



How Governments Matter to New Industry Creation

Author(s): Jennifer W. Spencer, Thomas P. Murtha and Stefanie Ann Lenway

Source: *The Academy of Management Review*, Apr., 2005, Vol. 30, No. 2 (Apr., 2005), pp. 321-337

Published by: Academy of Management

Stable URL: <https://www.jstor.org/stable/20159122>

REFERENCES

Linked references are available on JSTOR for this article:

https://www.jstor.org/stable/20159122?seq=1&cid=pdf-reference#references_tab_contents

You may need to log in to JSTOR to access the linked references.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



Academy of Management is collaborating with JSTOR to digitize, preserve and extend access to *The Academy of Management Review*

JSTOR

HOW GOVERNMENTS MATTER TO NEW INDUSTRY CREATION

JENNIFER W. SPENCER
George Washington University

THOMAS P. MURTHA
STEFANIE ANN LENWAY
University of Minnesota

We articulate opportunities and challenges for governments and innovating firms operating within countries that display four types of national political institutional structures. We argue that corporatist and associational institutional structures influence governments' capabilities to support diffusion- and mission-oriented technology policies and firms' tendencies to engage in bricolage or breakthrough approaches to technological entrepreneurship. We then show how the relative strength of state institutions can amplify or compromise governments' policies and firms' innovation strategies.

The new industries of the future will emerge from collisions of technological innovation and market opportunity that will assume an increasingly global character over time (Murtha, Lenway, & Hart, 2001; Spar, 2001; Vernon, 1971, 1998). Indeed, even the most geographically concentrated and apparently country-bound entrepreneurial communities generally comprise a diverse, international membership with global ties within and outside their regions (Murtha et al., 2001). Firms must reach across national borders to assemble the knowledge, complementary assets, partners, suppliers, and customers necessary to create new businesses (Doz, Santos, & Williamson, 2001). At the same time, however, the accelerating pace of industry evolution and the importance of speed to competitive advantage (Gomory, 1992; Nelson, 1992) continue to fuel the benefits of geographic proximity, particularly early in the industry emergence process.

If national boundaries neither contain nor circumscribe all of the elements that contribute to new industry creation, do national governments matter? In what circumstances can governments, with their relatively slow-moving political processes, implement policies relevant to

fast-evolving industries? The answer varies across countries, depending on national politics and political institutions.

In this article we offer a comparative framework to explore how governments in developed, capitalist economies can help, hinder, or avoid doing harm to firms engaged in new industry creation. Our framework links countries' political institutional structures, innovators' approaches to technological entrepreneurship, and governments' technology policy orientations. Because of the nascent stage of research development on this topic, however, we refrain from articulating detailed propositions.

In recent years, scholars' views of innovation have shifted from an emphasis on individual innovators to an analysis of the emergence of technological innovations within interfirm networks and technological communities (e.g., Kogut & Zander, 1996; Murtha et al., 2001; Spencer, 2003). Emerging high-technology industries increasingly depend more on knowledge creation and acquisition processes than on ownership of physical assets (Murtha et al., 2001). Research suggests that as emerging industries become more globally integrated, knowledge nonetheless continues to circulate through regional and national technological communities more readily than global ones (Almeida & Kogut, 1999; Spencer, 2003).

Our perspective is compatible with frameworks that depict technological innovation as

We appreciate Martin Kenney and Evan Schofer for critical connections. We thank Mark Lehrer, Stephen Kobrin, Peter Smith Ring, and the anonymous referees for comments that improved the work. Any errors remain on our account.

an evolutionary process of variation, selection, and retention characterized by incremental advances punctuated by occasional discontinuous changes (Tushman & Rosenkopf, 1992; Utterback & Abernathy, 1975). We see industry evolution as a process that involves the codevelopment of technology and institutions via repeated interactions among a range of industry participants (Ruttan, 2001; Van de Ven, 1993; Van de Ven & Garud, 1989). As industries develop from initial breakthrough to commercialization and large-scale manufacturing, the level of uncertainty inherent in the innovation process diminishes (Utterback & Abernathy, 1975). At the same time, as the pace of technological evolution accelerates (Basalla, 1988; Diamond, 1997), the level of overall technological uncertainty in the environment likely increases.

We adopt an institutionalist perspective based on the classic distinction between state and society (Weber, 1978). We hold, with Commons (1970), that institutional arrangements embody collective action that constrains, guides, and liberates individual action. Although institutional arrangements remain relatively stable within countries over time, they vary considerably across countries (Murtha & Lenway, 1994). We distinguish between the state, as a durable institutional structure that embodies legal institutional order within a national territory (Benjamin & Duvall, 1985), and government, as a group of decision makers that holds state power for a limited tenure (Goldstein & Lenway, 1989; Skocpol, 1979).

States evolve slowly, except in the face of sweeping social revolutions that take place rarely (Skocpol, 1979). Governments, however, come and go, bringing new initiatives and repealing and reinterpreting old ones. Even when governments qualify as "facilitative" of independent organizations (Pearce, 2001), the likelihood they will follow through on any given policy never approaches 100 percent (Murtha, 1991, 1993).

In the next section we summarize the characteristics of different types of national institutional structures, focusing on "associational" versus "corporatist" structures of interest intermediation and society-centric versus state-centric bases for state authority (Jepperson, 2002). We then define "bricolage" and "breakthrough" approaches to technological entrepreneurship (Garud & Karnøe, 2003), as well as dif-

fusion and mission orientations to national technology policy (Ergas, 1987).

In the following section we identify relationships among these constructs. We argue, on the one hand, that the individualism inherent in associational societies tends to correlate with breakthrough approaches to technology entrepreneurship, in which organizations work independently with the primary objective of establishing dominance over competitors. Corporatism, on the other hand, tends to associate with more networked bricolage approaches to technology entrepreneurship, in which organizations collaborate and mutually adapt while they compete for market share. We also expect governments of associational societies to display tendencies to either engage in laissez-faire policies or to promote great technological missions that create common cause among a country's disparate interests. In contrast, we expect corporatist societies to exhibit policy orientations that support the broad diffusion of technological capabilities within society.

The nature of collective agency complicates this picture, however. In society-centric polities, societal demands for technological diffusion compromise mission-oriented policy implementation and amplify diffusion orientations. In state-centric polities, state authority compromises diffusion-oriented policy implementation and amplifies mission orientations.

After probing these relationships, we use examples from high-technology industries to evaluate the opportunities and challenges for firms and governments operating within each of four types of polities. Finally, we discuss implications for managers and policy makers.

NATIONAL POLITICAL INSTITUTIONAL STRUCTURES

Echoing March and Olsen, we define political institutional structures as "collection[s] of institutions, rules of behavior, norms, roles, physical arrangements, buildings and archives that are relatively invariant in the face of turnover of individuals, and relatively resilient to the idiosyncratic preferences and expectations of individuals" (1984: 741). These political institutional structures and their associated policy networks shape the ways in which public and private sector actors share authority and accountability for resource allocation in national economies

(Lenway & Murtha, 1994; Murtha & Lenway, 1994; Murtha, Spencer, & Lenway, 1996). Jepperson (2002) has presented a model describing four archetypes of political institutional structures based on the composition and coordination of country-specific policy networks embedding state and society. We have adapted Jepperson's taxonomy, in which he defines political institutional structures along the two dimensions of "collective agency" and "organization of society."

Collective agency varies according to whether a state historically derived its authority and legitimacy intrinsically or from society (see Table 1). In state-centric polities, government steers and guides society and derives its authority from the state (Katzenstein, 1978; Krasner, 1978). Strong states emerged from an absolutist political tradition in which rights that accrued to individuals devolved from the state. France, Germany, and Japan stand as contemporary examples.

In society-centered polities, government derives its authority and legitimacy as the instrument and representative of "the people," in the form of a social contract (Hobbes, 1965; Locke, 1980) by which individuals cede just enough power to allow the state to maintain political order. In the United States—a classic example—the founders split the state into executive, legislative, and judicial branches, each with oversight of the other, to mitigate against centralization of power. Katzenstein (1978) suggested that strong states, such as those present in France and Japan, give their governments a greater ability to pursue coherent sets of policy objectives. U.S. governments' capabilities in this area suffer by comparison, owing to the susceptibility of its weaker state structures to interest group pressures.

Organization of society varies according to whether basic units of interest representation comprise connections among individuals—associational—or among groups—corporatist (see Table 2). Associational views of society construe collective action as individuals cooperating and competing to attain objectives that ultimately reflect aggregated interests of dominant coalitions. Social organization and interest group expression are spontaneous and emergent, with interest groups self-organizing to express preferences regarding specific policies. If the preferences of particular interests gravitate to extremes, pluralist political models anticipate that countervailing interests will emerge to sustain a policy equilibrium.

In contrast, corporatist models of social organization envision a communal order in which formally organized interests play specified roles in economic policy formation and implementation. The reification of corporate structures holding distinct roles, rights, and obligations (Jepperson, 2002) allows corporatist countries to more easily overcome classic collective action problems that can inhibit interest group longevity in more associational systems (Olsen, 1971). Political decisions emerge from consensus among functionally or hierarchically defined groups, rather than from victory of one group over another. Drawing on Jepperson (2002), we suggest that associational societies emphasize individual rights and choices, whereas corporatist societies emphasize collective requirements and duties.

The pace of political institutional change generally lags behind the pace of technological advance, and single innovations, no matter how radical, are not likely to rapidly alter political institutions (Spar, 2001). For instance, although some global convergence of institutional struc-

TABLE 1
Collective Agency (How Statist?)^a

Statist	Societal
<ul style="list-style-type: none"> ● Authority located within relatively unified state structure ● State dominates public realm and guides societal activity ● Politics founded on pursuit of objective national interest ● Individual participation in policy formulation seen as partisan and unproductive 	<ul style="list-style-type: none"> ● Authority located in society as a whole ● Government seen as an instrument of society ● Politics dominated by interest formation, bargaining ● Individual activism helps set agenda for government policy

^a Descriptions adapted from Jepperson (2002).

TABLE 2
Organization of Society (How Corporatist?)^a

Associational	Corporatist
<ul style="list-style-type: none"> ● Basic unit of society is individual ● Individual actors reified ● Social organization is natural, emergent ● Stress on individual rights, choices ● Majoritarian politics: winner takes all ● Bottom-up organization of interest representation 	<ul style="list-style-type: none"> ● Basic unit of society is group (organization, order, class, business association) ● Communal order of differentiated roles and collective functions reified ● Social organization is rational, planned ● Stress on collective requirements, duties ● Consensual politics: compensation for losers ● Official interest representation

^a Descriptions adapted from Murtha et al. (1996) and Jepperson (2002).

tures is inevitable, even such a major structural change as European integration has not entirely stamped out the corporatist tendencies of many European countries (Jepperson, 2002). Indeed, Knutsen (1997) and Adams (2002) have suggested that many of the structures of the European Union itself appear consistent with corporatism.

Our adaptation of this dimension builds on precedents in the management literature, in which scholars have discussed the impact of corporatist and pluralist institutions on firm/state strategic interaction (Hillman & Keim, 1995; Hillman & Hitt, 1999; Lenway & Murtha, 1994; Lodge, 1990; Murtha & Lenway, 1994). These contributions, in turn, owe a great deal to institutionalist perspectives on politics, particularly Katzenstein's (1978, 1984, 1985), Freeman's (1989), and March and Olsen's (1989).

Approaches to Technological Entrepreneurship

Given that the categorization of corporatist and associational politics reflects alternative assumptions about the basis for social organization, we argue that these dimensions are also consistent with alternative approaches to technology entrepreneurship. Garud and Karnøe (2003) have introduced a taxonomy that distinguishes between bricolage and breakthrough approaches. They use the term *bricolage* to refer to a mutually adaptive, collective, and gradually emergent process in which many networked actors proceed through a series of small wins to create and then improve a technology. These bricolage processes reflect emergent strategies based on informal structures similar to those

described by Brown and Eisenhardt (1997) and Garud and Jain (1996).

In breakthrough approaches, individual actors compete to achieve a technologically elegant innovation in one great leap or leapfrog. We hasten to add that the distinction we offer here does not pertain to an innovation per se (e.g., radical versus incremental) but, rather, to the nature of collective action that inheres in the process and that, as Garud and Karnøe (2003) have observed, varies across communities. Under bricolage, distributed actors become interwoven through a collective learning process. Breakthrough approaches involve less collaboration and a more competitive process, in which knowledge remains primarily within the innovating firm (Garud & Karnøe, 2003).

Although elements of both collective learning and interfirm competition likely occur in all innovative activity, we view bricolage entrepreneurship as most consistent with the cooperative, consensual, networked aspects of corporatism. Preexisting relationships among firms within business associations and enduring social networks help innovators to identify and build trusting relationships with other organizations active in their emerging industry.

We view breakthrough approaches as more consistent with the individualism and competitiveness at the core of associationalism. Granovetter (1985), for example, predicted that firms face greater pressure to internalize economic activities when they lack access to a strong network, or when conflict and opportunism characterize their networks. Competition rather than coordination among innovating

firms limits their abilities to leverage external technological advances and may increase managers' perceptions that their product will survive in the marketplace only if it stands out as a technological breakthrough.

Technology Policy Orientations

Henry Ergas (1987) has argued that developed, capitalist countries' technology policy orientations can be usefully described according to the relative dominance of mission- and diffusion-oriented programs. He describes mission-oriented policy orientations as "big science deployed to meet big problems" (1987: 193; citing Weinberg, 1967). Governments implement such policies to achieve radical innovations in a small number of strategic technologies, generally "intimately linked to objectives of national sovereignty" (Ergas, 1987: 192), including national defense and national pride. Diffusion-oriented technology policies aim to create a broad-based capacity for adjustment to technological change throughout a country's industrial structure, including small- and medium-size enterprises as well as the country's largest firms.

Ergas classified the United States, United Kingdom, and France as mission-oriented countries, and he provided examples of mission-oriented programs, including atomic energy, weapons, and aeronautics. The organizational characteristics of mission-oriented programs include a large-scale concentration of subsidies on a small number of firms and centralization of decision making within the state structure. This emphasis on big science within relatively few organizations is consistent with the individualistic, competitive, breakthrough approach to technological entrepreneurship.

Diffusion-oriented policy approaches, which Ergas identified with Germany, Sweden, and Switzerland, rarely target specific technological objectives, but rely more heavily on firms' funding and decision making, as well as efforts to link firms to private and quasi-public research organizations, such as the system of specialized Max Planck Institutes in Germany. Incorporating medium and small enterprises into programs requires significant coordination among firms in supporting industries, as well as the promotion of cooperative research, information sharing, and agreements on standards. The organizational characteristics of diffusion-ori-

ented programs include the prevalence of industry associations; decentralized decision making; and the involvement of many firms, universities, and other institutions.

The extensive interaction that takes place within a diffusion-oriented technology policy is most consistent with the communal order emphasized in corporatist systems and lends itself to a bricolage approach to innovation. Garud and Karnøe's (2003) study of the Danish wind turbine industry exemplifies the influence of a bricolage approach along with a diffusion orientation. As the technology advanced, both producers and owners of wind turbines formed associations that significantly influenced critical design elements, provided testing services, helped turbine producers ready their products for government certification, and assembled knowledge resources for the industry as a whole.

Although Ergas categorized a number of countries as mission or diffusion oriented, he acknowledged the loss of information inherent in all taxonomies and did not assert a perfect correspondence. Indeed, he found that Japan fit both orientations. We argue that, if anything, globalization has caused the typologies we have described to diminish over the years in precision as tools for categorizing countries, as a consequence of convergence due to demonstration effects and intergovernmental learning. But as Guillen (2001) has argued, global competition forces countries to exploit their distinctive strengths, creating natural limits to convergence. If political institutional structures evolve slowly while the pace of technological advance accelerates, the potential increases for technology, institutional context, and governments' technology policies to fall out of phase. Therefore, an understanding of the complexities inherent in the relationships among these constructs requires a set of relatively fine-grained arguments, rather than a simplified articulation of generic propositions.

In the remainder of this article, we show how each of the political institutional structures we outlined above poses distinctive challenges and opportunities for mission, diffusion, or hybrid policy implementation, taking into account national tendencies in approaches to technology entrepreneurship.

NATIONAL POLITICAL INSTITUTIONAL STRUCTURES: OPPORTUNITIES AND CHALLENGES

Figure 1 summarizes a four-cell typology of capitalist polities that categorizes national political institutional structures and their associated policy networks along the dimensions of collective agency (society to state centric) and organization of society (associational to corporatist). These two dimensions delineate four types of national political institutional structures: state corporatist, social corporatist, liberal pluralist, and state nation. As artifacts of history, these institutional structures have arisen

from tradition, path dependence, and historical accident rather than rational planning, and some countries exhibit the attributes of a given quadrant more closely than others. We describe exemplary features of firm/state relations within each category and discuss the capabilities and challenges of countries in each cell.

State corporatism combines a highly centralized public bureaucratic apparatus with policy networks that include societal groups recognized and legitimated by the state. Germany, Japan, and Korea represent this category. In Japan, relations between the state and large business organizations have been intermediated in

FIGURE 1
National Political Institutional Structures: Opportunities and Challenges

<p>Corporate</p> <p>Organization of society (how corporatist?)</p>	<p>Social corporatist</p> <ul style="list-style-type: none"> ● Interaction among interests formally organized along official lines ● State plays more facilitative role ● Government acts as partner, but does not lead new industry emergence ● Diffusion policy orientation and implementation ● Tendency for bricolage entrepreneurial approach reinforced <p>Countries: Sweden, Denmark, Finland</p>	<p>State corporatist</p> <ul style="list-style-type: none"> ● Centralized public bureaucratic apparatus ● Policy networks and societal groups recognized and legitimated by state ● Networks among organized social actors may equilibrate state centralism ● Diffusion-oriented policies capitalize on preexisting networks and norms of collaboration ● Strong state has capability to impose mission policy implementation ● Tendency for bricolage entrepreneurial approach can be compromised by resource targeting <p>Countries: Germany, Japan</p>
	<p>Liberal pluralist</p> <ul style="list-style-type: none"> ● Relatively fragmented, issue-focused interest groups ● Relatively weak state ● Independence and competition among business organizations, interest groups ● Tendency toward mission-oriented programs ● Societal demands for diffusion of resources can compromise mission policy implementation ● Tendency for breakthrough entrepreneurial approach can be compromised by resource fragmentation <p>Countries: United States, United Kingdom, Australia</p>	<p>State nation</p> <ul style="list-style-type: none"> ● Indistinct boundaries between public and private sectors ● Political and managerial leaders tend to cooperate rather than act as adversaries ● Mission policy orientation and implementation ● Tendency for breakthrough approach to technological entrepreneurship reinforced <p>Countries: France, Italy, Belgium</p>
<p>Associational</p>	<p>Societal</p>	<p>Statist</p>
<p>Collective agency (how statist?)</p>		

the post World War II era by the sprawling Ministry of Economy, Trade and Industry (METI, formerly MITI), partly in consultation with *Keidenren*, a cross-industry association of business enterprises. Korea, in turn, has borrowed from Japan in establishing state agencies, such as the Ministry of Science and Technology, that attempt to work with business to facilitate innovation and new industry emergence. The "statist" political traditions that characterize these polities predispose interest groups to rely on government authority to lead economic development, to resolve apparent interest conflicts, and to prod the consensus toward innovation.

If the authority of government begins to atrophy in such institutional structures while the structures themselves remain intact, the resulting vacuum can lead to economic paralysis. This appeared to occur in Japan during the 1990s and early 2000s, when the government failed to force the bankruptcies and corporate restructurings needed to awaken the country from economic doldrums following the collapse of overvalued stock and real estate markets.

Policy networks in social-corporatist political institutional structures—which Jepperson (2002) associates with the Nordic countries—also encompass interaction among interests formally organized along official lines. In contrast with state corporatism, however, social corporatism accords state authority a more facilitative than peremptory role in economic relations. In Sweden, for example, labor is organized in a centralized fashion along industry lines and typically maintains stable relations with business, without formal state intervention. These relations have been sustained in the context of a long-standing government commitment to full-employment policies, and they have contributed to an atmosphere in which labor has taken a welcoming attitude toward economic rationalization and technological change (Edquist & Lundvall, 1993). In social-corporatist polities, functional competence outweighs status or hierarchy in legitimizing a rationalized system of group representation (Jepperson, 2002). Well-developed and mutually agreed on structures of interest representation predispose policy networks to encompass agreements that distribute benefits widely.

In liberal-pluralist political institutional structures, such as the United States, United Kingdom, and Australia, relatively fragmented,

issue-focused, voluntaristic, grass-roots-based private interest groups interpenetrate a relatively weak state. Individualistic traditions lend themselves to entrepreneurial vitality in the private sector. They also resolve themselves in the extreme as contempt for authority, exemplified in Australia (Jepperson, 2002), and they contribute to the type of adversarial relationship between business and government (Vogel, 1978) exemplified by Microsoft's early defiant pose in its U.S. antitrust litigation. The combination of a political marketplace-style organization of society, with relatively weak and divided state power, can lead to a contentious style of politics around economic programs that pressures elected officials to capture benefits for their own constituencies. The roughly thirty West Virginia public institutions and infrastructure projects named for U.S. Senator Robert Byrd (Clines, 2002) illustrate one potential outcome.

The fourth type of political institutional structure, the state nation, describes France and, to a lesser extent, Italy and Belgium (Jepperson, 2002). The French polity juxtaposes the tradition of a strong, centralized state with the idealism and individualism of the French people, who view themselves as citizens and human beings above any professional or group identity. France has exhibited a long history of tension between the state and society, with state institutions restricting popular political participation and instead directing individuals' energies toward protest activities (Jepperson, 2002). The major enterprise sector reflects a high level of state ownership in comparison to most developed capitalist countries, including companies such as the car maker Renault and jet engine manufacturer SNECMA. Senior executives in both government and the private sector are drawn from the same elite, state-funded schools, and career paths tend to include both government and private sector service, epitomizing the symbiotic relationship between business and government (Chesnais, 1993).

Contrasting Liberal Pluralism and State Corporatism in New Industry Emergence

State corporatism's consensual politics, strong state, and embedded networks linking business, government, and labor suggest a well-established infrastructure fostering exchanges of information and agreements about technol-

ogy policy design and implementation. In contrast, liberal pluralism reflects an ideology of independence and competition among business organizations, diffusion of power within the state, and interest group competition over the benefits that government can provide. These features would seem to translate into relative strengths in state-corporatist countries for diffusion-oriented policies that capitalize on preexisting networks and norms of collaboration. In contrast, we would expect liberal-pluralist countries' strengths to lie in mission-oriented programs that gain some insulation from interest group competition because they address pressing national priorities for which broad-based support exists within society.

Examples of successes exist to support both assertions. Germany's system of industrial standardization, a quasi-public institution, is funded and administered primarily by industry participants but produces legally binding product standards across many industries (Ergas, 1987). This coordination lowers firms' costs by specifying standards among products—for instance, identifying how components will fit together and establishing quality expectations—more clearly than in many other countries. It also enhances bricolage as an approach to technology entrepreneurship by lowering the transaction costs of joint activity. In contrast, the U.S. Manhattan Project to develop atomic weapons represents a classic case of a mission-oriented policy (Gomory, 1992). Other mission-oriented programs in the United States have contributed to the development of aircraft and related industries that support military objectives.

But these relationships are not absolute. In particular, the strong state present under state corporatism can add an element of mission orientation to the implementation of some policies. Similarly, the relative strength of society under liberal pluralism can create demands for the diffusion of knowledge in the midst of mission-oriented programs. Either mix can lead to mismatches of policies and political institutional capabilities, with a corresponding loss of efficacy in implementation. The Japanese government, for example, has long pursued mixed policies that bring firms together in research consortia (a diffusion-oriented, bricolage approach) to achieve breakthrough advances (a mission-oriented outcome). Recent examples include the high-speed weather computer consor-

tium—an apparent success—and the Giant Technology Corporation's effort to develop a new way of coating thin-film transistors on glass substrates—a costly failure.

Governments' efforts to choose players for consortia can result in bad bets, missed opportunities, and unintended outcomes. Sharp drew impetus for its foray into calculators because the Japanese government excluded it from an early computer consortium. The consortium failed. But Sharp succeeded in calculators, and its advances in calculator screens provided a basis for its founding role in the high-volume, large-format flat panel display (FPD) industry.

Various U.S. administrations have tried to emulate the success of Japanese consortia, and officials have always claimed success. But the causal connections between consortium activity and industry outcomes have, in many instances, remained ambiguous. The SEMATECH consortium, for example, was established in 1986 in an effort to redress U.S. semiconductor firms' market share losses to Japanese firms. Part of this loss seemed attributable to U.S. firms' failure to stay ahead of state-of-the-art production technologies as product generations evolved. The consortium plan included construction of a shared fabrication facility (fab), in which semiconductor producers, equipment manufacturers, and materials makers would work together in bricolage fashion to design and integrate new production technologies. This part of the plan fell victim to the firms' individualist competitive cultures, however, because producers preferred to retain their knowledge as proprietary. Even so, the consortium eventually achieved a measure of success by replacing horizontal knowledge exchanges with vertical ones: it matched producers with equipment manufacturers to work together within the producers' plants (Young, 1994).

In contrast, the U.S. National Flat Panel Display Initiative provides an example of a failure (Hart, Lenway, & Murtha, 2000; Murtha et al., 2001). In 1994 the United States launched the initiative in an effort to create a U.S. manufacturing infrastructure for FPDs. The government used national defense as a justification and announced a goal of wresting 15 percent of global market share from Asian producers by 2000.

Taking a cue from the SEMATECH experience, the initiative established a consortium that offered research subsidies to U.S. companies to

develop FPD fabrication equipment and materials, and it required recipients to partner with U.S. FPD producers to design and road test their innovations. Unlike the semiconductor industry, however, no world-class, high-volume production facilities existed in the United States. Companies that accepted the subsidies but lacked the funds to carry out parallel projects with high-volume producers in Japan produced solutions that performed well in R&D facilities and small fabs but that could not be implemented in the leading companies' facilities.

The program fell far short of its objectives (only 1 percent of FPDs were produced on U.S. soil by 2000) for several reasons consistent with our framework. First, the defense element of the program's mission orientation led the most qualified firms to exclude themselves, because constraints on their ability to work with foreign partners would have interfered with their global strategies. Firms' misgivings about their government's ability to sustain the program were confirmed almost immediately, as underlying funding was cut when control of Congress passed from Democrats to Republicans.

Second, program officials were unable to overcome their timidity about the political acceptability to Congress of including foreign firms until 1998. By this time, failure already seemed likely.

Third, despite the program's mission-oriented goal, officials adopted a diffusion-oriented organizational structure, but they could not successfully impose a bricolage approach on program elements that clearly sought breakthrough objectives. One of two testbed grants spread aspects of a fabrication line, normally found within a single facility, across three different companies located on the East Coast, in the Midwest, and on the West Coast of the United States. In this instance, political competition in Congress prevailed over operational rationality (Hart et al., 2000).

Liberal-pluralist interest competition also led the program to spread its grants across various unproven technologies and numerous small projects in many regions of the country. Officials insisted that "technology-blind" grant criteria placed the program above politics. This search for a leapfrog technology was consistent with a mission policy orientation and breakthrough entrepreneurial approach. Yet the many, mostly small, grants amounted to funding numerous

small constellations of capital-starved companies pursuing breakthrough entrepreneurial approaches in isolation from one another.

These examples illustrate pitfalls that can arise when liberal-pluralist and state-corporatist governments attempt to design and implement policies to support industry emergence without taking political institutional structures into account. Errors and unintended consequences can arise from mission-oriented policies under both institutional structures when governments make bets early on in the uncertain industry emergence process. Collaborative norms and a preexisting network infrastructure may provide state-corporatist countries with an advantage in diffusion-oriented policy implementation. But strong-state systems afford government the discretion to substitute their own preferences for network and market outcomes. These systems perform better if governments use state power to generate the political will to refrain from such interference.

Coherent technology policy making in liberal-pluralist political structures requires objectives that reflect genuinely encompassing interests, in contrast to programs that aggregate particular interests by offering particularized benefits. Subsidies to basic research meet this criterion because they produce outcomes that any firm can use as foundations for product development, based on managers' perceptions of market opportunities.

New Industry Emergence Under Social Corporatism: Network Capitalism and Weak States

Social corporatism empowers governments to act as partners in industry emergence, but not to lead it. Governments have the capability to implement diffusion-oriented policies that facilitate peer networks of firms and institutions engaged in bricolage entrepreneurship, but social-corporatist institutional structures significantly constrain governments from doing harm by implementing technology policies that prove inconsistent with state capabilities. Unlike state-corporatist and liberal-pluralist models, governments have neither the capabilities derived from power nor the incentives derived from interest group politics to mix diffusion and mission policy models. Social-corporatist innovation systems exhibit strong tendencies for in-

ternal consistency among institutional structures, technology policy orientations, and entrepreneurial approaches.

Empirically, this balance may arise as a consequence of the prevalence of social corporatism in relatively small countries, where companies may control economic resources that rival those of their states. Consider Nokia, for example, which has, by itself, accounted for around 50 percent of the value of Finland's stock market in recent years (Pringle, 2002). Egalitarian norms of partnership and facilitation, rather than leadership and intervention, could leave such countries' government officials, as Ergas suggests of Switzerland, at odds with the idea that they have any independent technology policy at all. Country-level strategies for industry emergence are neither consensually planned nor subject to capture by the highest bidder. Rather, they are coshaped by business and government.

The influence of government cooperation is pervasive but contextualized. In Finland, for example, a joint program among the remote city of Oulu, Oulu University, and a state-run technology research center established a business incubation program that grew to encompass over 100,000 square meters of laboratory and office space overflowing with successful young businesses and new start-ups. Nokia's mobile telephone operation is only one of the many businesses born there over the years. Business-government partnerships have implemented similar centers in other parts of the country, with participation from government ministries, local landowners, universities, and high-technology firms (Shaw, 2001).

Garud and Karnøe's (2003) study of the wind turbine industry in Denmark and the United States provides an illustrative contrast between government approaches to new industry emergence under social corporatism and liberal pluralism. In the 1970s, national energy conservation priorities led both governments to get involved in the industry by establishing labs and subsidizing users. But their approaches differed in several key elements reflected in our framework.

The Danish industry had its roots in the agricultural equipment market, where suppliers devised small, relatively low-technology turbines and sold them to individual users and co-ops. The producers gradually built up to higher-capacity products through bricolage processes

that emphasized interaction among firms, users, and institutions to achieve continual learning through trial and error. Early on, the Danish Wind Turbine Testing Station (DWTS) engaged in iterative processes of interaction with producers seeking to upgrade their products. Its influence grew when the Danish government began offering subsidies for turbine ownership, provided the equipment met established certification standards. The DWTS became a critical center of knowledge accumulation through its publicly available test data, and the station encouraged open interaction among producers and users to continually upgrade the technology. By 1989 the government's subsidy programs had gradually been phased out, but a healthy industry remained. Danish firms held nearly 50 percent of global market share in 1999, and the country was home to four of the largest six firms (Garud & Karnøe, 2003).

In contrast, the U.S. policy toward the wind turbine industry sought to induce firms, through R&D contracts, to establish a breakthrough, high-technology design that would leapfrog Danish approaches by providing lightweight, novel, sophisticated alternative designs (Garud & Karnøe, 2003). The National Renewable Energy Laboratory (NREL) employed theorists to establish ideal models of wind turbine operation based mainly on aerospace science. But the U.S. aerospace-based models assumed steady-flow framing of wind turbulence, which did not resemble real conditions of use. Most of the scientific testing done in the lab employed smaller, older wind turbine models that reflected neither actual production nor the challenges encountered by larger, state-of-the-art machines (Garud & Karnøe, 2003). The NREL's programs steadily fell behind the global industry. Firms pursued their own development programs, seeking dramatic breakthroughs and huge leaps in scale of capacity. Most avoided interaction with each other for fear of leaking competitively valuable information (Garud & Karnøe, 2003).

The design of U.S. ownership subsidies contributed to a discontinuous, boom-and-bust cycle of industry development. Utilities were required to buy power from independent wind generators at favorable rates and to sell backup power to wind turbine users without discrimination. Federal subsidies were set at a 15 percent tax credit, and California added its own programs to reach a 50 percent total credit. Many

wind entrepreneurs used the tax credits to devise complex ownership instruments that divorced production efficiencies from financial performance. In the resulting "California Wind Rush," 12,000 turbines were erected between 1981 and 1986—95 percent of the windpower installations in the world. But in 1985 the Reagan administration abruptly terminated the federal subsidies, leading to a chain of bankruptcies. By 1986 only one U.S. wind turbine producer remained. Danish producers, also stung, retreated to the shelter of their domestic market, where they survived and eventually returned to dominate global markets.

We have seen that in liberal pluralism the presence of weak states may result in programs to support large numbers of isolated firms following narrow technological paths in the hope of achieving breakthroughs distinguishing them from others. Weak states may also mean that diffusion-oriented programs are implemented with a mission mindset. In state corporatism, companies embedded in preexisting networks have a better shot at leveraging diffusion-oriented policies, but relatively strong states provide governments with temptations to go on missions that either end up as poor gambles or exclude important potential network members. Social-corporatist states may avoid either pitfall. The strength of society relative to the state, corporatist network infrastructures, and diffusion-oriented technology policies combine to leverage bricolage approaches to technology entrepreneurship. Governments, even if they have the inclination to intervene more directly in industry emergence, do not have the political institutional structures at their disposal to sustain such programs.

Industry Emergence in State Nations: State-Led Capitalism

In contrast to state corporatism, countries with state-nation political structures lack the institutionalized networks among organized social actors to balance state centralism in technology policy design and implementation. This absence of enduring corporatist institutional structures also stifles innovators' abilities to interact in the manner necessary to pursue bricolage approaches to innovation. In contrast to liberal pluralism, political and managerial leaders in state nations tend to form a single, hierarchi-

cally privileged class, rather than two groups that act as adversaries. Indistinct boundaries divide the public and private sectors of the economy. In contrast to the social-corporatist vision of the state as an extension of society, in state-nation politics society lacks independent legitimacy (Jepperson, 2002). The state arrogates a technology entrepreneurship role for itself as a partner with large, oligopolistic enterprises in which it often also holds an ownership stake. Government takes a mission-oriented approach to technology policy, and this combination of strong state participation and mission orientation encourages innovating firms to pursue an approach to technology entrepreneurship that is unequivocally directed at achieving breakthroughs.

Among industrialized countries, only France perfectly fits the state-nation polity form, although Belgium and Italy approach it. According to Chesnais (1993), an important feature of French political and social history since the end of World War II has been the progressive establishment, between the state and the oligopolistic core of public and private industry, of a common view of the ways of attaining economic growth, modernization, and military independence through autonomous arms production, thus preserving France's rank in the world. Private capital should rally round the state, accept its help, and use it as an instrument for industrial restructuring and the channeling of financial and human resources to priority areas.

The history of new industry creation in France reflects the government's dominant role, with a disproportionate number of innovations taking place in large, technology-intensive systems conceived with the development of breakthrough innovations for public sector markets in view. For instance, the French government acted as the first large customer to enable market creation in a range of industries (Chesnais, 1993), including high-speed passenger trains, supersonic passenger jet aircraft, and the Minitel videotext machine.

Although all of these projects have proven technologically prestigious and industry transforming, if not new-industry creating, only the last has proven a financial success. The nature of success in the self-contained world of state-nation technology policy, however, appears double edged. Governments may enjoy uniquely unchallenged state capabilities to mobilize im-

mense resources for focused, coordinated industrial initiatives. Win or lose, however, such mobilizations, by virtue of their scale, have the potential to crowd out other industry possibilities (Florida & Kenney, 1990). They also generally produce lumpy capital assets specialized to a specific technological approach, which can create inflexibilities that retard adaptation to change.

Minitel offers a case in point. France Telecom introduced its Minitel videotext system in 1981, mainly as a means to access telephone directories. The government jump-started the system by purchasing and giving away five million terminals. The system soon grew to provide over 7,000 services, including directories, travel information, bill payment, online banking, news, stock trading, simple advertisements, singles networking, and shopping. France Telecom collects per-minute charges and directly invoices amounts due for special services or purchases on users' telephone bills. The service remains profitable and appears to have slowed the pace of internet adoption in France compared to other countries (Borzo, 2001; Tagliabue, 2001; *Wired*, 1998).

More to the point, the Minitel product platform was specialized to France, its special circumstances, and its telecommunications system. The platform did not establish an international market, nor did it create a global industry. These have proven salient characteristics of French innovations, particularly those that originate in military projects. Consistent with the U.S. experience (Florida & Kenney, 1990), such innovations rarely, if ever, result in successful products for private firms to sell either at home or in international markets (Chesnais, 1993). In general, managers organize their firms' incentive structures, communication channels, and information-processing filters to reflect their perceptions of their technology and institutional environment (Henderson & Clark, 1990). Therefore, when firms configure themselves based on an expectation of public funding and dependence on public procurement, they often organize themselves to mirror the priorities of their government customers and, thus, predispose themselves to rely on public sector clients when selling in international markets as well.

Firm-state strategic symbiosis, government-driven technology missions, and breakthrough approaches to entrepreneurship that character-

ize high-technology industries in France are deeply imprinted in French business culture. Chesnais suggests that even firms in which the state does not hold a financial interest "behave much in the same way as firms with public capital" (1993: 193). In the FPD industry, for example, the French entrepreneurial start-up Pix-Tech licensed a nonmainstream technology from a government lab, basing its strategy on the founder's confidence that it would leapfrog the dominant approach (Doz, Ring, Lenway, & Murtha, 1998). Despite incorporating in Delaware and listing on the NASDAQ, management was at first unable to persuade officials who administered U.S. government R&D programs to qualify PixTech to participate. Five months after exchanging 32 percent of its outstanding stock for the display operations of the U.S. firm Micron Technologies, however, PixTech obtained a contract from the U.S. Defense Advanced Research Projects Agency (DARPA).

At the extreme, state-nation political institutional structures offer governments a unique autonomy in new industry creation to act as policy makers, corporate strategists, entrepreneurs, their own first and best customers, and, ultimately, technology visionaries that can defy the short-sightedness of markets. As the pace of technological change increases, however, so does the danger that the industries established in this way will sow the seeds of national economic decline by creating obstacles to adaptation, squandering resources on prestigious projects for which the price of entry seems ever greater, and resisting participation in international entrepreneurial communities except as a leading light.

STATES' CAPABILITIES, FIRMS' CAPABILITIES, AND STRATEGIC OUTCOMES

It's very difficult for government to guide industry. Besides, it's old fashioned (Jae-Choon Lim, Ministry of Science and Industry, Republic of Korea, December 4, 1996; cited in Murtha et al., 2001: 160).

Political institutional structures sometimes constrain the set of new industry creation strategies that government officials can formulate, and they always constrain the set of strategies that governments can effectively implement. Proactive government intervention in new industry creation, therefore, often accomplishes

little beyond the expenditure of taxpayers' money. But poorly designed and implemented strategies also carry a risk of inhibiting industry emergence within a country. Indeed, we have seen that, in some instances, particularly in globalized industries, government policy can diminish a country's chances of hosting critical value creation activities, particularly R&D and production. What might this imply for firms' political strategies and for management scholarship in this area?

Management scholars' attention and sophistication regarding firms' political strategy processes have grown over the years. We may wish to ask ourselves how the biases acquired in our own national political contexts affect the appropriateness of our findings and prescriptions across the broad cross-section of countries in which our teaching and research carry influence. How should firms shape political strategy content to our times and national contexts? How do the political strategies of firms, narrowly construed to influence national governments, interact—for good or ill—in the increasingly global political economic context? In this article we have attempted to shape tools for comparative research that can help address these questions.

Theorizing from the institutionalist perspective we have adopted, it is tempting to suggest that the relationship between government and the state bears an analogy to the relationship between a firm's management and its organizational structure. The analogy may have some merit, but there are many critical differences. One of the most important pertains to change. As Chandler (1962) taught us, firms' strategies and organizational structures are intimately related. New strategies generally require organizational changes in order to be efficiently implemented. In the case of states, as Skocpol (1979) pointed out, change unfolds slowly and hardly ever in a revolutionary way.

Managers can change firms' organization structures much more easily and quickly than governments can change their states' institutional structures. Policy changes that governments try to bring about can run up against institutional constraints by proving incompatible with the capabilities inherent in existing state structures. The more revolutionary the policy changes, the greater the incompatibilities that can arise. When governments overreach the capabilities inherent in their states' institu-

tional structures, the resulting policies rarely prove sustainable, either because implementation proves too difficult or because politics intervene. The flip side of the coin is a conservative bias in government policies such that they may often prove less adaptable than circumstances in a fast-changing business world might seem to require.

We believe that this reality is fundamental to the painfully slow transition from state-led planning to market institutions in central Europe, and it may have a bearing on the difficulties of economic development in many emerging economies. We also think it is an important additional factor underlying Pearce's (2001) empirical observation that governments have appeared even less facilitative of independent economic activity in the early years of transition than in the later years of central planning. The political institutional changes necessary to support a transition to free markets and relatively unfettered independent business organizations will take many years—perhaps generations. Formerly communist parties drift in and out of power, under new labels. The "private" ownership of formerly state-owned enterprises becomes newly vested in agencies and banks in which the state owns significant stock. Change is recombinant, rather than radical (Stark, 1996). The old state institutional structures continue to exist in parallel with the nascent market institutions. The result is increased uncertainty, which retards business growth.

Nascent technologies and new industries have the potential to confront all states with similar challenges to change. In both developed and developing economies, policy errors can occur when governments and firms fail to recognize the confrontation of new technologies with existing institutions but implement strategies to "aid" new industries anyway. In such cases, national political institutional structures, historic national technology policies, and the nature of collective agency interact to confound adaptation.

Firms and states can escape these pitfalls if governments implement programs that minimize officials' choices in resource allocation and enhance the choices intermediated by markets (Murtha & Lenway, 1994; Murtha et al., 1996). Examples include support for basic research and, as O'Higgins (2002) has also suggested, programs that cultivate but do not direct the development of indigenous innovation networks

while enhancing flows of information and knowledge among industry participants. We have argued that social-corporatist states may have what might be called an "institutional comparative advantage" in designing and implementing such programs. But as O'Higgins has shown, in applying O'Riain's (2000) model of the "flexible developmental state" to Ireland, it is possible for governments to cultivate the consensual, networked partnership approaches to industry creation typified in social corporatism, at least in the context of a polity that has exhibited many characteristics of liberal pluralism. More research is needed to understand how and under what conditions such institutional adaptation becomes possible.

Policies that take resource allocation decisions out of officials' hands and place them in markets, however, do not always pass the test of political feasibility. Firms in new industries sometimes demand government actions to reduce their entrepreneurial risk (see Murtha et al., 2001). It would be interesting to discover, empirically, how and how often firms' political strategies act to diminish or increase the economic choices governments make and correspondingly increase or diminish those made in markets. The framework discussed in this article may serve to derive and test clear hypotheses regarding this question by establishing dimensions and outcomes on which cross-national variation might be observed.

Firms have flexibility to design and implement diverse innovation strategies (Zahra & Covin, 1993), but appeals for government assistance can diminish this discretion. As Lindblom notes, "Governments can not command business to perform. They must induce rather than command" (1977: 173). It falls to managers to assess the relevance of such government inducements to their firms' strategies. The uncertainty inherent in government technology strategies contributes to wariness among corporate strategists charged with evaluating them. Political strategy researchers have been relatively silent on the steps that managers may take to buffer their firms from this uncertainty (see Thompson, 1967). The wisest course may be for firms to avoid making participation in new industries contingent on government programs. If the programs unexpectedly end or diminish in funding, firms are left with compromised strategies, holding assets that have lost value be-

cause they cannot easily be put to other uses (Murtha, 1991, 1993; Teece, 1986). Indeed, firms that choose to participate in government-led industry development programs sometimes become so dependent that they cannot survive unaided (Murtha et al., 2001).

Even if an emerging industry demonstrates attractive risk and commercial profiles independent of government incentives to participate (or, alternatively, governments always keep their promises), the terms of assistance can reduce managerial discretion and the prospects of success. The potential for government programs to do such harm grows as new industries increasingly assume a global character from birth. In a world economy defined more by trade in knowledge than trade in physical products, new industry creation requires firms to leverage their country-based advantages with the best learning partners, regardless of their nationalities.

Government industrial strategies inhibit this process if they strengthen incentives to partner with local collaborators, suppliers, and customers when more qualified partners may exist outside the country. In this regard, O'Higgins's Irish case (2002) again proves exemplary. The vitalization of Ireland's economy since the 1980s has relied on programs that do not discriminate between foreign and Irish firms. These programs have aggressively encouraged local innovation networks to develop in concert with the world economy, rather than in isolation from it.

How do governments matter to new industry creation? We might summarize the key implications of our argument by paraphrasing the opening lines of Thoreau's "Civil Disobedience" (2000) to suggest that "government matters most that governs least." But our point is more complex. We have suggested that states can effectively work in concert with their national entrepreneurial cultures and the global economy to aid new industry creation, if their strategies match the distinctive characteristics of their own institutional structures. States are less flexible than firms. As embodiments of core values within society, we would not wish them otherwise. States maximize power, not profits. It remains for government office holders to recognize the country-specific potential—and limits—of that power in new industry creation. The same should hold true for firms, managers, political strategists, and the academics who offer them counsel.

REFERENCES

- Adams, P. S. 2002. *Can neo-corporatism survive the European Union? (And can the EU survive neo-corporatism?)* Paper presented at the European Community Studies Association-Canada Fifth Biennial Conference, Toronto.
- Almeida, P., & Kogut, B. 1999. Localization of knowledge and the mobility of engineers in regional networks. *Management Science*, 4: 905-917.
- Basalla, G. 1988. *The evolution of technology*. New York: Cambridge University Press.
- Benjamin, R., & Duvall, R. 1985. The capitalist state in context. In R. Benjamin & S. L. Elkin (Eds.), *The democratic state*: 1-57. Lawrence: University Press of Kansas.
- Borzo, J. 2001. Aging gracefully: France's Minitel is hanging on, much to the surprise of its critics. *Wall Street Journal*, October 15: R22.
- Brown, S. L., & Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42: 1-34.
- Chandler, A. D. 1962. *Strategy and structure: Chapters in the history of the American industrial enterprise*. Cambridge, MA: MIT Press.
- Chesnais, F. 1993. The French national system of innovation. In R. R. Nelson (Ed.), *National innovation systems: A comparative analysis*: 192-229. Oxford: Oxford University Press.
- Clines, F. X. 2002. How do West Virginians spell pork? It's B-Y-R-D. *New York Times*, May 4: A1.
- Commons, J. R. 1970. (First published in 1950.) *The economics of collective action*. Madison: University of Wisconsin Press.
- Diamond, J. 1997. *Guns, germs and steel: The fates of human societies*. New York: Norton.
- Doz, Y. L., Ring, P. S., Lenway, S. A., & Murtha, T. P. 1998. *PixTech, Inc.* Case No. 398-140-1. Fontainebleau, France: INSEAD.
- Doz, Y. L., Santos, J., & Williamson, P. 2001. *From global to metanational: How companies win in the knowledge economy*. Boston: Harvard Business School Press.
- Edquist, C., & Lundvall, B. Å. 1993. Comparing the Danish and Swedish systems of innovation. In R. R. Nelson (Ed.), *National innovation systems: A comparative analysis*: 265-298. Oxford: Oxford University Press.
- Ergas, H. 1987. Does technology policy matter? In B. R. Guile & H. Brooks (Eds.), *Technology and global industry: Companies and nations in the world economy*: 191-245. Washington, DC: National Academy Press.
- Florida, R., & Kenney, M. 1990. *The breakthrough illusion: Corporate America's failure to move from innovation to mass production*. New York: Basic Books.
- Freeman, J. R. 1989. *Democracy and markets: The politics of mixed economies*. Ithaca, NY: Cornell University Press.
- Garud, R., & Jain, S. 1996. The embeddedness of technological systems. *Advances in Strategic Management*, 13: 389-408.
- Garud, R., & Karnøe, P. 2003. Bricolage versus breakthrough: Distributed and embedded agency in technology entrepreneurship. *Research Policy*, 32: 277-300.
- Goldstein, J., & Lenway, S. A. 1989. Interests or institutions: An inquiry into congressional-ITC relations. *International Studies Quarterly*, 33: 303-328.
- Gomory, R. 1992. The technology-product relationship: Early and late stages. In N. Rosenberg, R. Landau, & D. C. Mowery (Eds.), *Technology and the wealth of nations*: 383-394. Stanford, CA: Stanford University Press.
- Granovetter, M. 1985. Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91: 481-510.
- Guillen, M. F. 2001. *The limits of convergence: Globalization and organizational change in Argentina, South Korea and Spain*. Princeton, NJ: Princeton University Press.
- Hart, J. A., Lenway, S. A., & Murtha, T. P. 2000. Technonationalism and cooperation in a globalized industry: The case of flat panel displays. In A. Prakash & J. Hart (Eds.), *Coping with globalization*: 117-147. London: Routledge.
- Henderson, R., & Clark, K. B. 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 35: 9-30.
- Hillman, A., & Keim, G. 1995. International variation in the business-government interface. *Academy of Management Review*, 20: 193-215.
- Hillman, A. J., & Hitt, M. 1999. Corporate political strategy formulation: A model of approach, participation, and strategy decisions. *Academy of Management Review*, 24: 825-842.
- Hobbes, T. 1965. (First published in 1651.) *The Leviathan*. Oxford: Clarendon Press.
- Jepperson, R. L. 2002. Political modernities: Disentangling two underlying dimensions of institutional differentiation. *Sociological Theory*, 20: 61-85.
- Katzenstein, P. J. 1985. *Small states in world markets*. Ithaca, NY: Cornell University Press.
- Katzenstein, P. J. 1984. *Corporatism and change: Austria, Switzerland, and the politics of industry*. Ithaca, NY: Cornell University Press.
- Katzenstein, P. J. (Ed.). 1978. *Between power and plenty: Foreign economic policies of advanced industrial states*. Madison: University of Wisconsin Press.
- Knutsen, P. 1997. Corporatist tendencies in the Euro-polity: The EU directive of 22 September 1994, on European works councils. *Economic and Industrial Democracy*, 18: 289-323.
- Kogut, B., & Zander, U. 1996. What firms do: Coordination, identity, and learning. *Organization Science*, 7: 502-518.
- Krasner, S. D. 1978. *Defending the national interest*. Princeton, NJ: Princeton University Press.
- Lenway, S. A., & Murtha, T. P. 1994. The state as strategist in international business research. *Journal of International Business Studies*, 25: 513-536.

- Lindblom, C. E. 1977. *Politics and markets: The world's political economic systems*. New York: Basic Books.
- Locke, J. 1980. (First published in 1690.) *Second treatise of government*. Indianapolis: Hackett.
- Lodge, G. C. 1990. *Comparative business-government relations*. Englewood Cliffs, NJ: Prentice-Hall.
- March, J. G., & Olsen, J. P. 1984. The new institutionalism: Organizational factors in political life. *American Political Science Review*, 78: 734-749.
- March, J. G., & Olsen, J. P. 1989. *Rediscovering institutions: The organizational basis of politics*. New York: Free Press.
- Murtha, T. P. 1991. Surviving industrial targeting: State credibility and public policy contingencies in multinational subcontracting. *Journal of Law, Economics and Organization*, 7: 117-143.
- Murtha, T. P. 1993. Credible enticements: Can host governments tailor multinational firms' organizations to suit national objectives? *Journal of Economic Behavior and Organization*, 20: 171-186.
- Murtha, T. P., & Lenway, S. A. 1994. Country capabilities and the strategic state: How national political institutions affect multinational corporations' strategies. *Strategic Management Journal*, 15: 113-129.
- Murtha, T. P., Lenway, S. A., & Hart, J. A. 2001. *Managing new industry creation: Global knowledge formation and entrepreneurship in high technology*. Stanford, CA: Stanford University Press.
- Murtha, T. P., Spencer, J. W., & Lenway, S. A. 1996. Moving targets: National industrial strategies and embedded innovation in the global flat panel display industry. *Advances in Strategic Management*, 13: 247-281.
- Nelson, R. R. 1992. What is "commercial" and what is "public" about technology, and what should be? In N. Rosenberg, R. Landau, & D. C. Mowery (Eds.), *Technology and the wealth of nations*: 57-72. Stanford, CA: Stanford University Press.
- O'Higgins, E. R. E. 2002. Government and the creation of the Celtic tiger: Can management maintain the momentum? *Academy of Management Executive*, 16(3): 104-120.
- Olsen, M. 1971. *The logic of collective action*. Cambridge, MA: Harvard University Press.
- O'Riain, S. 2000. The flexible developmental state: Globalization, information technology and the Celtic tiger. *Politics and Society*, 28: 157-193.
- Pearce, J. L. 2001. *Organization and management in the embrace of government*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Pringle, D. 2002. Finnish line: Facing big threat from Microsoft, Nokia places a bet. *Wall Street Journal*, May 22: A1.
- Ruttan, V. W. 2001. *Technology, growth, and development: An induced innovation perspective*. New York: Oxford University Press.
- Shaw, W. 2001. In Helsinki virtual village. *Wired*, March: 157-164.
- Skocpol, T. 1979. *States and social revolutions: A comparative analysis of France, Russia, and China*. Cambridge: Cambridge University Press.
- Spar, D. L. 2001. *Ruling the waves: Cycles of discovery, chaos, and wealth from compass to the internet*. New York: Harcourt Brace.
- Spencer, J. W. 2003. Firms' knowledge-sharing strategies in the global innovation system: Empirical evidence from the global flat panel display industry. *Strategic Management Journal*, 24: 217-233.
- Spencer, J. W. 2003. Global gatekeeping, representation and network structure: A longitudinal analysis of regional and global knowledge diffusion networks. *Journal of International Business Studies*, 34: 428-442.
- Stark, D. 1996. Recombinant property in East European capitalism. *American Journal of Sociology*, 101: 993-1027.
- Tagliabue, J. 2001. Online cohabitation: Internet and Minitel; videotext system in France proves unusually resilient. *New York Times*, June 2: C1.
- Teece, D. J. 1986. Transactions cost economics and the multinational enterprise: An assessment. *Journal of Economic Behavior and Organization*, 7: 21-45.
- Thompson, J. D. 1967. *Organizations in action: Social science bases of administrative theory*. New York: McGraw-Hill.
- Thoreau, H. D. 2000. Civil disobedience. In *Walden and other writings*: 665-695. New York: Modern Library/Random House.
- Tushman, M., & Rosenkopf, L. 1992. Organizational determinants of technological change: Towards a sociology of technological evolution. *Research in Organizational Behavior*, 14: 311-347.
- Utterback, J. M., & Abernathy, W. 1975. A dynamic model of process and product innovation. *Omega*, 33: 639-656.
- Van de Ven, A. H. 1993. A community perspective on the emergence of innovations. *Journal of Engineering and Technology Management*, 10: 23-51.
- Van de Ven, A. H., & Garud, R. 1989. A framework for understanding the emergence of new industries. In R. S. Rosenbloom & R. A. Burgelman (Eds.), *Research on technological innovation, management and policy*, vol. 4: 195-225. Greenwich, CT: JAI Press.
- Vernon, R. 1971. *Sovereignty at bay: The multinational spread of US enterprises*. New York: Basic Books.
- Vernon, R. 1998. *In the hurricane's eye: The troubled prospects of multinational enterprises*. Cambridge, MA: Harvard University Press.
- Vogel, D. 1978. Why businessmen distrust their state: The political consciousness of American corporate executives. *British Journal of Political Science*, 8: 45-78.
- Weber, M. 1978. *Economy and society*, vol. 2. Berkeley: University of California Press.
- Weinberg, A. M. 1967. *Reflections on big science*. Oxford: Pergamon Press.
- Wired*. 1998. IBM to update Minitel. <http://www.wired.com/>

news/business/0,1367,15439,00.html, October 6. Accessed May 30, 2002.

Young, R. A. 1994. *Silicon sumo: U.S.-Japan competition and industrial policy in the semiconductor equipment industry*. Austin, TX: The IC² Institute of the University of

Texas at Austin, Japan Industry and Management of Technology Program and Semiconductor Services.

Zahra, S. A., & Covin, J. G. 1993. Business strategy, technology policy and firm performance. *Strategic Management Journal*, 14: 451-478.

Jennifer W. Spencer is an associate professor of international business at George Washington University. She earned her Ph.D. in strategic management and organization at the University of Minnesota. Her research focuses on understanding the impact of national institutional environments on firms' technology strategies and on domestic entrepreneurial activity.

Thomas P. Murtha is an associate professor of strategic management and organization at the Carlson School of Management, University of Minnesota. He received his Ph.D. in business administration from New York University. Currently, he serves as department editor for the *Journal of International Business Studies* Technology and Innovation Area.

Stefanie Ann Lenway is the General Mills Professor of Strategic Management and Organization and associate dean at the Carlson School of Management, University of Minnesota. She received her Ph.D. in business from the University of California, Berkeley. Her research interests include technological innovation, new industry creation, and international firm/state strategic interaction.