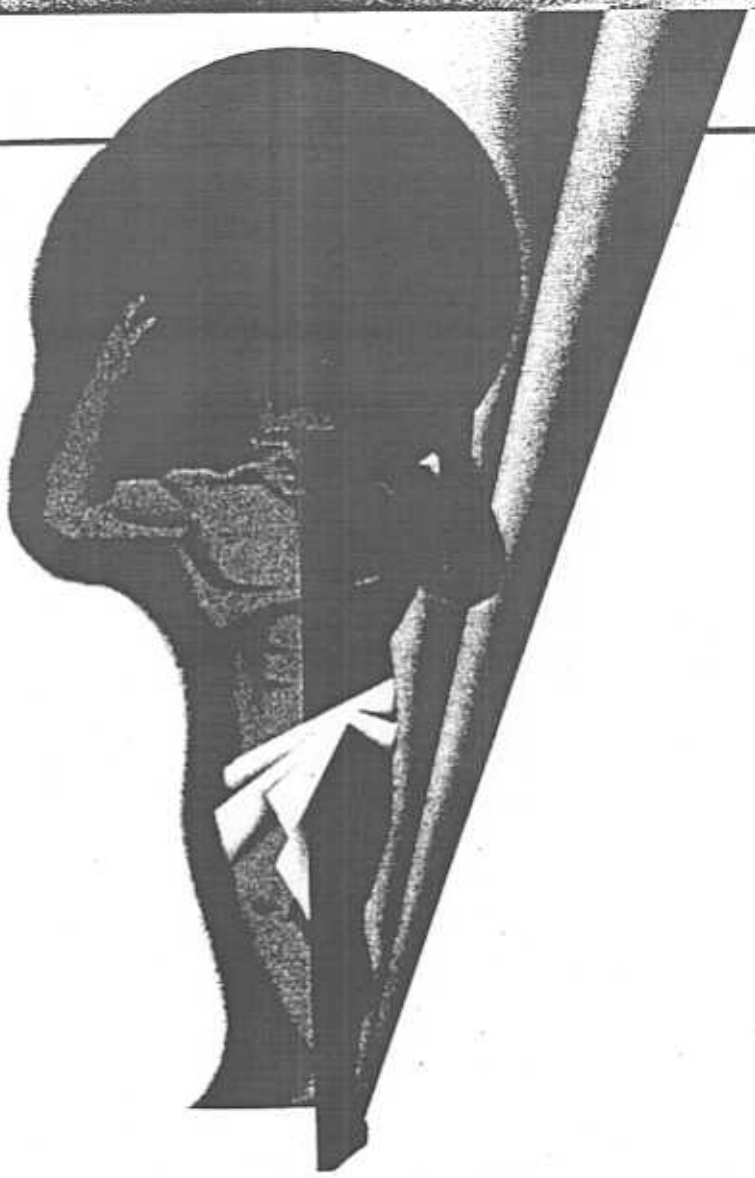

The Competitive Advantage of Nations

by Michael E. Porter

National prosperity is created, not inherited. It does not grow out of a country's natural endowments, its labor pool, its interest rates, or its currency's value, as classical economics insists.

A nation's competitiveness depends on the capacity of its industry to innovate and upgrade. Companies gain advantage against the world's best competitors because of pressure and challenge. They benefit from having strong domestic rivals, aggressive home-based suppliers, and demanding local customers.

In a world of increasingly global competition, nations have become more, not less, important. As the basis of competition has shifted more and more to the creation and assimilation of knowledge, the role of the nation has grown. Competitive advantage is

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DRAWINGS BY LESLIE CABARGA

created and sustained through a highly localized process. Differences in national values, culture, economic structures, institutions, and histories all contribute to competitive success. There are striking differences in the patterns of competitiveness in every country; no nation can or will be competitive in every or even most industries. Ultimately, nations succeed in particular industries because their home environment is the most forward-looking, dynamic, and challenging.

These conclusions, the product of a four-year study of the patterns of competitive success in ten leading trading nations, contradict the conventional wisdom that guides the thinking of many companies and national governments – and that is pervasive today in the United States. (For more about the study, see the insert "Patterns of National Competitive Success.") According to prevailing thinking, labor costs, interest rates, exchange rates, and economies of scale are the most potent determinants of competitiveness. In companies, the words of the day are merger, alliance, strategic partnerships, collaboration, and supranational globalization. Managers are pressing for more government support for particular industries. Among governments, there is a growing tendency to experiment with various policies intended to promote national competitiveness – from efforts to manage exchange rates to new measures to manage trade to policies to relax antitrust – which usually end up only undermining it. (See the insert "What is National Competitiveness?")

These approaches, now much in favor in both companies and governments, are flawed. They fundamentally misperceive the true sources of competitive advantage. Pursuing them, with all their short-term appeal, will virtually guarantee that the United States – or any other advanced nation – never achieves real and sustainable competitive advantage.

We need a new perspective and new tools – an approach to competitiveness that grows directly out of an analysis of internationally successful industries, without regard for traditional ideology or current intellectual fashion. We need to know, very simply, what works and why. Then we need to apply it.

How Companies Succeed in International Markets

Around the world, companies that have achieved international leadership employ strategies that differ from each other in every respect. But while every successful company will employ its own particular strategy, the underlying mode of operation – the character and trajectory of all successful companies – is fundamentally the same.

Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things. They perceive a new basis for competing or find better means for competing in old ways. Innovation can be manifested in a new product design, a new production process, a new marketing approach, or a new way of conducting training. Much innovation is mundane and incremental, depending more on a cumulation of small insights and advances than on a single, major technological breakthrough. It often involves

> The lure of the huge U.S. defense market has diverted the attention of U.S. companies from global commercial markets.

ideas that are not even "new" – ideas that have been around, but never vigorously pursued. It always involves investments in skill and knowledge, as well as in physical assets and brand reputations.

Some innovations create competitive advantage by perceiving an entirely new market opportunity or by serving a market segment that others have ignored. When competitors are slow to respond, such innovation yields competitive advantage. For instance, in industries such as autos and home electronics, Japanese companies gained their initial advantage by emphasizing smaller, more compact, lower capacity models that foreign competitors disdained as less profitable, less important, and less attractive.

In international markets, innovations that yield competitive advantage anticipate both domestic and foreign needs. For example, as international concern for product safety has grown, Swedish companies like Volvo, Atlas Copco, and AGA have succeeded by anticipating the market opportunity in this area. On the other hand, innovations that respond to concerns or circumstances that are peculiar to the home market can actually retard international competitive success. The lure of the huge U.S. defense market, for instance, has diverted the attention of U.S. materials and machine-tool companies from attractive, global commercial markets.

Information plays a large role in the process of innovation and improvement – information that either is not available to competitors or that they do

not seek. Sometimes it comes from simple investment in research and development or market research; more often, it comes from effort and from openness and from looking in the right place unencumbered by blinding assumptions or conventional wisdom.

This is why innovators are often outsiders from a different industry or a different country. Innovation may come from a new company, whose founder has a nontraditional background or was simply not appreciated in an older, established company. Or the capacity for innovation may come into an existing company through senior managers who are new to the particular industry and thus more able to perceive opportunities and more likely to pursue them. Or innovation may occur as a company diversifies, bringing new resources, skills, or perspectives to another industry. Or innovations may come from another nation with different circumstances or different ways of competing.

With few exceptions, innovation is the result of unusual effort. The company that successfully implements a new or better way of competing pursues its approach with dogged determination, often in the face of harsh criticism and tough obstacles. In fact, to succeed, innovation usually requires pressure, necessity, and even adversity: the fear of loss often proves more powerful than the hope of gain.

Once a company achieves competitive advantage through an innovation, it can sustain it only through relentless improvement. Almost any advantage can be imitated. Korean companies have already matched the ability of their Japanese rivals to mass-produce standard color televisions and VCRs; Brazil-

> Change is an unnatural act, particularly in successful companies; powerful forces are at work to avoid it at all costs.

ian companies have assembled technology and designs comparable to Italian competitors in casual leather footwear.

Competitors will eventually and inevitably overtake any company that stops improving and innovating. Sometimes early-mover advantages such as customer relationships, scale economies in existing technologies, or the loyalty of distribution channels are enough to permit a stagnant company to retain its entrenched position for years or even decades. But sooner or later, more dynamic rivals will find a way to innovate around these advantages or create a better or cheaper way of doing things. Italian appliance producers, which competed successfully on the basis of cost in selling midsize and compact appliances through large retail chains, rested too long on this initial advantage. By developing more differentiated products and creating strong brand franchises, German competitors have begun to gain ground.

Ultimately, the only way to sustain a competitive advantage is to *upgrade it*—to move to more sophisticated types. This is precisely what Japanese automakers have done. They initially penetrated foreign markets with small, inexpensive compact cars of adequate quality and competed on the basis of lower labor costs. Even while their labor-cost advantage persisted, however, the Japanese companies were upgrading. They invested aggressively to build large modern plants to reap economies of scale. Then they became innovators in process technology, pioneering just-in-time production and a host of other quality and productivity practices. These process improvements led to better product quality, better repair records, and better customer-satisfaction ratings than foreign competitors had. Most recently, Japanese automakers have advanced to the vanguard of product technology and are introducing new, premium brand names to compete with the world's most prestigious passenger cars.

The example of the Japanese automakers also illustrates two additional prerequisites for sustaining competitive advantage. First, a company must adopt a global approach to strategy. It must sell its product worldwide, under its own brand name, through international marketing channels that it controls. A truly global approach may even require the company to locate production or R&D facilities in other nations to take advantage of lower wage rates, to gain or improve market access, or to take advantage of foreign technology. Second, creating more sustainable advantages often means that a company must make its existing advantage obsolete—even while it is still an advantage. Japanese auto companies recognized this; either they would make their advantage obsolete, or a competitor would do it for them.

As this example suggests, innovation and change are inextricably tied together. But change is an unnatural act, particularly in successful companies; powerful forces are at work to avoid and defeat it. Past approaches become institutionalized in standard operating procedures and management controls. Training emphasizes the one correct way to do anything; the construction of specialized, dedicated facilities solidifies past practice into expensive brick and mortar; the existing strategy takes on an aura of invincibility and becomes rooted in the company culture.

Patterns of National Competitive Success

To investigate why nations gain competitive advantage in particular industries and the implications for company strategy and national economies, I conducted a four-year study of ten important trading nations: Denmark, Germany, Italy, Japan, Korea, Singapore, Sweden, Switzerland, the United Kingdom, and the United States. I was assisted by a team of more than 30 researchers, most of whom were natives of and based in the nation they studied. The researchers all used the same methodology.

Three nations – the United States, Japan, and Germany – are the world's leading industrial powers. The other nations represent a variety of population sizes, government policies toward industry, social philosophies, geographical sizes, and locations. Together, the ten nations accounted for fully 50% of total world exports in 1985, the base year for statistical analysis.

Most previous analyses of national competitiveness have focused on single nation or bilateral comparisons. By studying nations with widely varying characteristics and circumstances, this study sought to separate the fundamental forces underlying national competitive advantage from the idiosyncratic ones.

In each nation, the study consisted of two parts. The first identified all industries in which the nation's companies were internationally successful, using available statistical data, supplementary published sources, and field interviews. We defined a nation's industry as internationally successful if it *possessed competitive advantage relative to the best worldwide competitors*. Many measures of competitive advantage, such as reported profitability, can be misleading. We chose as the best indicators the presence of substantial and sustained exports to a wide array of other nations and/or significant outbound foreign investment based on skills and assets created in the home country. A nation was considered the home base for a company if it was either a locally owned, indigenous enterprise or managed autonomously although owned by a foreign company or investors. We then created a profile of all the industries in which each nation was internationally successful at three points in time: 1971, 1978, and 1985. The pattern of competitive industries in each economy was far from random: the task was to explain it and how it had changed over time. Of particular interest were the connections or relationships among the nation's competitive industries.

In the second part of the study, we examined the history of competition in particular industries to understand how competitive advantage was created. On the basis of national profiles, we selected over 100 industries or industry groups for detailed study; we examined many more in less detail. We went back as far as necessary to understand how and why the industry began in the nation, how it grew, when and why companies from the nation developed international competitive advantage, and the process by which competitive advantage had been either sustained or lost. The resulting case histories fall short of the work of a good historian in their level of detail, but they do provide insight into the development of both the industry and the nation's economy.

We chose a sample of industries for each nation that represented the most important groups of competitive industries in the economy. The industries studied accounted for a large share of total exports in each nation: more than 20% of total exports in Japan, Germany, and Switzerland, for example, and more than 40% in South Korea. We studied some of the most famous and important international success stories – German high-performance autos and chemicals, Japanese semiconductors and VCRs, Swiss banking and pharmaceuticals, Italian footwear and textiles, U.S. commercial aircraft and motion pictures – and some relatively obscure but highly competitive industries – South Korean pianos, Italian ski boots, and British biscuits. We also added a few industries because they appeared to be paradoxes: Japanese home demand for Western-character typewriters is nearly nonexistent, for example, but Japan holds a strong export and foreign investment position in the industry. We avoided industries that were highly dependent on natural resources: such industries do not form the backbone of advanced economies, and the capacity to compete in them is more explicable using classical theory. We did, however, include a number of more technologically intensive, natural-resource-related industries such as newsprint and agricultural chemicals.

The sample of nations and industries offers a rich empirical foundation for developing and testing the new theory of how countries gain competitive advantage. The accompanying article concentrates on the determinants of competitive advantage in individual industries and also sketches out some of the study's overall implications for government policy and company strategy. A fuller treatment in my book, *The Competitive Advantage of Nations*, develops the theory and its implications in greater depth and provides many additional examples. It also contains detailed descriptions of the nations we studied and the future prospects for their economies.

– Michael E. Porter

Successful companies tend to develop a bias for predictability and stability; they work on defending what they have. Change is tempered by the fear that there is much to lose. The organization at all levels filters out information that would suggest new approaches, modifications, or departures from the norm. The internal environment operates like an immune system to isolate or expel "hostile" individuals who challenge current directions or established thinking. Innovation ceases; the company becomes stagnant; it is only a matter of time before aggressive competitors overtake it.

The Diamond of National Advantage

Why are certain companies based in certain nations capable of consistent innovation? Why do they ruthlessly pursue improvements, seeking an ever-more sophisticated source of competitive advantage? Why are they able to overcome the substantial barriers to change and innovation that so often accompany success?

The answer lies in four broad attributes of a nation, attributes that individually and as a system constitute the diamond of national advantage, the playing field that each nation establishes and operates for its industries. These attributes are:

1. *Factor Conditions.* The nation's position in factors of production, such as skilled labor or infrastructure, necessary to compete in a given industry.

2. *Demand Conditions.* The nature of home-market demand for the industry's product or service.

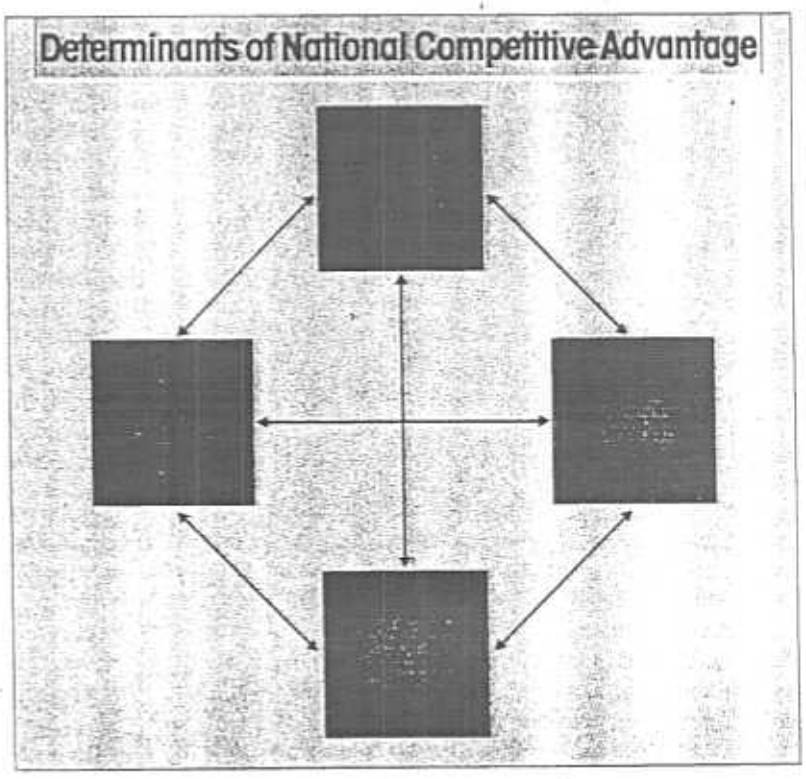
3. *Related and Supporting Industries.* The presence or absence in the nation of supplier industries and other related industries that are internationally competitive.

4. *Firm Strategy, Structure, and Rivalry.* The conditions in the nation governing how companies are created, organized, and managed, as well as the nature of domestic rivalry.

These determinants create the national environment in which companies are born and learn how to compete. (See the diagram "Determinants of National Competitive Advantage.") Each point on the diamond – and the diamond as a system – affects essential ingredients for achieving international competitive success: the availability of resources and skills necessary for competitive advantage in an industry; the information that shapes the opportunities that companies perceive and the directions in which they deploy their resources and skills; the goals of the owners, managers, and individuals in companies; and most important, the pressures on companies to invest and innovate. (See the insert "How the Diamond Works: The Italian Ceramic Tile Industry.")

When a national environment permits and supports the most rapid accumulation of specialized assets and skills – sometimes simply because of greater effort and commitment – companies gain a competitive advantage. When a national environment affords better ongoing information and insight into product and process needs, companies gain a competitive advantage. Finally, when the national environment pressures companies to innovate and invest, companies both gain a competitive advantage and upgrade those advantages over time.

Factor Conditions. According to standard economic theory, factors of production – labor, land, natural resources, capital, infrastructure – will determine the flow of trade. A nation will export those goods that make most use of the factors with which



it is relatively well endowed. This doctrine, whose origins date back to Adam Smith and David Ricardo and that is embedded in classical economics, is at best incomplete and at worst incorrect.

In the sophisticated industries that form the backbone of any advanced economy, a nation does not inherit but instead creates the most important factors of production – such as skilled human resources or a scientific base. Moreover, the stock of factors that a nation enjoys at a particular time is less important than the rate and efficiency with which it creates, upgrades, and deploys them in particular industries.

The most important factors of production are those that involve sustained and heavy investment and are specialized. Basic factors, such as a pool of labor or a local raw-material source, do not constitute an advantage in knowledge-intensive industries. Companies can access them easily through a global strategy or circumvent them through technology. Contrary to conventional wisdom, simply having a general work force that is high school or even college educated represents no competitive advantage in modern international competition. To support competitive advantage, a factor must be highly specialized to an industry's particular needs – a scientific institute specialized in optics, a pool of venture capital to fund software companies. These factors are more scarce, more difficult for foreign competitors to imitate – and they require sustained investment to create.

Nations succeed in industries where they are particularly good at factor creation. Competitive advantage results from the presence of world-class institutions that first create specialized factors and then continually work to upgrade them. Denmark has two hospitals that concentrate in studying and treating diabetes – and a world-leading export position in insulin. Holland has premier research institutes in the cultivation, packaging, and shipping of flowers, where it is the world's export leader.

What is not so obvious, however, is that selective disadvantages in the more basic factors can prod a company to innovate and upgrade – a disadvantage in a static model of competition can become an advantage in a dynamic one. When there is an ample supply of cheap raw materials or abundant labor, companies can simply rest on these advantages and often deploy them inefficiently. But when companies face a selective disadvantage, like high land costs, labor shortages, or the lack of local raw materials, they *must* innovate and upgrade to compete.

Implicit in the oft-repeated Japanese statement, "We are an island nation with no natural resources," is the understanding that these deficiencies have only served to spur Japan's competitive innovation. Just-in-time production, for example, economized on prohibitively expensive space. Italian steel producers in the Brescia area faced a similar set of disadvantages: high capital costs, high energy costs, and no local raw materials. Located in Northern Lombardy, these privately

owned companies faced staggering logistics costs due to their distance from southern ports and the inefficiencies of the state-owned Italian transportation system. The result: they pioneered technologically advanced minimills that require only modest capital investment, use less energy, employ scrap metal as the feedstock, are efficient at small scale, and permit producers to locate close to sources of scrap and end-use customers. In other words, they converted factor disadvantages into competitive advantage.

Disadvantages can become advantages only under certain conditions. First, they must send companies proper signals about circumstances that will spread to other nations, thereby equipping them to innovate in advance of foreign rivals. Switzerland, the nation that experienced the first labor shortages after World War II, is a case in point. Swiss companies responded to the disadvantage by upgrading labor productivity and seeking higher value, more sustainable market segments. Companies in most other parts of the world, where there were still ample workers, focused their attention on other issues, which resulted in slower upgrading.

The second condition for transforming disadvantages into advantages is favorable circumstances elsewhere in the diamond – a consideration that applies to almost all determinants. To innovate, companies must have access to people with appropriate skills and have home-demand conditions that send the right signals. They must also have active domestic rivals who create pressure to innovate. Another precondition is company goals that lead to sustained commitment to the industry. Without such a commitment and the presence of active rivalry, a company may take an easy way around a disadvantage rather than using it as a spur to innovation.

> Demanding buyers in the domestic market can pressure companies to innovate faster.

For example, U.S. consumer-electronics companies, faced with high relative labor costs, chose to leave the product and production process largely unchanged and move labor-intensive activities to Taiwan and other Asian countries. Instead of upgrading their sources of advantage, they settled for labor-cost parity. On the other hand, Japanese rivals, confronted with intense domestic competition and a mature home market, chose to eliminate labor through automation. This led to lower assembly costs, to products with fewer components and to improved quality and reliability. Soon Japanese companies were building assembly plants in the United States – the place U.S. companies had fled.

Demand Conditions. It might seem that the globalization of competition would diminish the importance of home demand. In practice, however, this is simply not the case. In fact, the composition and character of the home market usually has a disproportionate effect on how companies perceive, interpret, and respond to buyer needs. Nations gain competitive advantage in industries where the home demand gives their companies a clearer or earlier picture of emerging buyer needs, and where demanding buyers pressure companies to innovate faster and achieve more sophisticated competitive advantages than their foreign rivals. The size of home demand proves far less significant than the character of home demand.

Home-demand conditions help build competitive advantage when a particular industry segment is larger or more visible in the domestic market than in foreign markets. The larger market segments in a nation receive the most attention from the nation's companies; companies accord smaller or less desirable segments a lower priority. A good example is hydraulic excavators, which represent the most widely used type of construction equipment in the Japanese domestic market – but which comprise a far smaller proportion of the market in other advanced nations. This segment is one of the few where there are vigorous Japanese international competitors and where Caterpillar does not hold a substantial share of the world market.

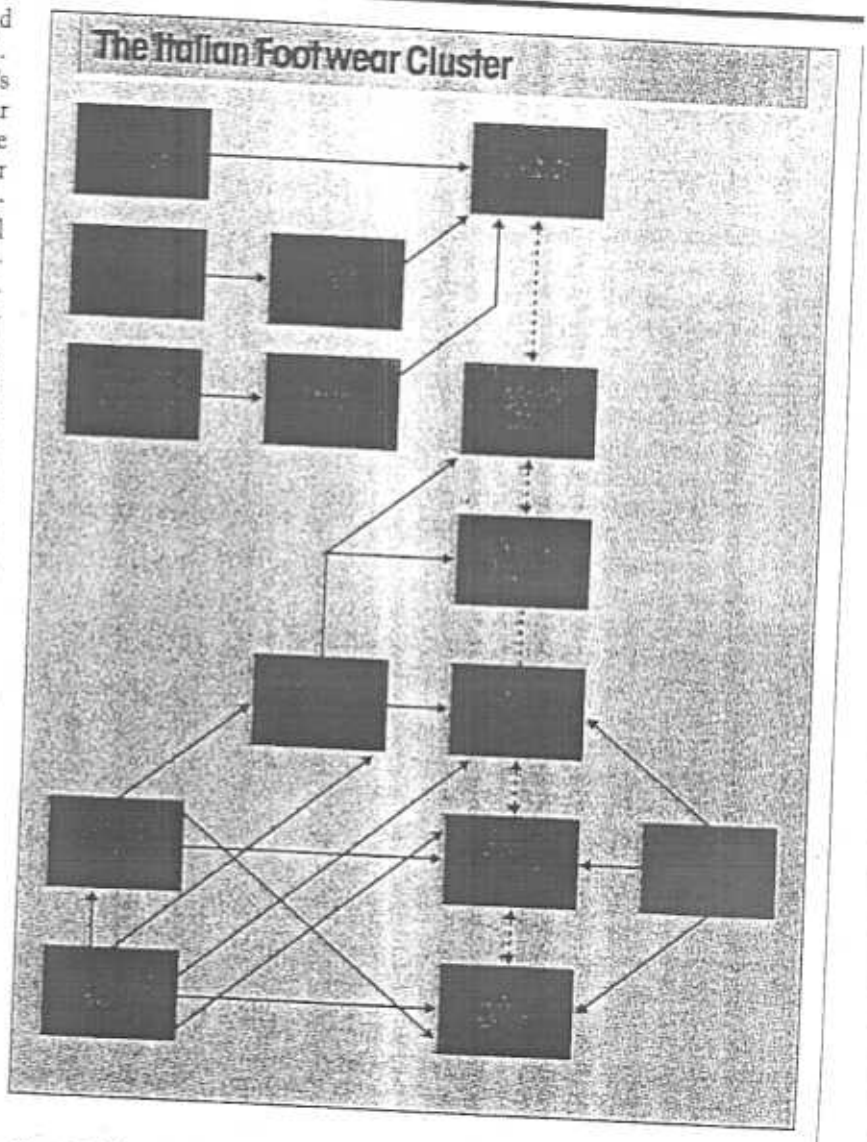
More important than the mix of segments per se is the nature of domestic buyers. A nation's companies gain competitive advantage if domestic buyers are the world's most sophisticated and demanding buyers for the product or service. Sophisticated, demanding buyers provide a window into advanced customer needs; they pressure companies to meet high standards; they prod them to improve, to innovate, and to upgrade into more advanced segments. As with factor conditions, demand conditions provide advantages by forcing companies to respond to tough challenges.

Especially stringent needs arise because of local values and circumstances. For example, Japanese consumers, who live in small, tightly packed homes, must contend with hot, humid summers and high-cost electrical energy – a daunting combination of circumstances. In response, Japanese companies have pioneered compact, quiet air-conditioning units powered by energy-saving rotary compressors. In industry after industry, the tightly constrained requirements of the Japanese market have forced companies to innovate, yielding products that are *kei-haku-tan-*

sho–light, thin, short, small–and that are internationally accepted.

Local buyers can help a nation's companies gain advantage if their needs anticipate or even shape those of other nations–if their needs provide ongoing "early-warning indicators" of global market trends. Sometimes anticipatory needs emerge because a nation's political values foreshadow needs that will grow elsewhere. Sweden's long-standing concern for handicapped people has spawned an increasingly competitive industry focused on special needs. Denmark's environmentalism has led to success for companies in water-pollution control equipment and windmills.

More generally, a nation's companies can anticipate global trends if the nation's values are spreading–that is, if the country is exporting its values and tastes as well as its products. The international success of U.S. companies in fast food and credit cards, for example, reflects not only the American desire for convenience but also the spread of these tastes to the rest of the world. Nations export their values and tastes through media, through training foreigners, through political influence, and through the foreign activities of their citizens and companies.



Related and Supporting Industries. The third broad determinant of national advantage is the presence in the nation of related and supporting industries that are internationally competitive. Internationally competitive home-based suppliers create advantages in downstream industries in several ways. First, they deliver the most cost-effective inputs in an efficient, early, rapid, and sometimes preferential way. Italian gold and silver jewelry companies lead the world in that industry in part because other Italian companies supply two-thirds of the world's jewelry-making and precious-metal recycling machinery.

Far more significant than mere access to components and machinery, however, is the advantage that home-based related and supporting industries provide in innovation and upgrading–an advantage based on close working relationships. Suppliers and end-users located near each other can take advantage of short lines of communication, quick and constant flow of information, and an ongoing exchange of ideas and innovations. Companies have the opportunity to influence their suppliers' technical efforts and can serve as test sites for R&D work, accelerating the pace of innovation.

The illustration of "The Italian Footwear Cluster" offers a graphic example of how a group of close-by, supporting industries creates competitive advantage in a range of interconnected industries that are all internationally competitive. Shoe producers, for instance, interact regularly with leather manufacturers on new styles and manufacturing techniques and learn about new textures and colors of leather when they are still on the drawing boards. Leather manufacturers gain early insights into fashion trends, help-

ing them to plan new products. The interaction is mutually advantageous and self-reinforcing, but it does not happen automatically: it is helped by proximity, but occurs only because companies and suppliers work at it.

The nation's companies benefit most when the suppliers are, themselves, global competitors. It is ultimately self-defeating for a company or country to create "captive" suppliers who are totally dependent on the domestic industry and prevented from serving foreign competitors. By the same token, a nation need not be competitive in all supplier industries for its companies to gain competitive advantage. Companies can readily source from abroad materials, components, or technologies without a major effect on innovation or performance of the industry's products. The same is true of other generalized technologies – like electronics or software – where the industry represents a narrow application area.

Home-based competitiveness in related industries provides similar benefits: information flow and technical interchange speed the rate of innovation and upgrading. A home-based related industry also increases the likelihood that companies will embrace new skills, and it also provides a source of entrants who will bring a novel approach to competing. The Swiss success in pharmaceuticals emerged out of previous international success in the dye industry, for example; Japanese dominance in electronic musical keyboards grows out of success in acoustic instruments combined with a strong position in consumer electronics.

Firm Strategy, Structure, and Rivalry. National circumstances and context create strong tendencies in how companies are created, organized, and managed, as well as what the nature of domestic rivalry will be. In Italy, for example, successful international competitors are often small or medium-sized companies that are privately owned and operated like extended families; in Germany, in contrast, companies tend to be strictly hierarchical in organization and management practices, and top managers usually have technical backgrounds.

No one managerial system is universally appropriate – notwithstanding the current fascination with Japanese management. Competitiveness in a specific industry results from convergence of the management practices and organizational modes favored in the country and the sources of competitive advantage in the industry. In industries where Italian companies are world leaders – such as lighting, furniture, footwear, woolen fabrics, and packaging machines – a company strategy that emphasizes focus, customized products, niche marketing, rapid change, and breathtaking flexibility fits both the dynamics of the industry and the character of the Italian management system. The German management system, in contrast, works well in technical or engineering-oriented industries – optics, chemicals, complicated machinery – where complex products demand precision manufacturing, a careful development process, after-sale service, and thus a highly disciplined management structure. German success is much rarer in consumer goods and services where image marketing and rapid new-feature and model turnover are important to competition.

Countries also differ markedly in the goals that companies and individuals seek to achieve. Company goals reflect the characteristics of national capital markets and the compensation practices for managers. For example, in Germany and Switzerland, where banks comprise a substantial part of the nation's shareholders, most shares are held for long-term appreciation and are rarely traded. Companies do well in mature industries, where ongoing investment in R&D and new facilities is essential but returns may be only moderate. The United States is at the opposite extreme, with a large pool of risk capital but widespread trading of public companies and a strong emphasis by investors on quarterly and annual share-price appreciation. Management compensation is heavily based on annual bonuses tied to individual results. America does well in relatively new industries, like software and biotechnology, or ones where equity funding of new companies feeds active domestic rivalry, like specialty electronics and services. Strong pressures leading to underinvestment, however, plague more mature industries.

No one managerial system is universally appropriate – notwithstanding the current fascination with Japanese management.

Individual motivation to work and expand skills is also important to competitive advantage. Outstanding talent is a scarce resource in any nation. A nation's success largely depends on the types of education its talented people choose, where they choose to work, and their commitment and effort. The goals a nation's institutions and values set for individuals and companies, and the prestige it attaches to certain industries, guide the flow of capital and human resources – which, in turn, directly affects the competitive performance of certain industries. Nations tend to be competitive in activities that people

admire or depend on – the activities from which the nation's heroes emerge. In Switzerland, it is banking and pharmaceuticals. In Israel, the highest callings have been agriculture and defense-related fields. Sometimes it is hard to distinguish between cause and effect. Attaining international success can make an industry prestigious, reinforcing its advantage.

The presence of strong local rivals is a final, and powerful, stimulus to the creation and persistence of competitive advantage. This is true of small countries, like Switzerland, where the rivalry among its pharmaceutical companies, Hoffmann-La Roche, Ciba-Geigy, and Sandoz, contributes to a leading worldwide position. It is true in the United States in the computer and software industries. Nowhere is the role of fierce rivalry more apparent than in Japan, where there are 112 companies competing in machine tools, 34 in semiconductors, 25 in audio equipment, 15 in cameras – in fact, there are usually double figures in the industries in which Japan boasts global dominance. [See the table "Estimated Number of Japanese Rivals in Selected Industries."] Among all the points on the diamond, domestic rivalry is arguably the most important because of the powerfully stimulating effect it has on all the others.

> Local rivalries go beyond economic competition – they become intensely personal feuds for "bragging rights."

Conventional wisdom argues that domestic competition is wasteful: it leads to duplication of effort and prevents companies from achieving economies of scale. The "right solution" is to embrace one or two national champions, companies with the scale and strength to tackle foreign competitors, and to guarantee them the necessary resources, with the government's blessing. In fact, however, most national champions are uncompetitive, although heavily subsidized and protected by their government. In many of the prominent industries in which there is only one national rival, such as aerospace and telecommunications, government has played a large role in distorting competition.

Static efficiency is much less important than dynamic improvement, which domestic rivalry uniquely spurs. Domestic rivalry, like any rivalry, creates pressure on companies to innovate and improve. Local rivals push each other to lower costs, improve quality and service, and create new products and processes. But unlike rivalries with foreign competitors, which tend to be analytical and distant, local rivalries often go beyond pure economic or business competition and become intensely personal. Domestic rivals engage in active feuds; they compete not only for market share but also for people, for technical excellence, and perhaps most important, for "bragging rights." One domestic rival's success proves to others that advancement is possible and often attracts new rivals to the industry. Companies often attribute the success of foreign rivals to "unfair" advantages. With domestic rivals, there are no excuses.

Geographic concentration magnifies the power of domestic rivalry. This pattern is strikingly common around the world: Italian jewelry companies are located around two towns, Arezzo and Valenza Po; cutlery companies in Solingen, West Germany and Seki, Japan; pharmaceutical companies in Basel, Switzerland; motorcycles and musical instruments in Ha-

Estimated Number of Japanese Rivals in Selected Industries

Air conditioners	13
Audio Equipment	25
Automobiles	9
Cameras	15
Car Audio	12
Carbon Fibers	7
Construction Equipment*	15
Copiers	14
Facsimile Machines	10
Large-scale Computers	6
Lift Trucks	8
Machine Tools	112
Microwave Equipment	5
Motorcycles	4
Musical Instruments	4
Personal Computers	16
Semiconductors	34
Sewing Machines	20
Shipbuilding†	33
Steel‡	5
Synthetic Fibers	8
Television Sets	15
Truck and Bus Tires	5
Trucks	11
Typewriters	14
Videocassette Recorders	10

Sources: Field interviews, *Nippon Kogyo Shimbun*, Nippon Kogyo Nenkan, 1987; Yano Research, *Market Share Atlas*, 1987; researchers' estimates.

*The number of companies varied by product area. The smallest number, 10, produced bulldozers. Fifteen companies produced shovel trucks, truck cranes, and asphalt-paving equipment. There were 20 companies in hydraulic excavators, a product area where Japan was particularly strong.

†Six companies had annual production exports in excess of 10,000 tons.

‡Integrated companies.

mamatsu, Japan. The more localized the rivalry, the more intense. And the more intense, the better.

Another benefit of domestic rivalry is the pressure it creates for constant upgrading of the sources of competitive advantage. The presence of domestic competitors automatically cancels the types of advantage that come from simply being in a particular nation—factor costs, access to or preference in the home market, or costs to foreign competitors who import into the market. Companies are forced to move beyond them, and as a result, gain more sustainable advantages. Moreover, competing domestic rivals will keep each other honest in obtaining government support. Companies are less likely to get hooked on the narcotic of government contracts or creeping industry protectionism. Instead, the industry will seek—and benefit from—more constructive forms of government support, such as assistance in opening foreign markets, as well as investments in focused educational institutions or other specialized factors.

Ironically, it is also vigorous domestic competition that ultimately pressures domestic companies to look at global markets and toughens them to succeed in them. Particularly when there are economies of scale, local competitors force each other to look outward to foreign markets to capture greater efficiency and higher profitability. And having been tested by fierce domestic competition, the stronger companies are well equipped to win abroad. If Digital Equipment can hold its own against IBM, Data General, Prime, and Hewlett-Packard, going up against Siemens or Machines Bull does not seem so daunting a prospect.

The Diamond as a System

Each of these four attributes defines a point on the diamond of national advantage; the effect of one point often depends on the state of others. Sophisticated buyers will not translate into advanced products, for example, unless the quality of human resources permits companies to meet buyer needs. Selective disadvantages in factors of production will not motivate innovation unless rivalry is vigorous and company goals support sustained investment. At the broadest level, weaknesses in any one determinant will constrain an industry's potential for advancement and upgrading.

But the points of the diamond are also self-reinforcing: they constitute a system. Two elements, domestic rivalry and geographic concentration, have especially great power to transform the diamond into a system—domestic rivalry because it promotes improvement in all the other determinants and geographic concentration because it elevates and magnifies the interaction of the four separate influences.

The role of domestic rivalry illustrates how the diamond operates as a self-reinforcing system. Vigorous domestic rivalry stimulates the development of unique pools of specialized factors, particularly if the rivals are all located in one city or region: the University of California at Davis has become the world's leading center of wine-making research, working closely with the California wine industry. Active local rivals also upgrade domestic demand in an industry. In furniture and shoes, for example, Italian consumers have learned to expect more and better products because of the rapid pace of new product development that is driven by intense domestic rivalry among hundreds of Italian companies. Domestic rivalry also promotes the formation of related and supporting industries. Japan's world-leading group of semiconductor producers, for instance, has spawned world-leading Japanese semiconductor-equipment manufacturers.

> Nations are rarely home to just one competitive industry; the diamond promotes industry *clusters*.

The effects can work in all directions: sometimes world-class suppliers become new entrants in the industry they have been supplying. Or highly sophisticated buyers may themselves enter a supplier industry, particularly when they have relevant skills and view the new industry as strategic. In the case of the Japanese robotics industry, for example, Matsushita and Kawasaki originally designed robots for internal use before beginning to sell robots to others. Today they are strong competitors in the robotics industry. In Sweden, Sandvik moved from specialty steel into rock drills, and SKF moved from specialty steel into ball bearings.

Another effect of the diamond's systemic nature is that nations are rarely home to just one competitive industry; rather, the diamond creates an environment that promotes *clusters* of competitive industries. Competitive industries are not scattered helter-skelter throughout the economy but are usually linked together through vertical (buyer-seller) or horizontal (common customers, technology, channels) relationships. Nor are clusters usually scattered physically; they tend to be concentrated geographically. One competitive industry helps to create an-

What Is National Competitiveness?

National competitiveness has become one of the central preoccupations of government and industry in every nation. Yet for all the discussion, debate, and writing on the topic, there is still no persuasive theory to explain national competitiveness. What is more, there is not even an accepted definition of the term "competitiveness" as applied to a nation. While the notion of a competitive company is clear, the notion of a competitive nation is not.

Some see national competitiveness as a macroeconomic phenomenon, driven by variables such as exchange rates, interest rates, and government deficits. But Japan, Italy, and South Korea have all enjoyed rapidly rising living standards despite budget deficits; Germany and Switzerland despite appreciating currencies; and Italy and Korea despite high interest rates.

Others argue that competitiveness is a function of cheap and abundant labor. But Germany, Switzerland, and Sweden have all prospered even with high wages and labor shortages. Besides, shouldn't a nation seek higher wages for its workers as a goal of competitiveness?

Another view connects competitiveness with bountiful natural resources. But how, then, can one explain the success of Germany, Japan, Switzerland, Italy, and South Korea – countries with limited natural resources?

More recently, the argument has gained favor that competitiveness is driven by government policy: targeting, protection, import promotion, and subsidies have propelled Japanese and South Korean auto, steel, shipbuilding, and semiconductor industries into global preeminence. But a closer look reveals a spotty record. In Italy, government intervention has been ineffectual – but Italy has experienced a boom in world export share second only to Japan. In Germany, direct government intervention in exporting industries is rare. And even in Japan and South Korea, government's role in such important industries as facsimile machines, copiers, robotics, and advanced materials has been modest; some of the most frequently cited examples, such as sewing machines, steel, and shipbuilding, are now quite dated.

A final popular explanation for national competitiveness is differences in management practices, including management-labor relations. The problem here, however, is that different industries require different approaches to management. The successful management practices governing small, private, and loosely organized Italian family companies in footwear, textiles, and jewelry, for example, would produce a management disaster if applied to German chemical or auto companies, Swiss pharmaceutical makers, or American aircraft producers. Nor is it possible to generalize about management-labor relations. Despite the commonly held view that powerful unions undermine competitive advantage, unions are strong in Germany and Sweden – and both countries boast internationally preeminent companies.

Clearly, none of these explanations is fully satisfactory; none is sufficient by itself to rationalize the competitive position of industries within a national border. Each contains some truth; but a broader, more complex set of forces seems to be at work.

The lack of a clear explanation signals an even more fundamental question. What is a "competitive" nation in the first place? Is a "competitive" nation one where every company or industry is competitive? No nation meets this test. Even Japan has large sectors of its economy that fall far behind the world's best competitors.

Is a "competitive" nation one whose exchange rate makes its goods price competitive in international markets? Both Germany and Japan have enjoyed remarkable gains in their standards of living – and experienced sustained periods of strong currency and rising prices. Is a "competitive" nation one with a large positive balance of trade? Switzerland has roughly balanced trade; Italy has a chronic trade deficit – both nations enjoy strongly rising national income. Is a "competitive" nation one with low labor costs? India and Mexico both have low wages and low labor costs – but neither seems an attractive industrial model.

The only meaningful concept of competitiveness at the national level is *productivity*. The principal goal of a nation is to produce a high and rising standard of living for its citizens. The ability to do so depends on the productivity with which a nation's labor and capital are employed. Productivity is the value of the output produced by a unit of labor or capital. Productivity depends on both the quality and features of products (which determine the prices that they can command) and the efficiency with which they are produced. Productivity is the prime determinant of a nation's long-run standard of living; it is the root cause of national per capita income. The productivity of human resources determines employee wages; the productivity with which capital is employed determines the return it earns for its holders.

A nation's standard of living depends on the capacity of its companies to achieve high levels of productivity – and to increase productivity over time. Sustained productivity growth requires that an economy continually *upgrade itself*. A nation's companies must relentlessly improve productivity in existing industries by raising product quality, adding desirable features, improving product technology, or boosting production efficiency. They must develop the necessary

capabilities to compete in more and more sophisticated industry segments, where productivity is generally high. They must finally develop the capability to compete in entirely new, sophisticated industries.

International trade and foreign investment can both improve a nation's productivity as well as threaten it. They support rising national productivity by allowing a nation to specialize in those industries and segments of industries where its companies are more productive and to import where its companies are less productive. No nation can be competitive in everything. The ideal is to deploy the nation's limited pool of human and other resources into the most productive uses. Even those nations with the highest standards of living have many industries in which local companies are uncompetitive.

Yet international trade and foreign investment also can threaten productivity growth. They expose a nation's industries to the test of international standards of productivity. An industry will lose out if its productivity is not sufficiently higher than foreign rivals' to offset any advantages in local wage rates. If a nation loses the ability to compete in a range of high-productivity/high-wage industries, its standard of living is threatened.

Defining national competitiveness as achieving a trade surplus or balanced trade per se is inappropriate. The expansion of exports because of low wages and a weak currency, at the same time that the nation imports sophisticated goods that its companies cannot produce competitively, may bring trade into balance or surplus but lowers the nation's standard of living. Competitiveness also does not mean jobs. It's the type of jobs, not just the ability to employ citizens at low wages, that is decisive for economic prosperity.

Seeking to explain "competitiveness" at the national level, then, is to answer the wrong question. What we must understand instead is the determinants of productivity and the rate of productivity growth. To find answers, we must focus not on the economy as a whole but on *specific industries and industry segments*. We must understand how and why commercially viable skills and technology are created, which can only be fully understood at the level of particular industries. It is the outcome of the thousands of struggles for competitive advantage against foreign rivals in particular segments and industries, in which products and processes are created and improved, that underpins the process of upgrading national productivity.

When one looks closely at any national economy, there are striking differences among a nation's industries in competitive success. International advantage is often concentrated in particular industry segments. German exports of cars are heavily skewed toward high-performance cars, while Korean exports are all compacts and subcompacts. In many industries and segments of industries, the competitors with true international competitive advantage are *based in only a few nations*.

Our search, then, is for the decisive characteristic of a nation that allows its companies to create and sustain competitive advantage in particular fields—the search is for the competitive advantage of nations. We are particularly concerned with the determinants of international success in technology- and skill-intensive segments and industries, which underpin high and rising productivity.

Classical theory explains the success of nations in particular industries based on so-called factors of production such as land, labor, and natural resources. Nations gain factor-based comparative advantage in industries that make intensive use of the factors they possess in abundance. Classical theory, however, has been overshadowed in advanced industries and economies by the globalization of competition and the power of technology.

A new theory must recognize that in modern international competition, companies compete with global strategies involving not only trade but also foreign investment. What a new theory must explain is why a nation provides a favorable *home base* for companies that compete internationally. The home base is the nation in which the essential competitive advantages of the enterprise are created and sustained. It is where a company's strategy is set, where the core product and process technology is created and maintained, and where the most productive jobs and most advanced skills are located. The presence of the home base in a nation has the greatest positive influence on other linked domestic industries and leads to other benefits in the nation's economy. While the ownership of the company is often concentrated at the home base, the nationality of shareholders is secondary.

A new theory must move beyond comparative advantage to the competitive advantage of a nation. It must reflect a rich conception of competition that includes segmented markets, differentiated products, technology differences, and economies of scale. A new theory must go beyond cost and explain why companies from some nations are better than others at creating advantages based on quality, features, and new product innovation. A new theory must begin from the premise that competition is dynamic and evolving; it must answer the questions: Why do some companies based in some nations innovate more than others? Why do some nations provide an environment that enables companies to improve and innovate faster than foreign rivals?

—Michael E. Porter

other in a mutually reinforcing process. Japan's strength in consumer electronics, for example, drove its success in semiconductors toward the memory chips and integrated circuits these products use. Japanese strength in laptop computers, which contrasts to limited success in other segments, reflects the base of strength in other compact, portable products and leading expertise in liquid-crystal display gained in the calculator and watch industries.

Once a cluster forms, the whole group of industries becomes mutually supporting. Benefits flow forward, backward, and horizontally. Aggressive rivalry in one industry spreads to others in the cluster, through spin-offs, through the exercise of bargaining power, and through diversification by established companies. Entry from other industries within the cluster spurs upgrading by stimulating diversity in R&D approaches and facilitating the introduction of new strategies and skills. Through the conduits of suppliers or customers who have contact with multiple competitors, information flows freely and innovations diffuse rapidly. Interconnections within the cluster, often unanticipated, lead to perceptions of new ways of competing and new opportunities. The cluster becomes a vehicle for maintaining diversity and overcoming the inward focus, inertia, inflexibility, and accommodation among rivals that slows or blocks competitive upgrading and new entry.

The Role of Government

In the continuing debate over the competitiveness of nations, no topic engenders more argument or creates less understanding than the role of the government. Many see government as an essential helper or supporter of industry, employing a host of policies to contribute directly to the competitive performance of strategic or target industries. Others accept the "free market" view that the operation of the economy should be left to the workings of the invisible hand.

Both views are incorrect. Either, followed to its logical outcome, would lead to the permanent erosion of a country's competitive capabilities. On one hand, advocates of government help for industry frequently propose policies that would actually hurt companies in the long run and only create the demand for more helping. On the other hand, advocates of a diminished government presence ignore the legitimate role that government plays in shaping the context and institutional structure surrounding companies and in creating an environment that stimulates companies to gain competitive advantage.

Government's proper role is as a catalyst and challenger; it is to encourage—or even push—companies to raise their aspirations and move to higher levels of competitive performance, even though this process may be inherently unpleasant and difficult. Government cannot create competitive industries; only companies can do that. Government plays a role that is inherently partial, that succeeds only when working in tandem with favorable underlying conditions in the diamond. Still, government's role of transmitting and amplifying the forces of the diamond is a powerful one. Government policies that succeed are those that create an environment in which companies can gain competitive advantage rather than those that involve government directly in the process, except in nations early in the development process. It is an indirect, rather than a direct, role.

> Competitive time for companies and political time for governments are fundamentally at odds.

Japan's government, at its best, understands this role better than anyone—including the point that nations pass through stages of competitive development and that government's appropriate role shifts as the economy progresses. By stimulating early demand for advanced products, confronting industries with the need to pioneer frontier technology through symbolic cooperative projects, establishing prizes that reward quality, and pursuing other policies that magnify the forces of the diamond, the Japanese government accelerates the pace of innovation. But like government officials anywhere, at their worst Japanese bureaucrats can make the same mistakes: attempting to manage industry structure, protecting the market too long, and yielding to political pressure to insulate inefficient retailers, farmers, distributors, and industrial companies from competition.

It is not hard to understand why so many governments make the same mistakes so often in pursuit of national competitiveness: competitive time for companies and political time for governments are fundamentally at odds. It often takes more than a decade for an industry to create competitive advantage; the process entails the long upgrading of human skills, investing in products and processes, building clusters, and penetrating foreign markets. In the case of the Japanese auto industry, for instance, companies made their first faltering steps toward exporting in the 1950s—yet did not achieve strong international positions until the 1970s.

But in politics, a decade is an eternity. Consequently, most governments favor policies that offer easily perceived short-term benefits, such as subsidies, protection, and arranged mergers – the very policies that retard innovation. Most of the policies that would make a real difference either are too slow and require too much patience for politicians or, even worse, carry with them the sting of short-term pain. Deregulating a protected industry, for example, will lead to bankruptcies sooner and to stronger, more competitive companies only later.

Policies that convey static, short-term cost advantages but that unconsciously undermine innovation and dynamism represent the most common and most profound error in government industrial policy. In a desire to help, it is all too easy for governments to adopt policies such as joint projects to avoid "wasteful" R&D that undermine dynamism and competition. Yet even a 10% cost saving through economies of scale is easily nullified through rapid product and process improvement and the pursuit of volume in global markets – something that such policies undermine.

There are some simple, basic principles that governments should embrace to play the proper supportive role for national competitiveness: encourage change, promote domestic rivalry, stimulate innovation. Some of the specific policy approaches to guide nations seeking to gain competitive advantage include the following:

Focus on specialized factor creation. Government has critical responsibilities for fundamentals like the primary and secondary education systems, basic national infrastructure, and research in areas of broad national concern such as health care. Yet these kinds of generalized efforts at factor creation rarely produce competitive advantage. Rather, the factors that translate into competitive advantage are advanced, specialized, and tied to specific industries or industry groups. Mechanisms such as specialized apprenticeship programs, research efforts in universities connected with an industry, trade association activities, and, most important, the private investments of companies ultimately create the factors that will yield competitive advantage.

Avoid intervening in factor and currency markets. By intervening in factor and currency markets, governments hope to create lower factor costs or a favorable exchange rate that will help companies compete more effectively in international markets. Evidence from around the world indicates that these policies – such as the Reagan administration's dollar devaluation – are often counterproductive. They work against the upgrading of industry and the search for more sustainable competitive advantage.

The contrasting case of Japan is particularly instructive, although both Germany and Switzerland have had similar experiences. Over the past 20 years, the Japanese have been rocked by the sudden Nixon currency devaluation shock, two oil shocks, and, most recently, the yen shock – all of which forced Japanese companies to upgrade their competitive advantages. The point is not that government should pursue policies that intentionally drive up factor costs or the exchange rate. Rather, when market forces create rising factor costs or a higher exchange rate, government should resist the temptation to push them back down.

Enforce strict product, safety, and environmental standards. Strict government regulations can promote competitive advantage by stimulating and upgrading domestic demand. Stringent standards for product performance, product safety, and environmental impact pressure companies to improve quality, upgrade technology, and provide features that respond to consumer and social demands. Easing standards, however tempting, is counterproductive.

When tough regulations anticipate standards that will spread internationally, they give a nation's companies a head start in developing products and services that will be valuable elsewhere. Sweden's strict standards for environmental protection have promoted competitive advantage in many industries. Atlas Copco, for example, produces quiet compressors that can be used in dense urban areas with minimal disruption to residents. Strict standards, however, must be combined with a rapid and streamlined regulatory process that does not absorb resources and cause delays.

Sharply limit direct cooperation among industry rivals. The most pervasive global policy fad in the competitiveness arena today is the call for more cooperative research and industry consortia. Operating on the belief that independent research by rivals is wasteful and duplicative, that collaborative efforts achieve economies of scale, and that individual companies are likely to underinvest in R&D because they cannot reap all the benefits, governments have embraced the idea of more direct cooperation. In the United States, antitrust laws have been modified to allow more cooperative R&D; in Europe, mega-projects such as ESPRIT, an information-technology project, bring together companies from several coun-

> Most Japanese companies participate in MITI research projects for defensive reasons.

tries. Lurking behind much of this thinking is the fascination of Western governments with – and fundamental misunderstanding of – the countless cooperative research projects sponsored by the Ministry of International Trade and Industry (MITI), projects that appear to have contributed to Japan's competitive rise.

But a closer look at Japanese cooperative projects suggests a different story. Japanese companies participate in MITI projects to maintain good relations with MITI, to preserve their corporate images, and to hedge the risk that competitors will gain from the project – largely defensive reasons. Companies rarely contribute their best scientists and engineers to cooperative projects and usually spend much more on their own private research in the same field. Typically, the government makes only a modest financial contribution to the project.

The real value of Japanese cooperative research is to signal the importance of emerging technical areas and to stimulate proprietary company research. Cooperative projects prompt companies to explore new fields and boost internal R&D spending because companies know that their domestic rivals are investigating them.

Tax incentives for long-term capital gains encourage long-term investment.

Under certain limited conditions, cooperative research can prove beneficial. Projects should be in areas of basic product and process research, not in subjects closely connected to a company's proprietary sources of advantage. They should constitute only a modest portion of a company's overall research program in any given field. Cooperative research should be only indirect, channeled through independent organizations to which most industry participants have access. Organizational structures, like university labs and centers of excellence, reduce management problems and minimize the risk to rivalry. Finally, the most useful cooperative projects often involve fields that touch a number of industries and that require substantial R&D investments.

Promote goals that lead to sustained investment. Government has a vital role in shaping the goals of investors, managers, and employees through policies in various areas. The manner in which capital markets are regulated, for example, shapes the incentives of investors and, in turn, the behavior of companies. Government should aim to encourage sustained investment in human skills, in innovation, and in physical assets. Perhaps the single most powerful tool for raising the rate of sustained investment in industry is a tax incentive for long-term (five years or more) capital gains restricted to new investment in corporate equity. Long-term capital gains incentives should also be applied to pension funds and other currently untaxed investors, who now have few reasons not to engage in rapid trading.

Deregulate competition. Regulation of competition through such policies as maintaining a state monopoly, controlling entry into an industry, or fixing prices has two strong negative consequences: it stifles rivalry and innovation as companies become preoccupied with dealing with regulators and protecting what they already have; and it makes the industry a less dynamic and less desirable buyer or supplier. Deregulation and privatization on their own, however, will not succeed without vigorous domestic rivalry – and that requires, as a corollary, a strong and consistent antitrust policy.

Enforce strong domestic antitrust policies. A strong antitrust policy – especially for horizontal mergers, alliances, and collusive behavior – is fundamental to innovation. While it is fashionable today to call for mergers and alliances in the name of globalization and the creation of national champions, these often undermine the creation of competitive advantage. Real national competitiveness requires governments to disallow mergers, acquisitions, and alliances that involve industry leaders. Furthermore, the same standards for mergers and alliances should apply to both domestic and foreign companies. Finally, government policy should favor internal entry, both domestic and international, over acquisition. Companies should, however, be allowed to acquire small companies in related industries when the move promotes the transfer of skills that could ultimately create competitive advantage.

Reject managed trade. Managed trade represents a growing and dangerous tendency for dealing with the fallout of national competitiveness. Orderly marketing agreements, voluntary restraint agreements, or other devices that set quantitative targets to divide up markets are dangerous, ineffective, and often enormously costly to consumers. Rather than promoting innovation in a nation's industries, managed trade guarantees a market for inefficient companies.

Better than managed trade: pressure Japan to buy more manufactured imports.

Government trade policy should pursue open market access in every foreign nation. To be effective, trade policy should not be a passive instrument; it cannot respond only to complaints or work only for those industries that can muster enough political clout; it should not require a long history of injury or serve only distressed industries. Trade policy should seek to open markets wherever a nation has competitive advantage and should actively address emerging industries and incipient problems.

Where government finds a trade barrier in another nation, it should concentrate its remedies on dismantling barriers, not on regulating imports or exports. In the case of Japan, for example, pressure to accelerate the already rapid growth of manufactured imports is a more effective approach than a shift to managed trade. Compensatory tariffs that punish companies for unfair trade practices are better than market quotas. Other increasingly important tools to open markets are restrictions that prevent companies in offending nations from investing in acquisitions or production facilities in the host country–thereby blocking the unfair country's companies from using their advantage to establish a new beachhead that is immune from sanctions.

Any of these remedies, however, can backfire. It is virtually impossible to craft remedies to unfair trade practices that avoid both reducing incentives for domestic companies to innovate and export and harming domestic buyers. The aim of remedies should be adjustments that allow the remedy to disappear.

The Company Agenda

Ultimately, only companies themselves can achieve and sustain competitive advantage. To do so, they must act on the fundamentals described above. In particular, they must recognize the central role of innovation–and the uncomfortable truth that innovation grows out of pressure and challenge. It takes leadership to create a dynamic, challenging environment. And it takes leadership to recognize the all-too-easy escape routes that appear to offer a path to competitive advantage, but are actually short-cuts to failure. For example, it is tempting to rely on cooperative research and development projects to lower the cost and risk of research. But they can divert company attention and resources from proprietary research efforts and will all but eliminate the prospects for real innovation.

Competitive advantage arises from leadership that harnesses and amplifies the forces in the diamond to promote innovation and upgrading. Here are just a few of the kinds of company policies that will support that effort:

Create pressures for innovation. A company should seek out pressure and challenge, not avoid them. Part of strategy is to take advantage of the home nation to create the impetus for innovation. To do that, companies can sell to the most sophisticated and demanding buyers and channels; seek out those buyers with the most difficult needs; establish norms that exceed the toughest regulatory hurdles or product standards; source from the most advanced suppliers; treat employees as permanent in order to stimulate upgrading of skills and productivity.

Seek out the most capable competitors as motivators. To motivate organizational change, capable competitors and respected rivals can be a common enemy. The best managers always run a little scared; they respect and study competitors. To stay dynamic, companies must make meeting challenge a part of the organization's norms. For example, lobbying against strict product standards signals the organization that company leadership has diminished aspirations. Companies that value stability, obedient customers, dependent suppliers, and sleepy competitors are inviting inertia and, ultimately, failure.

Establish early-warning systems. Early-warning signals translate into early-mover advantages. Companies can take actions that help them see the signals of change and act on them, thereby getting a jump on the competition. For example, they can find and serve those buyers with the most anticipatory needs; investigate all emerging new buyers or channels; find places whose regulations foreshadow emerging regulations elsewhere; bring some outsiders into the management team; maintain ongoing relationships with research centers and sources of talented people.

Improve the national diamond. Companies have a vital stake in making their home environment a better platform for international success. Part of a company's responsibility is to play an active role in forming clusters and to work with its home-nation buyers, suppliers, and channels to help them upgrade and extend their own competitive advantages. To upgrade home demand, for example, Japanese musical instrument manufacturers, led by Yamaha, Kawai, and Suzuki, have established music schools. Similarly, companies can stimulate and support local suppliers of important specialized inputs–including encouraging them to compete globally. The health and strength of the national cluster will only enhance the company's own rate of innovation and upgrading.

In nearly every successful competitive industry, leading companies also take explicit steps to create

How the Diamond Works: The Italian Ceramic Tile Industry

In 1987, Italian companies were world leaders in the production and export of ceramic tiles, a $10 billion industry. Italian producers, concentrated in and around the small town of Sassuolo in the Emilia-Romagna region, accounted for about 30% of world production and almost 60% of world exports. The Italian trade surplus that year in ceramic tiles was about $1.4 billion.

The development of the Italian ceramic tile industry's competitive advantage illustrates how the diamond of national advantage works. Sassuolo's sustainable competitive advantage in ceramic tiles grew not from any static or historical advantage but from dynamism and change. Sophisticated and demanding local buyers, strong and unique distribution channels, and intense rivalry among local companies created constant pressure for innovation. Knowledge grew quickly from continuous experimentation and cumulative production experience. Private ownership of the companies and loyalty to the community spawned intense commitment to invest in the industry.

Tile producers benefited as well from a highly developed set of local machinery suppliers and other supporting industries, producing materials, services, and infrastructure. The presence of world-class, Italian-related industries also reinforced Italian strength in tiles. Finally, the geographic concentration of the entire cluster supercharged the whole process. Today foreign companies compete against an entire subculture. The organic nature of this system represents the most sustainable advantage of Sassuolo's ceramic tile companies.

The Origins of the Italian Industry

Tile production in Sassuolo grew out of the earthenware and crockery industry, whose history traces back to the thirteenth century. Immediately after World War II, there were only a handful of ceramic tile manufacturers in and around Sassuolo, all serving the local market exclusively.

Demand for ceramic tiles within Italy began to grow dramatically in the immediate postwar years, as the reconstruction of Italy triggered a boom in building materials of all kinds. Italian demand for ceramic tiles was particularly great due to the climate, local tastes, and building techniques.

Because Sassuolo was in a relatively prosperous part of Italy, there were many who could combine the modest amount of capital and necessary organizational skills to start a tile company. In 1955, there were 14 Sassuolo area tile companies; by 1962, there were 102.

The new tile companies benefited from a local pool of mechanically trained workers. The region around Sassuolo was home to Ferrari, Maserati, Lamborghini, and other technically sophisticated companies. As the tile industry began to grow and prosper, many engineers and skilled workers gravitated to the successful companies.

The Emerging Italian Tile Cluster

Initially, Italian tile producers were dependent on foreign sources of raw materials and production technology. In the 1950s, the principal raw materials used to make tiles were kaolin (white) clays. Since there were red- but no white-clay deposits near Sassuolo, Italian producers had to import the clays from the United Kingdom. Tile-making equipment was also imported in the 1950s and 1960s: kilns from Germany, America, and France; presses for forming tiles from Germany. Sassuolo tile makers had to import even simple glazing machines.

Over time, the Italian tile producers learned how to modify imported equipment to fit local circumstances: red versus white clays, natural gas versus heavy oil. As process technicians from tile companies left to start their own equipment companies, a local machinery industry arose in Sassuolo. By 1970, Italian companies had emerged as world-class producers of kilns and presses; the earlier situation had exactly reversed: they were exporting their red-clay equipment for foreigners to use with white clays.

The relationship between Italian tile and equipment manufacturers was a mutually supporting one, made even more so by close proximity. In the mid-1980s, there were some 200 Italian equipment manufacturers; more than 60% were located in the Sassuolo area. The equipment manufacturers competed fiercely for local business, and tile manufacturers benefited from better prices and more advanced equipment than their foreign rivals.

As the emerging tile cluster grew and concentrated in the Sassuolo region, a pool of skilled workers and technicians developed, including engineers, production specialists, maintenance workers, service technicians, and design personnel. The industry's geographic concentration encouraged other supporting companies to form, offering molds, packaging materials, glazes, and transportation services. An array of small, specialized consulting companies emerged to give advice to tile producers on plant design, logistics, and commercial, advertising, and fiscal matters.

With its membership concentrated in the Sassuolo area, Assopiastrelle, the ceramic tile industry association, began offering services in areas of common interest: bulk purchasing, foreign-market research, and consulting on fiscal and legal matters. The growing tile cluster stimulated the formation of a new, specialized

factor-creating institution: in 1976, a consortium of the University of Bologna, regional agencies, and the ceramic industry association founded the Centro Ceramico di Bologna, which conducted process research and product analysis.

Sophisticated Home Demand

By the mid-1960s, per-capita tile consumption in Italy was considerably higher than in the rest of the world. The Italian market was also the world's most sophisticated. Italian customers, who were generally the first to adopt new designs and features, and Italian producers, who constantly innovated to improve manufacturing methods and create new designs, progressed in a mutually reinforcing process.

The uniquely sophisticated character of domestic demand also extended to retail outlets. In the 1960s, specialized tile showrooms began opening in Italy. By 1985, there were roughly 7,600 specialized showrooms handling approximately 80% of domestic sales, far more than in other nations. In 1976, the Italian company Piemme introduced tiles by famous designers to gain distribution outlets and to build brand name awareness among consumers. This innovation drew on another related industry, design services, in which Italy was world leader, with over $10 billion in exports.

Sassuolo Rivalry

The sheer number of tile companies in the Sassuolo area created intense rivalry. News of product and process innovations spread rapidly, and companies seeking technological, design, and distribution leadership had to improve constantly.

Proximity added a personal note to the intense rivalry. All of the producers were privately held, most were family run. The owners all lived in the same area, knew each other, and were the leading citizens of the same towns.

Pressures to Upgrade

In the early 1970s, faced with intense domestic rivalry, pressure from retail customers, and the shock of the 1973 energy crisis, Italian tile companies struggled to reduce gas and labor costs. These efforts led to a technological breakthrough, the rapid single-firing process, in which the hardening process, material transformation, and glaze-fixing all occurred in one pass through the kiln. A process that took 225 employees using the double-firing method needed only 90 employees using single-firing roller kilns. Cycle time dropped from 16 to 20 hours to only 50 to 55 minutes.

The new, smaller, and lighter equipment was also easier to export. By the early 1980s, exports from Italian equipment manufacturers exceeded domestic sales; in 1988, exports represented almost 80% of total sales.

Working together, tile manufacturers and equipment manufacturers made the next important breakthrough during the mid- and late 1970s—the development of materials-handling equipment that transformed tile manufacture from a batch process to a continuous process. The innovation reduced high labor costs—which had been a substantial selective factor disadvantage facing Italian tile manufacturers.

The common perception is that Italian labor costs were lower during this period than those in the United States and Germany. In those two countries, however, different jobs had widely different wages. In Italy, wages for different skill categories were compressed, and work rules constrained manufacturers from using overtime or multiple shifts. The restriction proved costly: once cool, kilns are expensive to reheat and are best run continuously. Because of this factor disadvantage, the Italian companies were the first to develop continuous, automated production.

Internationalization

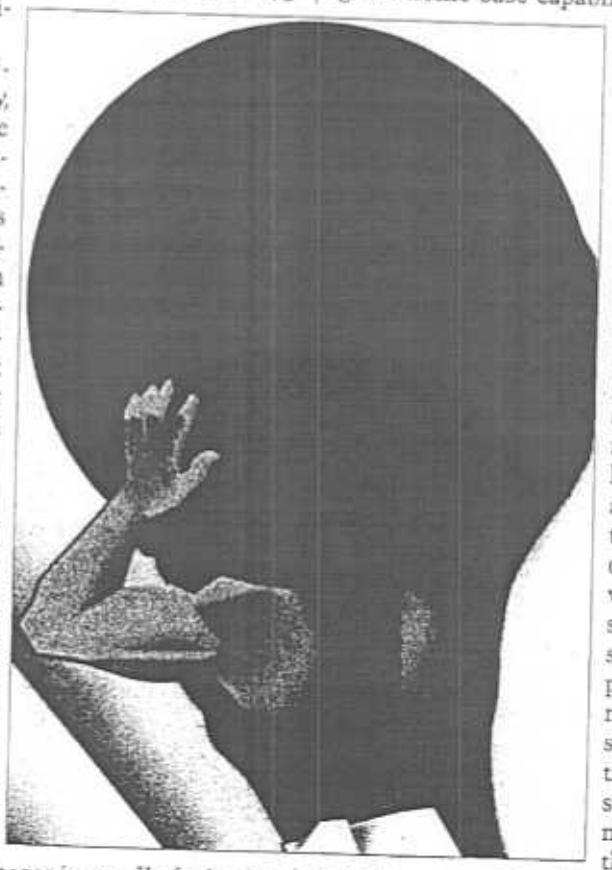
By 1970, Italian domestic demand had matured. The stagnant Italian market led companies to step up their efforts to pursue foreign markets. The presence of related and supporting Italian industries helped in the export drive. Individual tile manufacturers began advertising in Italian and foreign home design and architectural magazines, publications with wide global circulation among architects, designers, and consumers. This heightened awareness reinforced the quality image of Italian tiles. Tile makers were also able to capitalize on Italy's leading world export positions in related industries like marble, building stone, sinks, washbasins, furniture, lamps, and home appliances.

Assopiastrelle, the industry association, established trade-promotion offices in the United States in 1980, in Germany in 1984, and in France in 1987. It organized elaborate trade shows in cities ranging from Bologna to Miami and ran sophisticated advertising. Between 1980 and 1987, the association spent roughly $8 million to promote Italian tiles in the United States.

—Michael J. Enright and Paolo Tenti

Michael J. Enright, a doctoral student in business economics at the Harvard Business School, performed numerous research and supervisory tasks for The Competitive Advantage of Nations. *Paolo Tenti was responsible for the Italian part of research undertaken for the book. He is a consultant in strategy and finance for Monitor Company and Analysis PA.—Milan.*

specialized factors like human resources, scientific knowledge, or infrastructure. In industries like wool cloth, ceramic tiles, and lighting equipment, Italian industry associations invest in market information, process technology, and common infrastructure. Companies can also speed innovation by putting their headquarters and other key operations where there are concentrations of sophisticated buyers, important suppliers, or specialized factor-creating mechanisms, such as universities or laboratories.



Welcome domestic rivalry. To compete globally, a company needs capable domestic rivals and vigorous domestic rivalry. Especially in the United States and Europe today, managers are wont to complain about excessive competition and to argue for mergers and acquisitions that will produce hoped-for economies of scale and critical mass. The complaint is only natural—but the argument is plain wrong. Vigorous domestic rivalry creates sustainable competitive advantage. Moreover, it is better to grow internationally than to dominate the domestic market. If a company wants an acquisition, a foreign one that can speed globalization and supplement home-based advantages or offset home-based disadvantages is usually far better than merging with leading domestic competitors.

> Innovating to overcome local disadvantages is better than outsourcing; developing domestic supplies is better than relying on foreign ones.

Globalize to tap selective advantages in other nations. In search of "global" strategies, many companies today abandon their home diamond. To be sure, adopting a global perspective is important to creating competitive advantage. But relying on foreign activities that supplant domestic capabilities is always a second-best solution. Innovating to offset local factor disadvantages is better than outsourcing; developing domestic suppliers and buyers is better than relying solely on foreign ones. Unless the critical underpinnings of competitiveness are present at home, companies will not sustain competitive advantage in the long run. The aim should be to upgrade home-base capabilities so that foreign activities are selective and supplemental only to over-all competitive advantage.

The correct approach to globalization is to tap selectively into sources of advantage in other nations' diamonds. For example, identifying sophisticated buyers in other countries helps companies understand different needs and creates pressures that will stimulate a faster rate of innovation. No matter how favorable the home diamond, moreover, important research is going on in other nations. To take advantage of foreign research, companies must station high-quality people in overseas bases and mount a credible level of scientific effort. To get anything back from foreign research ventures, companies must also allow access to their own ideas—recognizing that competitive advantage comes from continuous improvement, not from protecting today's secrets.

Use alliances only selectively. Alliances with foreign companies have become another managerial fad and cure-all: they represent a tempting solution to the problem of a company wanting the advantages of foreign enterprises or hedging against risk, without giving up independence. In reality, however, while alliances can achieve selective benefits, they always exact significant costs: they involve coordinating two separate operations, reconciling goals with an independent entity, creating a competitor, and giving up profits. These costs ultimately make most alliances short-term transitional devices, rather than stable, long-term relationships.

Author's note: Michael J. Enright, who served as project coordinator for this study, has contributed valuable suggestions.

Most important, alliances as a broad-based strategy will only ensure a company's mediocrity, not its international leadership. No company can rely on another outside, independent company for skills and assets that are central to its competitive advantage. Alliances are best used as a selective tool, employed on a temporary basis or involving noncore activities.

Locate the home base to support competitive advantage. Among the most important decisions for multinational companies is the nation in which to locate the home base for each distinct business. A company can have different home bases for distinct businesses or segments. Ultimately, competitive advantage is created at home: it is where strategy is set, the core product and process technology is created, and a critical mass of production takes place. The circumstances in the home nation must support innovation; otherwise the company has no choice but to move its home base to a country that stimulates innovation and that provides the best environment for global competitiveness. There are no half-measures: the management team must move as well.

The Role of Leadership

Too many companies and top managers misperceive the nature of competition and the task before them by focusing on improving financial performance, soliciting government assistance, seeking stability, and reducing risk through alliances and mergers.

> Using alliances as a strategy will only ensure a company's mediocrity, not its international leadership.

Today's competitive realities demand leadership. Leaders believe in change; they energize their organizations to innovate continuously; they recognize the importance of their home country as integral to their competitive success and work to upgrade it. Most important, leaders recognize the need for pressure and challenge. Because they are willing to encourage appropriate—and painful—government policies and regulations, they often earn the title "statesmen," although few see themselves that way. They are prepared to sacrifice the easy life for difficulty and, ultimately, sustained competitive advantage. That must be the goal, for both nations and companies: not just surviving, but achieving international competitiveness.

And not just once, but continuously.

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