision making is labeled centralized; when decision making is delegated to business unit managers or below, the organization is referred to as decentralized. As noted in the introduction to this chapter, Leavitt and Whisler (1958) argued that IT would increase centralization of decision making. Their rationale was that managers prefer centralization, because it gives them greater control over the people and processes of the organization. They decentralize only reluctantly, because in large diversified organizations they cannot be well enough informed about local conditions to make good decisions. Growing computerization increased top managers’ ability to make more and better decisions themselves; consequently, use of IT was expected to promote re-centralization (Leavitt and Whisler, 1958).
Computerization was seen as a key tool in the strategy of top-down administrative control, because it gave managers the ability to formalize tasks and monitor the outcomes of decisions by lower-level staff (Blau and Schoenherr, 1971). Some empirical research (Blau et al., 1976; Whisler, 1970) found support for the centralizing effects of IT (cf. Whisler, 1970). For instance, Blau et al. (1976) found that the use of computers for administrative support generally continued the centralizing trend associated with advanced process control technology (versus mass production).

However, almost immediately, researchers advanced arguments for the “dual” or opposite effect. Klatzky (1970) argued that the analyses leading to routine decisions would be programmed into computer code, giving senior managers enough confidence to delegate responsibility for these areas to lower levels of the organization and allowing senior executives to concentrate on more strategic and less programmable decisions. Blau et al. (1976) found some evidence of IT-related decentralization, as well as centralization, in New Jersey manufacturing plants: “In contrast to the centralizing influence of an advanced production technology [e.g., process control], an in-house computer to automate support functions promotes decentralization, though primarily in the form of granting autonomy to the plant manager [but no lower]” (p. 35).

Of course, one has to ask whether the apparent decentralizing effects of IT constitute true delegation and autonomy for lower-level employees. As noted by Robey (1981) in an early review of IT and organizational structure research, “what appears to be greater decentralization may simply entail the delegation of more routine decisions whose outcomes are more closely controlled” (p. 681). Just as Aston school researchers had concluded that organizations can exert central control both by top-down supervision or by the application of impersonal rules (Donaldson et al., 1975), so it also seems that IT may be used to support greater centralization in either way: by enhancing the ability of superiors to make decisions themselves or by enabling subordinates to make decisions within carefully circumscribed limits encoded in information systems.

This reasoning suggests that it is not IT per se that determines whether organizations will move toward centralization or decentralization. Rather, it is managerial choice about how to use IT that appears to make the difference (George and King, 1991; Robey, 1981). This observation has been formulated theoretically in terms of statistical moderation (Markus and Robey, 1988; Robey, 1981). In other words, whether executives choose to run an organization in a centralized or decentralized fashion is likely to influence whether the use of IT subsequently leads to centralization or decentralization. But here again, theory and empirical results suggest the possibility of “dual outcomes.”

For example, one highly regarded stream of research suggests that IT reinforces the existing regime of power and control in organizations (Kraemer and Dutton, 1979; Pinsonneault and Kraemer, 1997). According to this theory, managers in organizations that are highly centralized to begin with are likely to use IT in ways that will increase central control, whereas decentralized organizations will become more decentralized as a result of using IT. This “reinforcement politics” perspective has received empirical support (Pinsonneault and Kraemer, 1997), especially in the context of the organizational size question, examined later.

On the other hand, some theorists have extended the earlier theory and interpreted empirical evidence to the opposite effect. For instance, in an award-winning paper, Huber (1990) theorized that, because the effects of computerization depend on the choices of decision makers at various organizational levels, the most likely outcome is a more uniform distribution of decision-making authority within and across organizations. In general, Huber predicted that IT would lead to more decentralized decision making in centralized organizations and more centralized decision making in decentralized organizations.

For Huber (1990), the prevailing distribution of authority in an organization was the most important contingency in the IT-leads-to-structural-change equation. However, the previously cited study by Blau et al. (1976) suggested that “the influences of automation may be more complex” (p. 37) than Huber proposed. Blau and colleagues compared manufacturing plants that had their own computers on-site and those that used off-site computer systems (probably in that era run by parent company headquarters), and found that the former had greater decision autonomy (were less centralized) than
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the latter. "[T]he data imply that the location of computer facilities governs the locus of decision-making authority [of manufacturing plants]. If a plant has its own computer, its management is likely to have much autonomy, but if a plant uses an off-site computer, presumably in most cases at corporate headquarters, chances are the authority is centralized there" (p. 37). In other words, the most important contingency related to IT’s effects on organizational structure may be managerial choice about how to manage IT, not overall organizational structure/decision-making authority as Huber (1990). (Of course, these two aspects of organizational design may be closely related.) The implications of this possibility are discussed in a later section of this chapter.

Further complicating the picture about the type, nature, and direction of IT’s effects is the fact that the power of IT has increased substantially over time, allowing organizations to apply IT to a greater number of decisions and to decisions of ever greater complexity and strategic relevance. For example, organizations began using IT to make decisions about automobile and credit card loans in the early 1980s, but until the second half of the 1990s almost all U.S. residential mortgage loans were decided by human underwriters using judgment and rules of thumb. By 2000, however, nearly 100% of all mortgage lending decisions were made by automated underwriting systems (Markus et al., 2008). Changes in the application of IT over time means that the ability of senior organizational executives in large organizations to make more decisions (or to delegate more decision making to subordinates while retaining tight control over the decisions made) has increased substantially in more than 50 years since Leavitt and Whisler first made their predictions. This condition naturally raises questions about the consequences of IT for the employment of middle managers, discussed next.

In short, both theoretical arguments and empirical evidence suggest that the use of IT in organizations has dual outcomes regarding the centralization of decision making.

67.2.2.2 IT and Organizational Size

As discussed earlier, the size of organizations is believed to be strongly related to organizational structure. Larger organizations are generally more decentralized than smaller organizations and more formalized or bureaucratic. This relationship led some scholars to speculate that increased use of IT would lead to smaller firms. Two primary reasons were offered. First, IT can be used to automate some activities performed by middle managers. This labor substitution effect is expected to result in middle management downsizing (Brynjolfsson et al., 1994; Leavitt and Whisler, 1958; Pinsonneault and Kraemer, 1997). Second, following the theory of Oliver Williamson (Williamson, 1985), IT is seen as reducing costs that might make it profitable for an organization to outsource an activity to another organization (Afuah, 2003; Brynjolfsson et al., 1994). In this “make versus buy” decision, three kinds of costs are relevant: the cost of performing the activity, the cost of internal coordination, and the cost of external coordination. How IT changes the relative magnitudes of these costs is theoretically expected to shift the balance toward or away from outsourcing. If the organization outsources, it will be able to eliminate the jobs previously devoted to performing the activity and thus will get smaller.

In this area of research, as with research on centralization of decision making, results are mixed. Brynjolfsson et al. (1994) started with evidence that the number of employees in business establishments had decreased substantially in the prior 15 years, whereas the extent to which IT was used in business had increased enormously. Through analysis of a large dataset of U.S. businesses, they concluded that use of IT was associated with a decline in firm size. Although they took pains not to overgeneralize their findings, the authors concluded that IT was contributing to a restructuring of the U.S. economy.

Others, however, took issue with both the premises and the conclusions of Brynjolfsson and colleagues’ research. Pryor (2001), for instance, argued that firm size is increasing, not decreasing, despite the waves of downsizing and outsourcing that occurred in the 1990s. Starting with arguments similar to those of Brynjolfsson and colleagues, Afuah (2003) concluded on theoretical grounds that the effects of Internet technology on firm boundaries (organizational size) should be moderated by
the nature of organizational technology (such as the interdependence among activities) and by the characteristics of information used. Therefore, in some industries, IT is likely to lead to increased organizational size.

Pinsonneault and Kraemer (1997) similarly found theoretical support both for the prediction that organizational size would decrease because of IT and for the prediction that IT would lead to larger organizational size. Therefore, they designed an empirical study to explore factors likely to moderate the relationship between IT and organizational size. They concluded that use of IT led to an increase in the number of middle managers in companies where decision authority (both for organizational and for computer-related decisions) was decentralized and a decrease in the number of middle managers where decision authority was centralized. This finding echoes that of Blau et al. (1976) about the association of computer location with plant managers’ decision autonomy—computer location being a key IT-related decision. Pinsonneault and Kraemer further found that use of different types of IT resulted in different outcomes. Organizations that used IT more for coordination purposes had fewer middle managers, whereas those that used IT more for control had more middle managers. Finally, in a configurational argument, they reported that the impacts of IT on organizational size depended not just on individual structural arrangements but also on the congruence among structural arrangements, that is, the compatibility between overall patterns of organizational decision making and the distribution of IT-related decision making.

In short, both theoretical arguments and empirical evidence suggest that the use of IT in organizations has dual outcomes regarding organizational size.

67.2.2.3 IT and New Organizational Forms

A large and still active body of literature has developed around the hypothesis that the use of IT promotes the emergence of new organizational forms. This hypothesis is analogous to Chandler’s observation that the railroads and telegraph enabled organizations to grow large, to diversify, and to innovate with the multidimensional form (see also Beniger, 1986; Yates, 1989). Some of the arguments and evidence in this literature overlap with research previously discussed, but generally scholars working in the new organizational forms tradition take a more holistic view of organizational design, focusing on configurations of attributes rather than isolated structural characteristics. However, scholars differ in their explicit or implicit characterizations of new organizational forms, and it is not always clear whether authors are discussing the same thing.

For example, Lambert and Peppard (1993) identified six different organizational arrangements as instances of new organizational forms associated with the use of information technology: (1) “network organizations”: collections of legally independent organizations that partner by means of strategic alliances or outsourcing relationships to coproduce products and services that used to be produced by an integrated firm; (2) temporary task-focused teams within individual organizations, in which members may be widely dispersed geographically; (3) relatively stable networked groups inside organizations that do not have a particular task focus; (4) horizontal organizations, understood as involving the creation of customer- and/or supplier-facing coordinating units; (5) learning organizations, in which knowledge-management processes and tools may play a prominent role; and (6) matrix management, in which some organizational members report simultaneously to more than one superior. Lucas and Baroudi (1994) discussed four, somewhat different, “prototypical organizational designs or strategies that have emerged within certain industries or companies during the past two decades” (p. 10). These designs were labeled: (1) “virtual organizations” in which organizational members work together through IT with few constraints of time or space; (2) “negotiated organizations” in which a formerly integrated supply chain is crafted from contractual relationships among independent companies; (3) “traditional companies” in which IT may be used to reduce layers of management and/or restructure business processes; and (4) “vertically integrated conglomerates” in which IT is
used as an essential tool for coordination and task forces. (This latter type may be equivalent to the "multidimensional organizational form."

More recently, Palmer et al. (2007) found five differences in language use and assumptions in the literature about new organizational forms: (1) whether the new forms involve revolutionary or evolutionary change; (2) whether the new forms are structurally simpler (smaller, less differentiated, less bureaucratic) or more complex (as for instance the "multidimensional" form is said to be); (3) whether the drivers of change are believed to be managerial choice or environmental influences (such as the widespread availability of low-cost IT); (4) whether the appropriate level of analysis is intraorganizational or interorganizational; and (5) and whether the "newness" of the organizational form refers to "new in time" or "new in a particular context" such as an industry or even a specific organization.

Palmer and colleagues' point (2) hints at the possibility of "dual effects" from use of IT. Their point (5) encompasses the observation that some of Lambert and Peppard's and Lucas and Baroudi's new organizational forms are arrangements inside organizations, whereas others refer to arrangements between or among organizations. These differences make it challenging to integrate the theories and findings of the new organizational forms literature; the following review is more illustrative than comprehensive.

Some studies focus on IT's effects on new intraorganizational arrangements, such as the reduction of layers of hierarchy and the use of more lateral coordination mechanisms. These arrangements have labels like "virtual teams," "distributed organizing," or "internal markets" (DeSanctis and Monge, 1998; Halal, 1994; Orlikowski, 2002). For example, Hitt and Brynjolfsson (1997) theorized that organizations making heavy use of information technology would adopt a package of complementary organizational design arrangements including decentralization of decision making, subjective incentives, and greater reliance on skills and human capital. They found support for this hypothesis in the study of the detailed work practices and IT expenditures in large organizations. Orlikowski (2002) showed how the use of IT augmented direct interpersonal forms of coordination in a distributed new product development team in a global high-tech organization. Sambharya et al. (2005) concluded that the internal structures of multinational enterprises were becoming more "organic" in nature.

However, other studies suggest that the use of IT, particularly in global enterprises, has spurred the evolution of new bureaucratic organizational arrangements, characterized by much less decision autonomy for business unit heads and by much more impersonal coordination along with interpersonal coordination across business units. In a study of Irish subsidiaries of global multinationals, Finnegan and Longaith (2002) found large reductions in the autonomy of subsidiaries linked to the ways in which parent company headquarters used IT:

> For many subsidiaries studied, pricing and production decisions used to be within their range of activities as long as they stayed within corporate policies. This approach facilitated a level of local responsiveness. However, six subsidiaries now used enterprise resource planning (ERP) systems located at headquarters. This had resulted in the elimination of subsidiary management’s input to pricing decisions. Corporate management also used the ERP system for drawing up a rolling overall production plan for the subsidiary .... IT was also found to play a similar role in selecting suppliers, engaging in research and development and devising the group’s strategy. ... IT therefore facilitates the ability of corporate management for excluding subsidiary managers from these types of decisions (p. 156).

Finnegan and Longaith (2002) also found significant changes in the nature of cross-subsidiary coordination and again argued that the use of IT was responsible for these changes. In the traditional form of coordination, people in different units work directly together and make joint decisions through personal interaction. Finnegan and Longaith found that the use of e-mail and groupware made
traditional coordination more personal than in the past, as Orlitowski (2002) also did. However, they also identified a new form of impersonal coordination that they called “programmed coordination,” which they argued to be impossible without the use of IT:

Programmed coordination] is coordination without direct communication and it leads to the synchronization of activities as opposed to joint decision making. It is apparent more at an operational rather than a strategic level and, based on the findings of this study, it would be impossible to operate … without the aid of IT. An example … was where subsidiaries were obliged to consult a real time database in order to ensure that subsidiaries were not quoting for the same business (Finnegan and Longaigh, 2002, p. 157).

Finnegan and Longaigh’s (2002) study provides a graphic illustration of the operation of management systems in what some experts claim to be a new organizational form, often called the multidimensional enterprise (Ackoff, 1999; Galbraith, 2000, 2008; Goold and Campbell, 2002; Palmisano, 2006; Strikwerda and Stoelhorst, 2009). Many environmental contingencies and strategic considerations have converged to promote the emergence of this form, and some observers suggest that IT is largely irrelevant. Galbraith (2000), for instance, claimed that the information processing demands of multidimensional organizations can be handled with relatively simple information technologies like spreadsheets. Others, however, insisted that integrated systems and corporate databases (e.g., ownership of subsidiary’s customer and transaction data by corporate headquarters and a shared general ledger system in use across the firm) are required (Strikwerda and Stoelhorst, 2009), and Finnegan and Longaigh’s study provides supporting evidence.

Many writers identify new organizational forms more with interorganizational than with the intraorganizational arrangements just discussed. Here many observers agree that the use of information technology has made it easier for people to coordinate activities across organizational lines and has therefore been a factor in the increased incidence of outsourcing, joint ventures, and other kinds of cooperative interfirm arrangements (Fulk and DeSanctis, 1995; Lucas, 1995; Malone et al., 1987; Zammuto et al., 2007), including the development of interorganizational coordination hubs, in particular business sectors (Markus and Bui, 2012).

Ahuja and Carley (1998), Majchrzak et al. (2000), and Argyres (1999) provide particularly rich case examples of the use of IT to facilitate these new (or at least more widespread) forms of interorganizational networking. For example, the B-2 “Stealth” bomber was an aircraft designed by four independent firms almost entirely by computer. In analyzing this case, Argyres (1999) found that the use of information systems: (1) made coordination across the firms less costly; (2) made the governance of the project more efficient by establishing social conventions that rendered resort to hierarchical authority less necessary; (3) reduced risks that result from poor distribution of information across firms; and (4) decentralized decision making. A comparative study (using data aggregated at the industry level) found evidence that multinational enterprises in information-intensive industries that use IT heavily are more likely to contract with other organizations to perform activities that were traditionally performed internally (Rangan and Sengul, 2009).

The general consensus in the new interorganizational forms literature is that IT promotes horizontal, decentralized, or networked organizational forms. But even here, the possibility of dual effects has been raised. Sahayam et al. (2007) theorized that, because IT can enhance coordination both within and between organizations, IT can promote both tightly coupled organizations (such as vertically integrated companies or ones with strong central control) as well as loosely coupled organizations (such as organizations that rely on alliances with other organizations or those that engage workers on contract instead of through employment). In an industry-level study, they found that the relationship between the use of IT and loosely coupled forms of organization was more frequent in industries with industry-wide product or process standards and low technological change.

By extension, Sahayam and colleagues’ findings suggest that other organizations may be using IT to support more tightly coupled interorganizational coordination. Steinfield et al. (2012) reviewed the arguments and evidence in support of this proposition. Through a case study of an international coordination
hub serving the automotive industry, Steinfeld et al. illustrated how the use of IT can promote tighter interorganizational coupling.

In short, the literature on IT and new organizational forms also provides some evidence of dual outcomes.

67.2.2.4 Summary
For a half century, scholars of varied theoretical orientations have explored the relationship between IT and organizational structure. The three related issues of centralization or decentralization of decision making, organizational size, and new organizational forms have been the primary foci of research. Trying to make sense of the literature is hampered by differences in theory, concepts, and context, not to mention the fact that the capabilities and applications of IT have grown enormously over the time period.

Nevertheless, regardless of research focus and research time frame, one remarkable consistency runs through the literature. Both theory and empirical evidence strongly suggest that the relationship of IT with organizational structure is one of “dual outcomes,” as Pool observed long ago in the context of telephone technology (1978). Robey’s conclusion of 30 years ago, “several different organizational structures [are] compatible with computer information systems” (1981, p. 686), seems equally valid today.

This conclusion may be discouraging to some readers, but it should have the opposite effect. When one digs deeper into the findings, one can see that they offer practically important recommendations to practitioners, and they suggest exciting theoretical and methodological challenges for future scholarship.

67.3 Impact on Practice
The research on IT and organizational structure has two major implications for practitioners. First, the literature tells us a great deal about how IT can constrain organizations’ ability to adopt new organizational designs successfully; conversely, adopting new designs often requires major changes in systems support. Put differently, good organizational design involves making careful decisions about the nature of IT infrastructures and platforms, which is a critical insight of the “enterprise architecture” discipline. Second, the literature tells us that organizational designs for IT management are also critical for good organizational performance. IT management design does not have a necessary one-to-one relationship with overall organizational design. However, certain ways of organizing IT management are not capable of producing the systems needed by some organizational designs. Therefore, practitioners should pay close attention to the implications of the literature both for system design or selection and for organizing and managing IT services.

67.3.1 Fit between Organizational Structure and Information Systems
The literature on IT and organizational structure does not support the idea that using IT changes organizational structure in any one particular way (e.g., toward centralization versus toward decentralization). The literature does not even support the idea that using IT changes organizational structure in different ways under different conditions. (Recall that it is not IT per se that changes organizational structures; managerial decisions about whether, when, how, and why to use IT and managerial actions are certainly the most critical factors.)

But the literature does suggest practical implications. First, an organization’s legacy of IT may make it difficult, if not impossible, for an organization to adopt new organizational structures or designs. Some years ago, I studied organizations that had redesigned their business processes (Bashein et al., 1997). As a result of process reengineering, an insurance company decided to change its processes for handling claims. The company had been functionally organized; the new design was organized by market segment. That is, the company decentralized into customer-oriented groups, each of which would be free to adopt different policies for claims processing. Fortunately, the company’s claims processing system was flexible enough to adapt to this change, but the company’s management information systems were not. The information systems produced reports that were useful for functional unit heads, but they did
not provide information broken down by customer segment. Every single management report had to be reprogrammed, before the organization was able to move to the new organizational design.

Another example of how IT can hinder organizations’ ability to function effectively given their organizational designs is Microsoft, which adopted SAP’s financial systems in the mid-1990s (Bashein et al., 1997). Microsoft has a multidimensional organizational design (Strikwerda and Stoelhorst, 2009), meaning that it manages products, markets, and projects—three organizational dimensions that overlap in multiple ways. At the time Microsoft implemented SAP financials, the software product did not provide good support for a three-dimensional company like Microsoft, because it allowed companies to “tag” transactions in only two ways (e.g., by product and market, but not also by project) (Bashein et al., 1997). Unwilling to modify SAP software, Microsoft circumvented the software limitation, painfully, by making people work with a complicated chart of accounts. This constraint was so vexing that Microsoft upgraded to a new version of SAP, which did support three organizational dimensions, as soon as it was available.

A corollary of the first point is that successfully moving to new organizational designs often requires major information systems modifications or entirely new system implementations. The process can be seen in detailed case descriptions of companies like Procter and Gamble (P&G) (Galbraith, 2009; Piskorski and Spandini, 2007) and Nestlé (Steinert-Threlkeld, 2006). In the late 1990s, both of these large multinational companies were structured in a fairly decentralized manner: Managers in different geographic regions had considerable decision-making autonomy. This was believed necessary because preferences for consumer products vary greatly around the globe. But many support functions such as accounting, human resources management, and IT were also decentralized, which encouraged variations in business practices and increased costs.

Several factors motivated a change in organizational design, including recession, declining organizational performance, and perceived needs to standardize global brand images and to be more responsive to the needs of multinational retailers. Consequently, both organizations among many others adopted new organizational designs characterized by much greater centralization and standardization in certain areas.

P&G, for instance, created a new Global Business Services (GBS) unit, with facilities in three geographic locations (San Jose, Costa Rica, and Newcastle) (Delong et al., 2005; Sia et al., 2010). The mission was to provide a wide array of standardized support services to all of P&G’s facilities in each region. (Previously, each facility had performed those activities for themselves, and there was less standardization across locations.) The support services provided by GBS included a number of core business activities, such as market research and merchandising, in addition to traditional “support” activities, such as human resources management and IT.

P&G’s legacy information systems were not up to the task of supporting this new organizational design, and P&G embarked on a multiyear systems initiative to implement the SAP-integrated enterprise information system. It is clear that IT did not cause this organizational change: The intent to reorganize preceded the system project. However, the new organizational design could not have worked without change in the company’s legacy information technology. (Imagine a geographically and organizationally centralized “shared services center” trying to provide standardized services while using a patchwork of nonstandardized information systems running in many dispersed organizational locations. Impossible!)

A third practical implication of the literature on IT organizational structure is that once systems are in place to support a new organizational design, people will discover new ways to use the systems, and the organizational design will evolve. But the organizational design will only evolve up to the point where it is again constrained, this time by the new systems.

In short, the literature on IT and organizational structure offers practical advice that can be summarized as the “Principle of Enterprise Architecture”: Design an organization’s IT infrastructures and digital platforms to support the organization’s “TO BE” (versus “AS IS”) organization design. If you design organizational IT to support the existing organizational design, IT may prevent movement toward a preferred organizational design.

A concrete statement of this principle can be found in Ross, Weill, and Robertson (2006). According to Ross and colleagues, organizations with multiple business units can have different “operating models”
(organizational design configurations). The “Unification” model is the classic U-form organization like an airline—a single business company with globally standardized business processes. If Unification is the preferred (“TO BE”) operating model, Ross and colleagues prescribe enterprise systems that support globally standardized processes and global access to data. The “Replication” operating model is one with multiple, nearly identical, business units: A hotel chain is a good example. For this type of enterprise, a standard IT infrastructure and set of applications is needed that can then be “replicated” in locations around the world. The “Coordination” operating model describes a multi-business company in which the partially independent business units need to coordinate frequently, for example, an insurance company with multiple product lines serving the same customers. Here, the IT platform needs at minimum to be able to provide access to shared data through standard technology interfaces. Organizations with the “Diversification” operating model have independent business units with different technologies and customers (e.g., the Sears holding company, which includes financial services as well as retailing). Here, the need for sharing information across units is low, but IT can provide economies of scale through a light “shared services” platform that does not restrict business units’ strategic flexibility.

In short, the literature on organizational design and structure has much to offer practitioners in the way of advice about appropriate systems and technologies.

67.3.2 Managing Information Systems

A second practical implication of the literature on IT and organizational structure concerns, not just the systems and technologies organizations use, but also how they choose to manage IT (Earl, 1996; Galliers and Currie, 2011; King, 1983). Managing IT involves many decisions such as (1) whether to provide IT services internally or to contract with external service providers (like IBM or Accenture) for those services; (2) how to organize (structure) people in the organization who perform or manage IT services; (3) how to make decisions about which information technologies, systems, and services to adopt, and so forth. In other words, organizations have designs for IT management in addition to their overall organizational designs.

Therefore, an important practical question for every organization is: “What should be our organizational design for managing IT?” As you might expect, there is likely to be some relationship between overall organizational design and IT organizational design. For example, if an organization is highly decentralized, perhaps because it has a strategy of unrelated diversification (e.g., the “Diversified” operating model), chances are good that the organization would not only have different IT and systems in different units but would also decentralize the management of IT and systems to the diversified business units. Conversely, if an organization is centralized (e.g., the “Unified” operating model) at the enterprise level, it seems likely that the organization would also choose to have centralized IT management.

And, in fact, a fair number of studies have addressed the relationship between organizational design at the enterprise level and IT management design, particularly in global companies (Alavi and Young, 1992; Jarvenpaa and Ives, 1993; Karimi and Konsynski, 1991; King and Sethi, 2001; Ramarapu and Lado, 1995). This research generally reports a correspondence between organizational strategy and structure, IT management design, and the types of information technologies and systems used.

But the correspondence between organizational design and IT management design is not as close as you might think, because additional considerations enter in. One consideration is history. Computers have not always been as powerful as they are today, and their smaller capacity in the past encouraged decentralized IT management. For example, Southwest Airlines, a “Unified” organization, used to allow each functional unit head to manage its own IT unit and develop its own systems, partly for historical reasons. Today, Southwest has a centralized IT management design (Ross and Beath, 2007), in part because of concerns about IT management costs arising from duplication of effort, lack of standardization, etc., and in part because that way of organizing IT is more “congruent” (Pinsonneault and Kraemer, 1997) with Southwest’s overall organizational design. A second reason for the correspondence between organizational design and IT management design being less than complete concerns the flexibility of today’s centralized IT management design. Organizations can set up centralized IT services and
operate them in a way that will produce either (1) standardized and integrated IT, systems, and services for use across an organization or (2) IT, systems, and services that are tailored to the needs of individual business units.

Although a centralized IT organizational design can support either a centralized or decentralized organizational operating model, the reverse is not true. If an organization has a very decentralized design for managing IT (i.e., each business unit makes its own decisions about IT), there is almost no way this IT management design would be able to produce IT systems and services that are integrated, standardized, or commonly used across the entire organization. The practical principle here is: IT management design for an organization should be no less centralized than the overall organizational design or operating model.

67.3.3 Summary

Findings of the literature on IT and organizational structure do not guarantee practitioners particular organizational outcomes like greater top-down control or improved lateral coordination. But they nevertheless have important practical implications.

For example, Blau et al.’s (1976) finding that managers of plants with their own computers on-site had more decision autonomy than managers of plants with computers at parent company headquarters provides useful insights. This finding tells us that the parent companies of the plants with their own computers (1) had decentralized organizational designs for managing IT, (2) had technologies, systems, and services that were tailored to the needs and preferences of individual plant managers, and (3) therefore, parent company executives would have had great difficulty in exerting stronger top-down control without changing the systems used by plant managers, (4) which in turn would have also required them to change the IT management design in the direction of greater centralization.

As another example, Pinsonneault and Kraemer’s (1997) finding that use of IT led to an increase in the number of middle managers in organizations that were decentralized both at the enterprise level and in their IT management also provides practical insights. Business units in these organizations had to add middle managers to manage IT. The technologies, systems, and services they produced were not shared with other business units, compounding the increase in middle management staff. A different organizational design for IT management in the same decentralized companies would have led to a much lower increase in middle management staff. In short, research on IT and organizational structure has much to offer to IS and IT practitioners in the way of advice about how to organize and manage IT.

67.4 Research Issues

The consistently mixed findings in research on IT and organizational structure certainly call for more research and theorizing, but not necessarily more of the same. The research record suggests the need for new theoretical perspectives and raises some promising questions for future research.

67.4.1 Need for New Theoretical Perspectives

Organizational structure is a foundational concept in a number of disciplines, including strategic management, organizational theory and economics, and information systems. However, possibly because research results about the role of IT in organizational structure change seem so mixed, scholarly attention has drifted toward other issues, particularly toward IT governance and toward informal, lateral relationships within and across organizations (Brown and Grant, 2005; Martinez and Jarillo, 1989; Whittington and Mayer, 2001). This move is a step backward from the work of scholars like Blau, who explicitly recognized the interplay between organizations’ structural characteristics and informal interactions, or Chandler, whose broad conception of organizational structure included both formal/vertical and informal/lateral dimensions.
Without looking at both structure and informal relations, scholars are not able to address how these two dimensions of organizations are (or are not) aligned and how they interact in different organizational design configurations. The alignment or nonalignment among various dimensions of organizations is a central theme in many literatures. For example, in the IS literature, scholars have proposed the theory of strategic alignment (Bergeron et al., 2004; Chan and Reich, 2007b; Henderson and Venkatraman, 1993) to explain variations in organizational performance. The core hypothesis of this literature, supported by systematic research as well as casual observation, is that organizational elements (e.g., IS strategy and business strategy, organizational structure and systems, or IT policies and IT practices) are not always aligned, and that lack of alignment contributes to intraorganizational conflict and ineffectiveness (Bergeron et al., 2004; Chan and Reich, 2007a).

Despite the centrality of alignment theory, the types, sources, and consequences of alignment and misalignment among aspects of organizational design, including IT and IT management arrangements, have not been fully explored. There are many possible “alignment” relationships among organizational elements: One element may dominate another (Sambamurthy and Zmud, 2000). One element may reinforce another (Argyres and Silverman, 2004). One element may suppress or dampen the effects of another (Markus et al., 2013). Understanding these possibilities is necessary, if research on IT and organizational structure will be able to produce reliable recommendations for practice.

Further, as noted both by IT alignment scholars such as Chan and Reich (2007b) and by organization structure scholars such as Whittington (2002), we need better theories about the dynamics of structural change and alignment. Whittington (2002), for example, recommended further development of the practice perspective on organizational structure. Such a theoretical perspective would be particularly valuable for the study of IT and organizational structure, because it would emphasize “the role of particular functional areas or skills [such as accounting or IT] to the working of structure” (Whittington, 2002, p. 130).

Another promising theoretical perspective for the study of IT and organizational structure is evolutionary (or coevolutionary) theory (Dosi and Marengo, 2007; Lewin and Volberda, 2011; Romanelli, 1991; Williams, 2008), which has also seen some application in the IS literature (Lewin, 2008; Peppard and Breu, 2003). Evolutionary theories posit reciprocal causal relations between concepts such as management intentions and aspects of organizations and their environments such as organizational structures and information technologies. A particularly valuable application of evolutionary theory would be to examine the role of IT in the diffusion of new organizational forms.

For example, I earlier described the difficulties Microsoft encountered in the mid-1990s when it tried to adapt SAP software (an enterprise software package widely used by large organizations) to its multidimensional structure. A few years later, the SAP package did support multidimensionality, and, around that same time, a number of other large companies (e.g., Nestlé and P&G) both restructured and implemented the SAP package enterprise-wide. Twenty years earlier, Golden Triangle Corporation had painfully modified an accounting package to make use of modern database management technology in order to realize its organizational design intentions (Markus, 1983, 2010). Later, accounting packages employing database management technology became widely available commercially. This is precisely the era when the multidivisional organizational form (pioneered in the 1920s) diffused rapidly (Fligstein, 1985).

I believe there is a story here. It is not a story of simple causality (IT causes change in organizational structure), but rather one of reciprocal causation (Wagner et al., 2005) in which organizational needs for new ways of organizing intersected with the software development trajectory, fueling further evolution of both.

In short, much remains to be learned about the role of IT in organizational structure change. New and better theories are one way to get there. In addition, the survey of literature in this chapter suggests a few specific research issues for scholars in the information management tradition.
67.4.2 Unanswered Research Questions

It is now well established that IT contributes to organizational effectiveness under certain circumstances (Melville et al., 2004). And scholars have examined how patterns of alignment among multiple organizational design dimensions including IT management have contributed to organizational performance (Bergeron et al., 2004). However, there is little comparative research linking alternative IT management designs to organizational performance outcomes.

For example, I noted earlier that a centralized IT-shared services model could be used to provide standardized IT capabilities shared across an entire complex organization or to provide IT capabilities customized to individual business units. Both approaches are likely to be more cost effective than entirely decentralizing IT management to business units. The standardized approach is likely to be less costly than the customized one, but it may involve reduced effectiveness for business units. How much difference do these organizational models make for overall organizational performance? The literature does not, to my knowledge, clearly answer this question.

Second, we know relatively little about how and why lack of alignment between various aspects of organization design occurs and what difference it makes. For instance, the World Bank, a highly decentralized organization, adopted an IT-shared services model similar to that of P&G and other more centralized organizations (McFarlan and Delacey, 2003). Does this apparent lack of alignment represent an indicator of, or contributor to, poor organizational performance? Or could it mean that there really is "one best way" to organize IT today in large global organizations (Markus et al., 2012)? If that were the case, we should certainly find out why, because it shakes the foundations of the contingency theory of alignment.

All told, IS scholars have not yet exhausted the topic of IT and organizational structure. Among other possibilities, organizational structure provides a valuable lens for exploring the relationship between IT management and organizational performance.

67.5 Summary

The role of IT and organizational structure has been a topic of speculation, theorization, and empirical research for over 50 years. In particular, research has examined the effects of IT on organizational centralization, organizational size, and new organizational forms. In all three areas, scholars have produced theoretical arguments and empirical results consistent with the “dual effects” hypothesis—the idea that advances in information technology can result in opposite structural consequences simultaneously and cotermiously.

Some scholars interpret evidence about dual effects to mean that IT is irrelevant to changes in organizational design. These scholars argue that only managerial intentions and actions (“human agency”) are a factor in the outcomes. However, there is considerable evidence that IT does indeed make a difference, even if IT alone does not cause the outcomes observed.

This conclusion has important practical implications. Specifically, organizations are advised to align (or co-design) their information systems and technologies with their strategies and structures. In addition, organizational structure should be an important consideration among several in the design of effective IT management arrangements.

At the same time, much remains to be learned about the processes by which organizational structures intersect with technologies both within individual organizations and across organizations and over time. In addition, much more needs to be learned about organization designs for IT management and how they contribute to, or hinder, organizational effectiveness.

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