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The Flexibility Paradox

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Abstract

Organizational flexibility is unquestionably a strategic asset in today's dynamic business environment, and an adaptable IT infrastructure is a competitive necessity. Modern organizations must be prepared to change directions quickly to meet the needs of customers, to respond to the moves of competitors, and to take advantage of emerging opportunities. Information technology makes possible a much higher degree of flexibility than could be reached in prior years. Yet, the concept is a slippery one, very difficult to define, and there is a curious paradox: implementing an effective infrastructure requires careful planning, and planning constrains flexibility.

Organizational flexibility can provide competitive advantage, especially in an increasingly turbulent environment such as exists today. Information technology makes possible the "virtual organization", characterized by five attributes: alliance for a common goal, underlying information and communication technologies, vertical integration, globalization, and collaboration. (Grimshaw and Kwok, 1998, p. 46). Such arrangements are often short-lived; when the goal is reached, the virtual firm may disperse and then reformulate in other configurations. Electronic commerce enables a small firm to serve markets throughout the world. Manufacturing firms have moved away from "mass production", with its long, inflexible production runs, and toward "mass customization", a tailoring of products to the demands of individual consumers or groups of consumers while maintaining a profitable cost structure (Parker, 1996).

Effective mass customization requires a high degree of flexibility and great creativity, but many business firms today are achieving it to a significant degree. Stewart (1992) describes the degree of flexibility achieved by the most successful Japanese business firms. Flexibility can enable a firm to "read the market quicker, manufacture many different products on the same line, switch from one to another instantly and at low cost, make as much profit on short runs as on long ones, and bring out new offerings faster" and force other firms to follow their lead on prices (p. 63). Rather than depending on strategic plans developed in advance, organizations must be prepared to respond to what Ansoff (1979) has called "weak signals" in the environment (p. 56). Duncan (1995) argues that we now have the technological capacity for an infrastructure to provide information on "anything to anyone at anytime" and that this is "the epitome of flexibility" (p. 39).

There is a paradox here, however. An infrastructure that provides a high degree of organizational flexibility may in itself be inflexible. Building the infrastructure may take years to complete, or the costs may be difficult to justify to executive management with benefits that are uncertain and hard to measure. Some firms have discovered that it can make operations much more complex and have a negative impact on profitability (Gilmore and Pine, 1997). An effective IT infrastructure is likely to be inflexible in terms of its components. For example, decisions about the design of networks may provide a high degree of flexibility for current conditions, but the decisions may be quite difficult to modify should conditions change after they are implemented.

Similarly, a well-designed relational database and accompanying database management system provides excellent flexibility as an information source; very complex ad hoc queries can be formulated and executed quickly. However, the development of the database may have taken several years of effort and very significant resource expenditures. The rationalization of data names, the elimination of redundancies, the resistance to giving up ownership of data, development of the data dictionary, establishment of a data-driven approach to software development and the integration of CASE tools, providing training in query formulation, and all the other tasks inherent in the centralization of the data resource provide very significant enhancements to organizational flexibility. It would be all but impossible in most industries to compete globally without an effective database management system. And yet, all the decisions that were made in creating the database are constraints that limit infrastructure flexibility. The logical design process results in a particular set of entities and attributes, which are then converted into a particular set of normalized tables. A particular DBMS is chosen, with its particular SQL dialect, its limitations on table sizes, the CASE tools that are compatible with it, and all the other factors that make it somewhat different from other DBMS packages. A particular hardware configuration is chosen; the DBA staff and the users are trained for this DBMS, and a library of embedded SQL queries is gradually built up. The decision to centralize the data tables may make it more difficult later to distribute the data geographically. Many other decisions are made which, once implemented, will be difficult to change later. Virtually all infrastructure decisions will reflect this paradox: they have the potential to improve organizational flexibility, but at the same time constrain the infrastructure configuration.

A good infrastructure requires painstaking planning, but planning is inherently inflexible. An approved strategic plan is an organizational commitment, and a constraint to flexibility of action (Mintzberg, 1994). Complete flexibility would be an

impossibility; to implement a plan requires that a choice be made from the available alternatives. Contingency planning, whereby alternative plans are implemented based on the monitoring of conditions, allows more flexibility but it can lead to "paralysis by analysis" (p. 252). Contingency planning does not work well unless the employees closest to the customer, or with the most up-to-date knowledge of conditions in the environment, are empowered to make day-to-day decisions, and provided with timely information for making the necessary judgments. This often requires remote access to an accurate and up-to-date database, a telecommunications network for receiving messages and for inputting new data, and a system for keeping track of the employee's current location (Rollier and Liou, 1998). After such a system is implemented, it may have to be significantly modified a few months later.

Another paradox is that, as the need for planning increases, effective planning becomes steadily more difficult. Over the last quarter of a century the business environment has become much more turbulent and unpredictable; at the same time, adaptation to the environment has become increasingly critical. Such developments as rapid globalization and electronic commerce have intensified competition and expanded the rivalries within industries; most firms are competing globally today whether or not they want to do so. Long range planning has become unreliable as planning horizons are compressed (Mintzberg, 1994), and industrial firms have been forced to develop rapid response capabilities and to become more reactive rather than proactive.

Ansoff (1979) developed a theory to explain the increasing environmental turbulence of the latter part of the twentieth century. The *rate of change* has been increasing more and more rapidly; product life cycles are dramatically shorter in many industries; there is greater volatility in energy and raw materials prices, in currency fluctuations, and in shifting power relationships. Industry deregulation has intensified the changes. The *novelty of change* is increasing; the changes that are occurring are so radically different from previous conditions that our past experiences are less reliable as a guide to the prediction of future conditions. *Strategic intensity* is increasing; interorganizational systems, joint ventures, new marketing channels, and new organizational structures have proliferated. Establishing effective communications between the participating firms requires resources and managerial attention. *Complexity of the environment* is increasing; organizational boundaries and industrial lines are less distinct; competitor identification is more difficult. All of these factors create increasing uncertainty, and planning difficulty increases because of the irrelevance of past experience.

Powerful computers, increasing telecommunications bandwidth, and rapidly falling technology costs have been both the driving force in causing this increased environmental turbulence, and the enabler which makes it possible for industrial firms to cope with the increased uncertainty (Senn, 1993). Technological breakthroughs such as electronic data interchange, computer-aided design, electronic commerce, and groupware have enabled firms to support widely separated workers, geographically dispersed plants and marketing offices, globally distributed information, round-the-clock operations, virtual offices with mobile workforces, and increased span of control. The challenge for the CIO is to build and maintain an infrastructure that is aligned with the strategic needs of the organization and is sufficiently adaptable to accommodate changes in strategic direction.

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