

Chapter 5

Managing Strategic Change: A Systems View of Strategic Organizational Change and Strategic Flexibility

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Introduction

As the environments of many organizations become increasingly dynamic,¹ managers face a growing challenge to continuously improve the systemic ability of their organizations to identify and respond to strategic changes. In the following discussion, we use the term *strategic flexibility* to refer to the systemic ability of an organization to change in strategically important ways, and we explain a systems model of organizations that helps to develop insights into five interrelated forms of organizational flexibility on which the achievement of overall strategic flexibility depends.

Our model represents organizations as *open systems* that depend for their survival and success on assuring inward flows of a changing array of useful resources, on effective coordination of the resources currently within or accessible to an organization, and on setting appropriate goals for the deployment of an organization's resources in strategic processes of value creation and value distribution. We then use this open systems model to identify and clarify some key dynamics that must be managed well to create a strategically flexible organization.

The systems properties that affect an organization's ability to sustain adaptive change have been studied for some time by systems researchers as well as by strategists. In formulating his "law of requisite variety," for example, Ashby (1956) observed that to survive in a complex environment while maintaining internal stability, a system must be able to generate a requisite variety of responses to a changing environment. Forrester's (1961, 1968) industrial dynamics modeling helped to clarify the important impacts on the

¹*Dynamic environments* are characterized by rapid technological changes, the frequent emergence of multiple (and often conflicting) market opportunities and threats, and resulting high levels of irreducible uncertainty about the long-term direction and extent of strategic change in the environment. These uncertainties may apply not just to future scenarios, but to present circumstances as well. Even current market needs and customer preferences may be unclear, often forcing an organization to pursue rapidly shifting market demands and opportunities.

dynamics of industries and economies of information feedback loops and time delays in adjusting stocks of resources. Researchers in the systems dynamics field have extended the industrial dynamics framework to the analysis of organization processes and dynamics (e.g., Morecroft, 1988, 2001 in this volume; Warren, 2001 in this volume; Sterman, 2000). Herbert Simon (1981) also identified a number of basic properties shared by systems of all types, whether purely physical systems, natural systems, or human systems.

In the strategic management field, Beer (1994) and Ansoff (1988) have investigated designs of organizations as systems that can improve their responsiveness to changing competitive conditions. Dierickx and Cool (1989) further characterized organizations as systems composed of stocks of interrelated, strategically useful resources. They argued that organizations with current stocks of strategically useful resources may be able to sustain their resulting competitive advantages for some time, because competing organizations that try to change their stocks of resources quickly will be disadvantaged by time-compression diseconomies, the lack of asset mass efficiencies, inadequate asset interconnectedness, and causal ambiguity about the most appropriate ways to deploy and coordinate available resources. These effects result from the systemic interrelatedness of resources in an organization and impose higher costs and longer time requirements on competitors trying to duplicate a successful organization's current stocks of resources. In a closely related argument, Teece, Pisano, and Shuen (1997) proposed that an organization's capabilities are dynamic — i.e., they take time to develop — and therefore organizations that currently have certain capabilities may have competitive advantages during the time it takes competing organizations to develop comparable capabilities.

Strategists in the competence perspective have proposed a model of organizations as goal-seeking open systems composed of various tangible and intangible resources (Sanchez, Heene, & Thomas, 1996; Heene & Sanchez, 1997; Sanchez & Heene, 1997). This open-system view of organizations extends Dierickx and Cool's (1989) model of an organization as a collection of resource stocks and flows by explicitly recognizing that an organization's ability to strategically reconfigure its resources also depends on:

- (i) the *cognitive processes* through which managers try to determine what kinds of resource stocks and flows an organization should try to develop and what uses an organization's available resources may best be applied to;
- (ii) managers' ability to *coordinate* both intraorganizational and interorganizational flows of resources and capabilities in processes of organizational change;
- (iii) managers' ability to maintain processes of *organizational learning* that continuously renew an organization's base of knowledge as a critical strategic resource (Sanchez, 2001a).

By incorporating these three key aspects of organizational change, the competence-based open system model we explain below provides a conceptual framework for understanding some of the fundamental uncertainties managers face in managing strategic change and identifies the kinds of flexibilities managers must develop in their organizations to deal with those uncertainties.

The Open System Model of Organizations

Figure 1 presents our model of an organization as an open system. In this model, an organization's tangible and intangible resources are deployed and coordinated in a manner determined by the organization's *strategic logic*, which represents the organization's "operative rationale for achieving its goals" (Sanchez & Heene, 1996). An organization's strategic logic does not just represent the strategic thinking of top managers, but includes all the ideas that influence all decision makers who determine the composition of an organization's resource stocks and flows, the uses to which available resources will be applied, and the ways in which resources will be coordinated. Thus, an organization's strategic logic may include a spectrum of strategic ideas held by many organizational actors and generated through a variety of organizational processes.

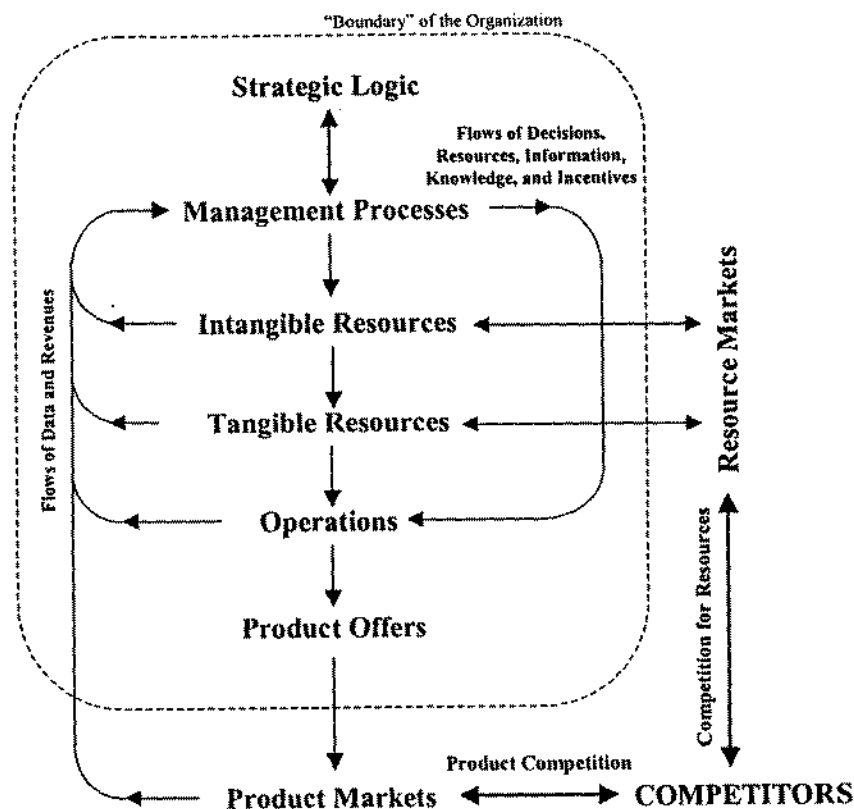


Figure 1: View of an Organization as an "Open System". (Adapted from Sanchez and Heene 1996).

Some organizations' strategic logics may be the result of "top-down" strategy making processes that are undertaken within a strong authority hierarchy and that lead to a detailed strategic plan for implementation through strict controls for allocating and monitoring resource flows. Other organizations' strategic logics, however, may both emerge from and be implemented through a "flat" organization design and an organizational culture of empowerment in which teams of employees have broad authority to make decisions about resource flows, uses, and methods of coordination. Many other processes for originating and implementing an organization's strategic logic are of course possible. In effect, the model in Figure 1 is intended to suggest that an organization's strategic logic is the aggregate set of ideas that motivates and guides the cognitive processes of *decision makers at all levels of an organization* in their acquisition, deployment, and coordination of an organization's resources. These ideas then find specific expression in the *management processes* an organization follows in interpreting its environment (i.e., its *sensemaking* activities) and in responding to environmental opportunities and threats through appropriate deployments of available resources.

Resource Flows. As an open system, an organization must continuously replenish its stocks of both *tangible resources* (equipment, buildings, etc.) and *intangible resources* (including knowledge and capabilities necessary to use tangible resources effectively). An organization's *operations* are determined by the specific activities or organizational routines an organization can perform in using its resources (Nelson & Winter, 1982). The market's responses to the organization's *product offers* generate flows of revenues as well as data about its markets. Data about the organization's products, operations, and resource stocks also flow to decision makers within the organization's management processes. From an organization's management processes emanate the specific decisions, policies, procedures, budgets, and norms that direct the flows of the organization's financial and other resources to maintain or increase resource stocks in the organization's operations, tangible assets, intangible assets, or management processes.

Resource flows may also consist of firm-addressable resources, the use of which an organization can arrange through transactions in markets for resources or through strategic alliances of various types. In its processes for maintaining or increasing resource flows, organizations must compete against other organizations to obtain inputs of the best available resources. Competition to obtain both desirable resources as inputs and revenue flows from outputs creates important interactions and interdependencies that embed competing organizations in progressively larger open systems of market segments, product markets, and industries.

Perception of Strategic Gaps in Resource Stocks. In the open-system model of organizations, strategic change consists of changes in the kinds of resources an organization uses, in the purposes to which an organization applies its resources, or in the processes an organization uses to coordinate its resources. Strategic changes are undertaken when decision-makers within an organization perceive that unacceptable *strategic gaps* exist between the organization's current stocks of resources, its processes for using resources, the purposes to which its resources are being applied in pursuit of the organization's goals, or the organization's overall goals, on the one hand, and the resource stocks, processes, purposes, and

goals the organization's decision makers believe are desirable or necessary for the organization, on the other hand. Decision-makers' perceptions of the need to change an organization's resource stocks, processes, purposes, and goals are shaped by the *feedback* they receive about the current condition of the organization. In the competence framework, the term *control loops* is used to refer to the feedback flows through which decision makers gather and interpret flows of data about an organization's resource stocks, processes, purposes, and goals.

Data flowing to decision makers through control loops are subject to *increasing causal ambiguities* as the origin of the data flows moves from the bottom to the top of Figure 1. This means that it becomes progressively more difficult for managers to discover clear cause-and-effect relationships as they try to identify and interpret data originating from lower to higher levels in the open system model of Figure 1. For example, finding clear cause-and-effect relationships is more feasible in a organization's "operations" (e.g., the impact of alternative machine settings on yield rates) than at the level of an organization's strategic logic or management processes (e.g., the impact of a particular human resources policy on an organization's success or failure in a given product market).

Many forms of data typically have to be gathered and evaluated in an effort to assess the current effectiveness of an organization's intangible resources, management processes, or strategic logic, and the ambiguities in available data are unlikely to be definitively resolved no matter how much and how many kinds of data are gathered. Thus, the problem of increasing causal ambiguity means that initiating strategic change in an organization's "higher-order" stocks of intangible resources, management processes, and strategic logic cannot be made dependent on first obtaining "hard," quantitative, unequivocal evidence of a need for change. Rather, strategic change at this level must proceed on the basis of managers' judgmental perceptions of *implied* strategic gaps in an organization's higher-order resource stocks, processes, purposes, and goals.

Dynamic Response Times in Changing Resource Stocks. Processes of strategic change are also subject to increasing *dynamic response times* as an organization tries to change its resource stocks and processes at progressively higher levels in the open system model of Figure 1. In other words, an organization can change its mix of products more readily than it can change the way it operates, can change its operations more readily than its tangible assets, can change its tangible assets more readily than its intangible assets, and can change its intangible assets more readily than its management processes and strategic logic. In essence, the upward direction of increasing dynamic response times in Figure 1 means that it takes an organization longer to change the *ideas* it uses (i.e., its knowledge, concepts for coordinating resources, and goals) than the *things* it uses (i.e., its machines, buildings, etc.). The problem of managing changes in the essentially cognitive resources in an organization is accentuated when dynamic environments demand both fast and innovative changes in the ideas that motivate and direct an organization's strategies for value creation.

The Need for Strategic Flexibility. Researchers in the competence perspective (e.g., Sanchez & Heene, 1997) argue that the cognitive challenge of managing the increasing causal ambiguities and dynamic response times in organizations as open systems today

cannot be overcome through a singular focus on trying to improve an organization's ability to predict future events. Rather, managers and theoreticians alike must recognize that today's complex competitive environments have substantial *irreducible uncertainties* that cannot be resolved adequately through heightened efforts to predict the future. In effect, the competence perspective argues that the most effective — and perhaps only feasible — approach to coping with irreducible uncertainties is creating *strategic flexibilities* in an organization to generate a range of timely responses to a range of potential future environmental conditions.

As we discuss further below, creating the strategic flexibility to generate the requisite variety of responses required from an organization as an open system requires developing both flexible resources and flexible capabilities to deploy and coordinate resources in alternative processes useful for a range of purposes (Sanchez, 1995, 1997). To respond flexibly to the changing opportunities and demands of dynamic environments, managers must help their organization develop several distinct "modes" of competence that will enable the organization to respond with appropriate levels and forms of flexibility as environmental conditions change (Sanchez, 2001b). We therefore summarize below five modes of competence (each of which represents an important form of flexibility), the contributions of each competence mode to the overall strategic flexibility of an organization, and some key dynamic interactions between competence modes that must be managed well. We also explain how developing the five competence modes needed to achieve strategic flexibility in turn requires management processes that use both "lower-order" and "higher-order" control loops effectively.

Building Strategic Flexibility from Flexible Resources and Coordination Capabilities

In the open system view, the strategic flexibility of an organization depends jointly on the *flexibilities of the resources* available to the organization and on the *coordination flexibilities* of managers in using the organization's available resources (Sanchez, 1995).

The flexibility of a resource can be represented in three dimensions. Resource flexibility increases as the range of alternative uses to which a resource can be applied increases, as the time required to switch a resource from one use to another decreases, and as the cost of switching from one use to another decreases. Thus, flexible resources are those that have more than one use and can be switched from one use to another quickly and inexpensively, while inflexible resources are those that cannot be switched to other uses or that may only be switched to alternative uses with significant cost, difficulty, and time.

Strategic management theory in the 1970s and 1980s typically emphasized the need to make significant commitments to specific-use resources in order to build future competitive advantage (e.g., Ghemawat, 1991). This prescription was essentially based on the two assumptions that specific-use resources (i.e., resources custom-designed to produce a specific product) enable lower unit costs of production than do flexible, general-purpose resources (Riordan & Williamson, 1985) and that low cost production of a specific product was the key to competitive success. In the increasingly dynamic product markets of the

1990s and beyond, however, this emphasis on *static economizing* in producing a given product has given way to recognition of the need for *dynamic economizing* in the form of efficiently generating a fast, flexible response to a changing array of market opportunities and threats (Sanchez, 2000).² The dynamic interdependencies of resources in an organization as a system mean that the inflexibility of the least flexible essential resource in an organization will act as a bottleneck that limits the overall flexibility of the organization to respond to change. Since the overall flexibility of a system cannot be greater than the flexibility of the least flexible essential resource to be used in the system, improving the flexibilities of *all* key resources is a prerequisite to building strategic flexibility in the organization as a system.

Of course, the overall flexibility of an organization as a system also depends on the cognitive flexibilities of its managers in changing the processes, purposes, and goals that motivate the organization's coordination and deployments of its resources in alternative uses. The concept of *coordination flexibility* represents the abilities of an organization's managers to coordinate new strategic uses for resources through reconfiguring and reemploying the resources available to the organization.

The building of strategic flexibility in an organization requires the development of resource flexibilities and coordination flexibilities that can be combined in various ways to achieve specific kinds of organizational flexibilities. We next consider how five forms of flexibility that are critical to achieving overall strategic flexibility in an organization are related to five forms or "modes" of competences that must be developed and maintained by a competent organization in a dynamic environment.

Five Modes of Organizational Competence

The open system model of organizations in Figure 1 can be used to identify five key forms or modes of organizational competence (Sanchez, 2001b), which are summarized in Table 1. The term *competence mode* refers to an important way in which the overall competence of an organization is expressed through specific kinds of activities and processes. Each competence mode depends on a specific kind of organizational *flexibility* to respond to changing or diverse environmental conditions, such as evolving market demands, technological change, and competitive developments in an industry. Each kind of flexibility can in turn be described by the specific kinds of *strategic options* that each flexibility brings to an organization (Sanchez, 1993, 1995).

Competence Modes I and II pertain to the ability of an organization's top managers to identify and embrace new strategic logics and new management processes. Competence Modes III, IV, and V relate to the abilities of middle managers, other employees, and other resources in an organization to actually enact new strategic logics and new management processes generated through Competence Modes I and II. The strategic changes that an organization can undertake are therefore determined jointly by the strategic boundaries top managers place on

²Moreover, technology advances in many resource markets have made available flexible resources with unit costs of production that now rival those of specialized, single-purpose equipment.

Table 1: The Five Competence Modes and the Strategic Options each Competence Mode Creates.

Competence mode	Strategic options created by competence mode
I. <i>Cognitive flexibility</i> of strategic managers to define alternative strategic logics	Portfolio of perceived market opportunities to create value
II. <i>Cognitive flexibility</i> of strategic managers to define alternative management processes	Portfolio of perceived ways of managing value creation processes
III. <i>Coordination flexibility</i> of managers to identify, configure, and deploy resource chains	Portfolio of resource chains managers can identify, configure, and deploy
IV. <i>Resource flexibilities</i> of resources to be used in alternative operations	Portfolio of alternative processes to which resource chains can be applied
V. <i>Operating flexibilities</i> of managers and other employees in applying skills and capabilities in alternative uses of available resources	Portfolio of feasible operations

the goals and purposes an organization may pursue (Competence Modes I and II) and the capabilities of the organization to adopt and sustain new resources and processes within the strategic boundaries set by top managers (Competence Modes III, IV, and V).

A summary of the "re-invention" of Chrysler Corporation in the late 1980s and early 1990s illustrates the five competence modes and the flexibilities derived from each mode.

Competence Mode I: Cognitive Flexibility to Imagine Alternative Strategic Logics

Competence Mode I derives from the *cognitive flexibility* of an organization to imagine alternative ways of creating value in markets. Competence Mode I therefore depends on an organization's ability to perceive market needs, to define products that can satisfy those needs, and to design supply chains and distribution channels for realizing new kinds of products. In the terminology of the competence perspective, Competence Mode I is the ability of an organization to define *alternative strategic logics* for using available resources in value-creation processes that help the organization achieve its goals (cf. Hamel's (2001) concept of "business system innovation").

Competence Mode I results largely from the cognitive flexibility of an organization's strategic managers, because they normally have the authority to launch or support important new strategic initiatives like creating new kinds of products. In this regard, strategic managers may lead their organization in launching new initiatives, or they may act as "bottlenecks" that limit strategic change by blocking new initiatives proposed by middle managers or others within an organization. The extent to which an organization's strategic managers are willing to bear the risks inherent in a change in strategic logic determines the extent to which Competence Mode I will be achieved in the organization.

The cognitive flexibility of an organization's strategic managers in Competence Mode I is expressed by the feasible strategic options managers believe the organization has to pursue new *market opportunities to create value*.

Competence Mode II: Cognitive Flexibility to Imagine Alternative Management Processes

Competence Mode II results from a second form of *cognitive flexibility* of managers — their ability to conceive of new management processes for implementing new strategic initiatives. This flexibility in turn derives from managers' abilities to identify and access the new kinds of resources needed to carry out a new strategic logic, to devise new organization designs (allocations of tasks, decision making, and information flows) for using new resources, and to define appropriate controls and incentives for monitoring and motivating new value-creating processes.

Like Competence Mode I, Competence Mode II depends primarily on an organization's strategic managers, who normally have ultimate responsibility for an organization's management processes, and who may be either willing to experiment with new forms of coordination or unwilling to depart from existing management structures and processes. Where an organization's managers lie on the continuum between openness to organizational innovation and reactionary organizational rigidity will determine the extent to which Competence Mode II is achieved in an organization.

An organization's Competence Mode II therefore results from its managers' flexibility to undergo strategic change in the organization's management processes and is expressed by the strategic options managers perceive are available to an organization to pursue alternative approaches to managing its value creation processes.

Competence Mode III: Coordination Flexibility to Configure and Deploy Resources

Competence Mode III pertains to the *coordination flexibility* of an organization to assemble alternative chains of resources that may be needed to carry out alternative strategic logics. Coordination flexibility generally depends on the ability of middle managers (or the top managers of smaller organizations) to identify, acquire or access, configure, and deploy alternative chains of appropriate tangible and intangible resources in effective ways. Appropriate resources may include both *firm-specific resources* that are internal to an organization and *firm-addressable resources* that an organization can access but that remain external to the firm (Sanchez & Heene, 1996). Effectively configuring a chain of resources requires devising appropriate designs for the specific ways the resources will interact in value-creating processes.³ Deploying a resource chain requires focusing the

³The decomposition of product creation and realization processes into specific activities and the specification of the ways in which those activities interact defines a *process architecture*. See Sanchez & Mahoney (1996) and Sanchez (1999) for further discussion of the ways in which process architectures can affect an organization's coordination flexibility.

activities involved in using resources on clearly defined tasks in pursuit of a market opportunity.

The coordination flexibility of an organization creates a portfolio of strategic options to assemble the alternative resource chains required to create and realize a range of product offers, and those options increase in value as the time and cost an organization takes to assemble an effective new resource chain decreases.

Competence Mode IV: Flexibility of Resources to be Used in Alternative Operations

Competence Mode IV derives from the ability of the resources in an organization's resource chains to be used in alternative ways and is constrained by the intrinsic resource flexibility of the organization's available resources. The forms of resource flexibilities may include upgradeability to higher performance levels, scalability to increase capacity, and extendibility to add new functionalities, as well as the ability to switch a resource from one use to another. The intrinsic flexibilities of the resources an organization possesses or can access therefore determine its strategic options to use resources in alternative ways in value-creating processes.

Competence Mode V: Operating Flexibility in Applying Skills and Capabilities to Available Resources

Competence Mode V derives from the ability of an organization to use the flexibilities of its firm-specific and firm-addressable resources effectively and efficiently over a range of operating conditions. This *operating flexibility* essentially depends on the collective human skills and capabilities that an organization's front-line managers and employees can apply *at the working level* in using its available resources.

The operating flexibilities of an organization in using its available resources determine the reliability and efficiency with which a firm can sustain production and delivery of its products. In effect, Competence Mode V determines the *robustness* of a firm's operations over a range of operating conditions (cf. Leonard-Barton *et al.*, 1994). Thus, the operating flexibility of an organization determines its portfolio of operational strategic options — i.e., the operationally feasible ways an organization can bring its products to markets.

The Five Competence Modes in Action: The "Re-Invention" of Chrysler Corporation

An example may help to illustrate the nature of the five competence modes and the various flexibilities that result from them.

In the late 1980s Chrysler Corporation was on the verge of bankruptcy. Except for its minivans, Chrysler's automobile designs had fallen well behind the competition and could only be sold at deep discounts. As Chrysler's financial condition worsened, the company had to be rescued by a package of loans (guaranteed by the US government) that

essentially gave Chrysler a grace period during which it had to fundamentally transform itself into a viable business. In one of the most dramatic turn-arounds in business history, Chrysler was able to re-invent itself and create a new set of competences at all levels of the organization.

Chrysler's new management team headed by Robert Eaton recognized that Chrysler's boxy and staid product designs no longer appealed to consumers. The management team launched several new product development initiatives that were intended to significantly reposition Chrysler in the American automobile market. These new product initiatives included an aggressively styled, limited production sports car called the Viper and the introduction of a sleek, revolutionary "cab-forward" vehicle design in its main line of LH platform family automobiles. Both vehicles received great public acclaim and established a new market position for Chrysler as the innovative design leader in the US market. The cognitive flexibility of Chrysler's management team to imagine a radically new set of market possibilities for Chrysler enabled a major increase in Competence Mode I of Chrysler as an organization.

Chrysler's management team also re-invented the way the company manages the development of new vehicles. Previously, development of new cars was subject to review by several layers of management, who often intervened to overrule new design approaches suggested by Chrysler's designers and development engineers. The heavily managed development process took five years or more and cost US\$ 2–3 billion to develop a new vehicle, assuring that Chrysler's new product designs were out of date on introduction and likely to be unprofitable. Chrysler's new management team reorganized product development processes around a new "platform team" concept that gave broad decision making autonomy to product developers and allowed them to manage their own development processes within strategic guidelines for product market positioning outlined by Chrysler's management team. The new development management process at Chrysler reduced development time and costs by more than 50 percent and led to the development of innovative product designs with strong market acceptance. The flexibility of Chrysler's strategic managers to adopt a much more "empowered" approach to managing development processes gave Chrysler as an organization a new set of capabilities in Competence Mode II.

Chrysler's new management team also transformed Chrysler's relationships with its suppliers from an arm's-length, cost-focused, zero-sum game bargaining relationship to a more communicative, collaborative relationship with a mission to continuously improve quality and cost performance of components. Suppliers of key components were invited to join Chrysler's new platform teams and to share their ideas and expertise in creating Chrysler's new generations of vehicles. New contracts for sourcing components were also devised that established commitments to strict quality requirements and continuous cost reductions. Chrysler engineers began to work closely with suppliers to improve component designs and production processes, and as it recovered financially, Chrysler began to assist major suppliers in financing purchases of advanced production machinery. The flexibility of Chrysler's managers and engineers to conceive of and implement this new approach to coordinating supplier relationships significantly improved Competence Mode III within Chrysler.

Chrysler's new platform approach to developing new vehicles also enabled the carmaker to "leverage" a larger number of model variations from each development program. Produc-

tion lines then had to be engineered to allow a greater mix of product variations to be assembled on Chrysler's vehicle assembly lines. The increased flexibility of Chrysler's new product designs and production systems represents an increase in Competence Mode IV.

By the early 1990s Chrysler Corporation also completed a materials and resources planning (MRP) system that created an elaborate "map" of the flow of all materials, parts, components, and subassemblies through every supplier's operations and through every transportation channel into each of Chrysler's auto assembly plants. Chrysler's production managers (assisted of course by computers) now use this MRP map to maintain an uninterrupted flow of materials, parts, components, and subassemblies into Chrysler's assembly plants. The MRP system can be used, for example, to reschedule or redirect shipments from alternate suppliers when a snow storm in the Midwest of the USA interrupts planned shipments from a given supplier. By having an accurate picture of the supply flexibilities that are "designed into" Chrysler's production system, production managers can make more effective and efficient use of those flexibilities in responding to a range of unexpected circumstances that otherwise could greatly impact its assembly operations. These capabilities have greatly improved Chrysler's operating flexibility in Competence Mode V, enabling it to achieve significant increases in plant utilization rates by avoiding interruptions in the flow of inputs to its assembly lines.

Systemic Interrelationships Among the Five Competence Modes

Achieving overall strategic flexibility in an organization requires developing a complementary balance among the five flexibilities in the organization's five competence modes. We now consider some key systemic interrelationships between the five competence modes that must be managed to achieve *coherence* among the dynamic complementarities between activities in the five competence modes (Christensen & Foss, 1997).

Since the ability of an organization to create value through its various processes depends on achieving adequate flexibility in each of the five complementary competence modes, each competence mode can act as a potential bottleneck that limits the overall competence and strategic flexibility of the organization. If an organization behaves like an adaptive system, in the long run the flexibility of any competence mode that is not put to full use is likely to diminish to a level that is simply adequate to function with the least flexible competence mode of the organization. In effect, we can expect the competence modes of the organization to equilibrate to the level of the least flexible competence mode, which acts as a *capability bottleneck* that limits the organization's overall competence leveraging processes.⁴ Managers of organizations as competence leveraging systems must therefore understand which competence modes are or could become capability bottlenecks and take steps to develop and maintain an adequate level of complementary flexibility in each of the five competence modes.

As one moves upwards in Figure 1 from activities resulting from Competence Mode V to activities that lead to Competence Mode I, it generally takes longer for an organization

⁴For a discussion of how well defined product and process architectures can be used to discover an organization's capability bottlenecks, see Sanchez & Collins (2001).

to increase the flexibilities of its higher-level competence modes. Because each competence mode will tend to equilibrate with the least flexible competence mode of the organization, making long-term changes in lower-level competence modes will generally require making complementary changes in higher-level competence modes. Because higher-level competence modes take longer to change, however, the rate of change in an organization's lower-level competence modes will be constrained by the maximum rate of change in its higher-level competence modes. Thus, Sanchez and Heene (1996) have argued that to avoid becoming bottlenecks in the strategic change processes of an organization, strategic managers must meet "the never-ending challenge of continuously learning how to better manage their own cognitions," which is the source of the cognitive flexibilities that underlie Competence Modes I and II. The need for managers to find ways to manage their own cognitive processes is especially important — and challenging — in dynamic environments because of the high levels of causal ambiguity encountered at the levels of Competence Mode I and II.

Managing Through Control Loops: A Systems View of Strategic "Stretch"

Managers, through their collective impact on the five competence modes of an organization, can greatly influence the capabilities and behavior of an organization as an open system. In their sensemaking processes for identifying strategic gaps in an organization's five competence modes, managers generally rely heavily on the feedback flows of data and information established within the organization — which we refer to as the organization's *control loops*. Through an organization's control loops, managers try to monitor various aspects of its internal conditions and external environment, to identify the changing array of resources needed by and available to the organization, to direct and monitor the organization's processes for acquiring and using resources, to assess the success of the organization's value-creation processes, to "fine-tune" or radically transform the organization's value-creation processes, and thereby to adapt the organization to a changing environment.

From this perspective, an organization undertakes *strategic change* when its managers detect strategic gaps, and seek significant changes in the organization's current competence modes by pursuing qualitative changes in its stocks and flows of resources, capabilities, processes, or goals. Important differences in the strategic responses of organizations to a changing environment may therefore result from differences in the kinds of strategic gaps their managers perceive. We next consider how two kinds of control loops affect the sensemaking processes of managers and thus the actions they take to adapt their organizations to a changing environment (Sanchez & Heene, 1996).

Use of Lower-Order Control Loops to Drive Strategic Change

Lower-order control loops gather data on an organization's current product offers in its product markets, its operations and its tangible assets, as suggested in Figure 2(a).

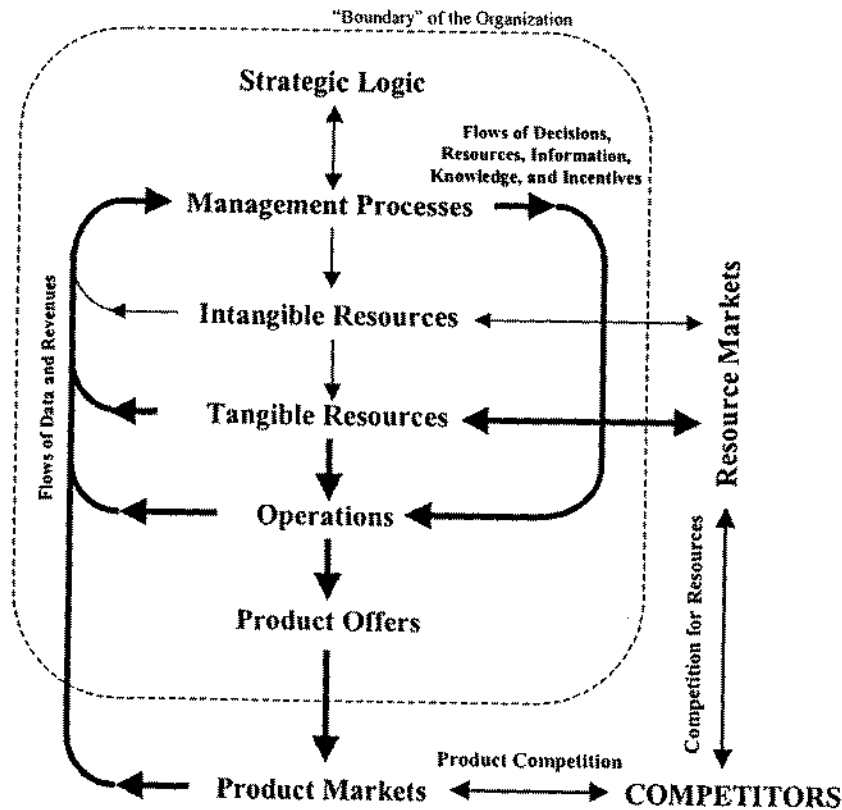


Figure 2(a): Lower-order Control Loops in an Organization as an "Open System".
(Adapted from Sanchez and Heene, 1996).

Lower-order control loops generally gather "hard" quantified data about current sales levels, market share, productivity, capacity utilization, inventory levels, and similar economic measures. Such data are essential inputs for managers assessing the adequacy of an organization's Competence Modes IV and V to carry out effectively the organization's existing processes within the current usual range of change and variation in its environment.

It has often been noted, however, that we tend to "manage what we measure." As a result, many managers may tend to focus on measuring and managing lower-level competence modes, whose resources, capabilities, and processes are easier to define, measure, and interrelate causally. The tendency to focus on issues that can be managed through lower-order control loops, however, may create cognitive "blind spots" (van der Vorst, 1997) about the current state of an organization's higher-level competence modes. The

tendency to develop cognitive blind spots about higher-level competence modes may become acute when an organization's value-creation processes are currently successful and control loops bringing managers current operating data begin to act like positive or reinforcing feedback loops. Current market acceptance of an organization's products may lead to data on profitability, revenues, and market share that managers interpret positively, increasing their confidence in the adequacy of all the organization's current competence modes. Believing that the processes that have brought current success will also bring future success, confident managers may expand current operations quantitatively. If expanding operations leads to more sales and profits, managers may become even more strongly persuaded that the organization's current competences are adequate for meeting the future.

While the currently successful organization's managers are focused on carrying out and expanding current value-creation processes, the market environment may undergo a shift in consumer preferences, or competitors may undertake strategic change in higher-level competence modes that lead to introductions of more competitive products. Detection of such strategic shifts in the environment through lower-order control loops may be subject to considerable time delays before a long-term deterioration in an organization's market share and profitability becomes evident. Managers' first response to such data, moreover, is likely to be scrutiny of the processes that are directly monitored by the lower-order control loops (e.g., production, distribution, and sales) that are generating signs of deteriorating current performance. It may take considerable time for managers to suspect that the deterioration in current performance can only be reversed by development of new kinds of product offers, which may require new value-creation capabilities that can only be accomplished through changes in higher-level competence modes. Given the longer times required to change higher-order competence modes, however, managers who have been focused on managing changes in lower-order competence modes may not be able to identify and make needed changes in the organization's higher-order competence modes before the organization's condition has deteriorated beyond a point of no return.

Use of Higher-Order Control Loops to Drive Strategic Change

The inherent cognitive limitations of lower-order control loops as drivers of strategic change suggest that establishing control loops to monitor the adequacy of an organization's higher-level competence modes is essential for managing strategic change in a dynamic environment. This effort will rely on patterns of data gathering through higher-order control loops, as suggested in Figure 2(b).

To assess the adequacy of an organization's higher-level competence modes, however, managers must usually gather "soft" qualitative data whose interpretations are likely to be highly causally ambiguous. Thus, for managers the task of driving strategic change through higher-order control loops will necessarily be a cognitive exercise in "strategy as stretch" (Prahalad & Hamel, 1993). Leading an organization to stretch beyond its current higher-order competence modes requires a *stretch of managerial imagination* to identify potential strategic gaps in an organization's higher-order competence modes that may only be *implied* by the flows of "soft," causally ambiguous data through higher-order control

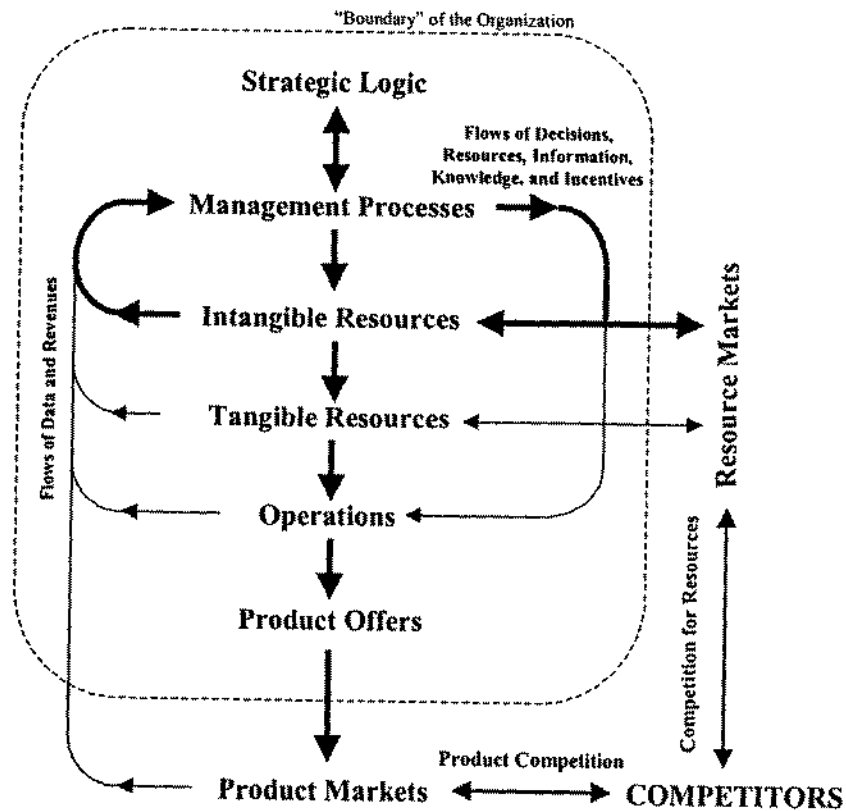


Figure 2(b): Higher-order Control Loops in an Organization as an "Open System".
(Adapted from Sanchez and Heene, 1996).

loops. Managers must also develop a collective corporate imagination that enables them to envision alternative strategic logics, management processes, and intangible resources unlike those currently constituting the organization's Competence Modes I, II, and III.

Like lower-order control loops, however, higher-order control loops can also behave like positive or reinforcing feedback loops. Current competitive success may increase managers' confidence in the adequacy of their organization's higher-level competence modes, and encourage them to focus on using lower-order control loops to fine-tune the organization's lower-level competence modes. Thus, even when current operating data indicate current profitability and a strong market position, strategic managers must initiate processes that continually question the adequacy of the organization's current Competence Modes I, II, and III to manage the uncertainty and change in its environment. Three

approaches to challenging the adequacy of higher-level competence modes are summarized below.⁵

Benchmarking and Benchtrending. Benchmarking is a process for systematically comparing an organization's current strategic logic, management processes, intangible resources, tangible resources, operations, and/or products against their counterparts in organizations considered to be world-leading in their product markets (Karlof & Ostblom, 1993; Watson, 1993). To effectively challenge an organization's higher-level competence modes, however, benchmarking must look beyond comparisons of a firm's current operating data gathered through lower-order control loops. Benchmarking should include comparisons of processes for developing new technologies, creating new product and process designs, designing and changing organization structures, devising incentive plans, challenging and revising strategic logics, and identifying new sources of data that may be relevant to changing higher-level competence modes. To be most effective, comparisons should be dynamic and oriented towards the identification and understanding of trends and change trajectories being undertaken by world-leading organizations. Future-oriented process comparisons — often referred to as *benchtrending* — are critical in assessing Competence Modes I, II, and III, which must provide adequate flexibility to respond to a range of strategic contingencies in the future.

The ability to perceive implied strategic gaps in higher-level competence modes may be improved by benchtrending organizations that are best-in-world organizations in any industry for a given process or capability. When an automaker like Chrysler benchtrends a world-leading service company like Federal Express, for example, managers may acquire a new understanding of ways to define, create, and deliver highly appreciated services. This new understanding may then suggest new ways of providing new or improved service to customers in the automobile business. In some organizations, ongoing benchtrending has become an integral part of continuous learning processes that regularly and systematically challenge and improve higher-level competence modes.

Environmental Scanning. When cooperative benchtrending is not possible to arrange with world-leading firms within or outside an organization's industry, the assessment of higher-level competence modes may still benefit from environmental scanning for potentially significant changes in other organizations' technological, organizational, and marketing capabilities. Managers may scan for both technologies in current use and for apparent directions and rates in the evolutions of currently or potentially important technologies. Similar assessments may also be made for organizational innovations in use or being adopted by other organizations. New ways of discovering and serving emerging market preferences may also be monitored and assessed for their applicability to an organization's own value-creation processes.

⁵It is also possible that the causal ambiguity inherent in data gathered through higher-order control loops may prevent identification of better strategic logics and lead managers to make escalating commitments to failing strategic logics (Staw, 1981).

Managerial perceptions of emerging technological, organizational, and marketing possibilities could stimulate managers to ask how those possibilities might improve an organization's higher-level competence modes under a variety of future scenarios. When managers perceive implied gaps between an organization's current competence modes and the competences it will need or might advantageously use in the future, managers may begin to build new competences now that would significantly shorten the dynamic response times of its higher-level competence modes in responding to new competitive conditions in the future. Also, by beginning early to build new competences, managers may be able to resolve some of the causal ambiguities surrounding new technologies, new organizational forms, and new marketing approaches before competitors develop insights in these areas.

Challenging Cognitive Frameworks. The thought processes of managers are limited by the bounded rationality that constrains the gathering and interpretation of data by all decision makers (Simon, 1954). Accepting the inevitability of bounded rationality may help managers to avoid falling into defensive routines (Argyris, 1986) that limit communication with others who might suggest new analytic frameworks and theories of value creation that could challenge managers' current interpretive frameworks for sensemaking. Managers may try to overcome the limits of their own bounded rationality by *hiring consultants* or other advisers or by *working with management researchers* investigating new models for competing in their industry or in other industries. Managers may also seek to *hire new executives* from other firms or other industries to bring new perspectives or new industry recipes (Spender, 1989) that would provide new perspectives for assessing and improving an organization's higher-level competence modes. In a growing number of cases in the USA, in particular, boards of directors are becoming active agents of strategic change by recruiting new managers with new cognitive frameworks when current managers are unable to let go of cognitive frameworks that are no longer capable of creating value.

Managers may also try to create a pool of different cognitive frameworks within an organization by seeking *diversity in its mix of managers*. Managers may also seek to build an organizational *culture of confrontation* with processes that promote "no-holds-barred" questioning of the basic assumptions underlying a current strategic logic. Managers may also seek to stimulate "*dissidence*" and constructive debate through the application of techniques such *Devil's advocate or dialectic inquiry* (Vennix, 1996).

Managers may also use *system dynamics models* to create microworlds that can serve as learning environments for testing managerial assumptions and designing higher-order control loops for assessing and managing higher-level competence modes (Senge, 1990). An organization may also choose to force continual redefinition of an organization's strategic logic and management processes through periodic "*zero-based strategy-making*" in which the appropriateness of current strategies, processes, and resources must be argued and affirmed in order to receive further resource allocations.

Conclusions

In organizations facing significant environmental change and uncertainties, a critical task of strategic managers is guiding the *strategic change processes* of their organization. We

have used an open system model of an organization to describe this key managerial activity as an essentially cognitive process of perceiving possibilities for the creation of new strategic logics, new management processes, and new kinds of tangible and intangible resources for effective value-creation activities. We have also used the open system model to further characterize the task of managing strategic change as one of managing competence building in five distinct competence modes and managing key dynamic interrelationships between competence modes.

In managing the five competence modes, managers must use feedback loops or control loops that are appropriate for identifying and remedying strategic gaps in each competence mode. Important differences in the patterns of gap-closing actions undertaken by different organizations result from differences in the ways their managers detect strategic gaps in organizational competences. Relying on lower-order *versus* higher-order control loops in managing strategic change, for example, typically leads managers to focus on improving lower-level competence modes concerned with current products, operations, and tangible assets, as suggested in Figure 2(a). Use of lower-order control loops to drive strategic change may therefore deepen an organization's current capabilities and sustain incremental learning in lower-level competence modes, and may be the basis for competitive success in stable environments that reward progressive reductions in costs and steadily improving efficiency. Exclusive or excessive reliance on lower-order control loops, however, may transform an organization's current "core capabilities" into "core rigidities" (Leonard-Barton, 1992) if managers lose their ability to identify opportunities to improve or change higher-level competence modes that can generate new concepts and processes for value creation.

Managers that actively gather and interpret data through higher-order control loops ought to be more capable of identifying strategic gaps and pursuing gap-closing actions in an organization's strategic logic, management processes, and intangible assets — the objects of an organization's higher-level competence modes, and the primary locus of strategic change. Thus, *strategic learning* by managers who develop and use higher-order control loops to identify and pursue changes in an organization's higher-level competence modes plays a central role in the "perception-forming, direction-setting, decision-making, process-coordinating, and change-inducing activities of decision makers that result in a organization's distinctive patterns of competence building and leveraging over time" (Sanchez & Heene, 1996).

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