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Standing Up for Manufacturing

In more than four decades at MIT, political scientist Suzanne Berger has shifted from studying French peasants to spearheading research on how to revive U.S. industry.

By Peter Dizikes

When Suzanne Berger arrived at MIT, in 1968, the United States was in the middle of a three-decade-long economic expansion. Much of that growth occurred because so many Americans spent their time making things: about a quarter of the country's jobs were in the manufacturing sector. This manufacturing-based prosperity seemed a simple fact of life to Berger—and as a newly hired assistant professor of political science who studied the views of French peasants, she did not devote much thought to it.

Much has changed since then. Fewer than 10 percent of employed Americans now work in manufacturing. And Berger, unlikely as it might have seemed in 1968, has become one of the world's leading authorities on manufacturing in the United States. She has conducted extensive research on globalization and industrial activity, served as a key member of MIT research groups studying those subjects since the 1980s, and written influential texts such as the 2006 book *How We Compete*.

Indeed, Berger may be the best-known social scientist asserting that a renewal of American manufacturing is not just desirable but possible, if only we can learn more about how technological innovations fuel productivity. In Berger's view, although laboratory research continues to thrive in the United States, too often it remains untapped commercially. And she disagrees strongly with those who insist that U.S. manufacturing is in a state of irreversible decline and that labor costs will force many remaining factories and production jobs to move to developing countries.

"I don't buy the argument that manufacturing is a sunset activity destined to disappear in countries with high wages and well-educated populations," she says. "There is no inevitability about it. It is possible to do profitable manufacturing in the United States. This is not just a vestigial activity but a vibrant activity."

As an accomplished scholar of France—she was made a *Chevalier de la Légion d'Honneur* in 2009—Berger could be conducting research in, say, Paris. Instead, she is touring American factories, examining production lines that churn out items from plastic jugs to metal pipes and sensitive calibration tools, all in the hope of illuminating America's industrial future and putting people back to work. That's an important priority at MIT. The Institute's president, Susan Hockfield, cochairs the executive committee of President Obama's new Advanced Manufacturing Partnership, an initiative intended to bolster industrial production. *(For more on advanced manufacturing, see "Can We Build Tomorrow's Breakthroughs?" p. 36.)* And Berger is cochair of a new MIT initiative on manufacturing, Production in the Innovation Economy (PIE), a two-year project involving 19 faculty members. Among the questions it hopes to address: What are the best ways to move innovations from the lab to the shop floor? And how can manufacturing firms grow from tiny startups to large-scale enterprises?

French lessons

Berger's academic career has involved some surprising twists and turns. She attended Antioch College in Ohio, received her undergraduate degree from the University of Chicago in 1960, and went to graduate school in government at Harvard, where she planned to focus on the Soviet Union. "Initially, I wasn't particularly drawn to France," she says.

That changed after she took classes from the famed political scientist Stanley Hoffmann. "A teacher can open the world for you," says Berger. "He had an extraordinary ability to show how in the experience of one country, in this case France, you could see the dilemmas facing people living in all advanced industrial countries—about government, authority, citizenship, and the relationship of the market to society."

Berger's PhD thesis showed the deeply entrenched nature of political loyalties within the French province of Brittany. "At that time social scientists believed economic modernization would automatically change people's politics," she says. "What I discovered was different. If you mapped the politics of one part of the region, there was almost perfect overlap between voting in the 1960s and how villages lined up during the French Revolution."

By the time her work earned her a job at the Institute, student demonstrations against the Vietnam War were roiling the campus. "Those were very dramatic years at MIT," says Berger. "My department here at MIT was particularly under attack. But my colleagues were always willing to discuss the issues with students. I've found that at MIT, people feel the need to explain themselves—not just retreat behind authority."

Her first book, *Peasants against Politics* (based on her thesis), was published in 1972, and a series of articles exploring French politics in light of industrialization would follow. Over time, Berger's reputation grew, and her recognition along with it. In addition to the *Legion d'Honneur* award, she has won a Guggenheim fellowship and been named a fellow in the American Academy of Arts and Sciences. She has also delivered an inaugural lecture at Sciences Po, the elite political-science graduate school in Paris, and was given a visiting chair at the École des Hautes Études en Science Sociales in Paris.

"I've always found everything she's written extremely provocative and very shrewd," says Hoffmann, who still teaches at Harvard. "The French have recognized that, too. She helped form a wave of acceptance of Americans as specialists of France ... [creating] a new willingness to recognize that other people than the French have written intelligent things about France."

A determined antideterminist

Berger has continued to write about French politics throughout her career, and she could have remained a France specialist. As she cheerfully acknowledges, "It may seem very strange that someone who would have started her work by devoting so much attention to French peasants would then spend 10 or 15 years working on globalization and then on manufacturing." Still, she insists, "to me there is a line of continuity."

From studying the relationship between economic forces and politics in France, she moved to the study of those economic forces themselves, by examining first globalization and then manufacturing more specifically.

Another thread of continuity in Berger's work: her studies have consistently emphasized that society does not operate deterministically, one phenomenon leading unavoidably to another in a fixed cause-effect relationship. Political and social theorists have often asserted that market forces, acting with a machinelike efficiency, will inevitably lead to economic globalization, especially the migration of shop-floor jobs to low-wage countries. But Berger is suspicious of such claims; much as the economic changes of the 20th century didn't force French peasants to vote any particular way, she believes, the economic changes of the 21st century don't force American politicians or corporate leaders to adopt one particular set of policies.

"The message of all of Suzanne's work is that she's against any kind of determinism," says Richard Locke, PhD '89, professor of management and political science and head of MIT's political-science department. "Many people think there's inevitability in market opportunities or technological constraints. Suzanne doesn't pretend that anything is possible, but she believes our range of options is typically much greater than we think."

This perspective stems partly from Berger's awareness of history. At the moment, she is writing a book on political debates about democracy and openness in the United States and Europe in the first two decades of the 20th century. "This was really a debate about globalization, which people thought was irreversible then, partly because so many changes at the time were brought about by technology," she says. Transatlantic cables and faster ships had made the world more connected than ever by 1900. However, Berger points out, after World War I, the pace of globalization slowed for several decades, until the end of the Cold War. "Technology may be irreversible, but states really do control their boundaries and national frontiers," she says. In light of history, current claims about globalization's inevitability may seem less compelling.

It's no accident that Berger's research leads to insights with very practical applications. Having started her career in a somewhat narrow specialty, she has always strived to persuade her MIT colleagues that her work is relevant. "From the moment I came to MIT, people were asking me about the use of my studies," she says. "The idea of knowledge for its own sake is always challenged here. That inner tension at MIT is powerful. There are many times when I'm simply fascinated with something in itself: how could a political pattern persist for 200 years in an area that has undergone profound economic transformation? But at MIT, you are pushed to ask, 'What good could it be just to know this?'"

As Berger sees it, in her case the answer is straightforward. "The use of my work is to show a space for choice," she says. "We really can make decisions about what kind of companies or society we want. The idea that we're being forced into something can blind us to the opportunities we really have."

made in cambridge Berger has been contributing to MIT-wide research projects on the industrial economy since 1986, when Paul Gray '54, SM '55, ScD '60, then the Institute's president, chose her as one of 17 faculty members to serve on the Commission on Industrial Productivity. At the time, other countries had made inroads in economic sectors long dominated by the United States; Japan, for one, had become a power in automobiles and consumer electronics. Over two years, the MIT commission, chaired by the computer scientist Michael Dertouzos, PhD '64, visited more than 200 companies, pored over data, and came to some conclusions about the state of the American economy.

"Once we started doing these interviews in companies, working from the ground up, a number of patterns emerged," says Berger. Among other things, the commission found, American companies were too focused on short-term results and not doing a good enough job of training workers, using input from employees at all levels of companies, and applying technology to develop and improve products. For instance, Japanese manufacturers in industries from consumer electronics to steelmaking were far more likely than U.S. companies to apply the concept of continuous improvement, seeking to make frequent, incremental changes to their products and production lines.

The project resulted in a book called *Made in America*, coauthored by Dertouzos, Institute Professor emeritus of economics Robert Solow, HM '90, and Richard Lester, PhD '80, now head of MIT's Department of Nuclear Science and Engineering. It sold more than 300,000 copies; after it was released in 1989, Berger found herself testifying before the U.S. Senate, along with the three principal coauthors, about the changes needed in American industry included greater flexibility in manufacturing processes, a wider variety of products, and government policies helping firms make capital investments.

At the commission's urging, MIT founded the Industrial Performance Center (IPC), which became the home of several large, interdisciplinary economic research projects in which Berger has since played a key role. These include a pair of studies about globalization and production in Hong Kong and Taiwan; Berger and Lester coedited books about the findings, *Made by Hong Kong* (1997) and *Global Taiwan* (2005).

Working on IPC projects with professors from other disciplines has given Berger an invaluable perspective on how manufacturing works and how industries evolve. She has visited dozens of factories with IPC member and electrical-engineering professor Charles Sodini, who taught her, she says, "to look through the eyes of an engineer at a manufacturing plant." From his own experience in the computer industry, Sodini also helped convince Berger that even as some industries or companies decline, others will rebuild with the leftover parts. For instance, she notes, although Digital Equipment Corporation, the prominent Massachusetts-based computer maker, floundered and vanished in the 1990s (after being acquired by Compaq), its legacy includes prominent alumni throughout the industry and the popularization of technological advances from programming languages to network protocols.

This idea is related to the Austrian economist Joseph Schumpeter's notion of "creative destruction," but Berger thinks of the phenomenon as "creative recomposition," in which knowledge, innovations, and capital are reorganized in productive ways. "It's a whole different way of looking at the world that I never could have gained from reading a book or going to a lecture," she says.

Within the last decade, Berger has helped lead still another global research project on manufacturing, involving 13 researchers over five years. She also served as lead author on the resulting 2006 book, *How We Compete*. The book examines two major issues facing multinational corporations: under what circumstances do they outsource basic business tasks to other companies, and when do they move their factories to developing countries with cheap labor costs? Diverse strategies emerged, even within particular industries. "Dell outsources just about everything," Berger says of the computer maker, "whereas Samsung is making many of the same products, but they're trying to keep as much as possible in-house. Over the years they have been very profitable companies. If we take industries that are under the most ferocious competitive pressures in the world—consumer electronics, apparel, automobiles—we see there are real choices for those companies."

How We Compete asserts that focusing on lowering labor costs, far from being a corporate necessity, can be self-defeating. "If you get your advantage by reducing labor costs, then you're in a place where your advantage is not sustainable," Berger explains. "Your margins will be thin and evanescent. There will always be someone who can undercut you, because there will always be other regions where people are willing to work for less. Instead, profits come from being able to do something that another company cannot easily replicate."

A slice of PIE

As the U.S. economy continues to stagnate, many observers believe that the manufacturing sector will inexorably give way to generally lower-paying service-industry jobs. In an op-ed in the *New York Times* in October, for example, the financier Steven Rattner decried "politically attractive happy talk nostalgically centered on restoring lost manufacturing jobs" and forecast that they would continue to disappear, "just as occurred decades ago with agriculture."

Historically, however, "there are big differences between agriculture and manufacturing," Berger says. "In the case of agriculture, we're eating all the food we can eat in the United States. Whereas in the case of manufactured goods, our appetite is vastly greater than our ability to produce this stuff. We have a huge trade deficit, and it's growing not only in simple goods but now in high-tech products." That reality calls these "standard tropes" about the inevitable decline of manufacturing into question, she believes.

She also rejects the idea that America's future lies even more in service industries. "The distinction between manufacturing and services seems to me ultimately a false one," she says. "Most of the most valuable products, from the most valuable companies we see, are bundles of services and manufactured products. An iPod or iPhone is both hardware and services."

The factory visits Berger has been making for PIE underscore that point. On a recent visit to a company in the eastern United States that makes equipment pipes and tanks for biotechnology companies, she found that a quarter of the company's revenue comes from repairing and servicing the equipment. "What we're discovering is that this connection between manufacturing and services is an integral one," she says. Moreover, she adds, "a set of capabilities is gained in making products that then get redeployed in the service part of a business."

But PIE is not generally intended to reinforce existing ideas. Indeed, the assumption guiding its work is that "this is a truly innovative society," explains Berger. "The single most important question in the study is: what kind of manufacturing do we need in order to get full value out of our innovation strengths?" Whereas *Made in America* examined productivity issues in several large industries, PIE focuses on questions that may cut across a multitude of industrial sectors, seeking ways to further develop manufacturing and extract more economic value from innovations generated in America's research labs.

PIE is scrutinizing a common assumption of the last quarter-century: that the IT industry is the basic paradigm for innovation-based manufacturing in America. "Some people think we can just do the innovation, and then license and sell and outsource it," says Berger. "When you look at Apple, that model works."

By contrast, Berger says, "those of us in the PIE study think it's an open question whether a similar model works elsewhere, particularly in the new emerging-technology areas." After all, IT companies often have low startup costs covered by venture capital, and their production tasks lend themselves to being handled overseas. But in areas such as energy, advanced materials, or biotechnology, "you're going to need far heavier capital investment," she says. It's not obvious how such companies can best finance the development and commercialization of their products.

Ultimately, the MIT researchers may outline many pathways to manufacturing success. As one slice of the PIE project, researchers are visiting a randomly chosen selection of the 3,500 U.S. manufacturing companies that doubled their revenues between 2004 and 2008, to see how these firms moved from the research and development stage into full production and how they decided where to locate their facilities. Some of these companies are not in new industries, either, but are what Berger calls "workhorses," such as a factory she recently visited in Western Massachusetts that produces the kinds of plastic jugs found in grocery stores.

The company has developed an innovative automation system that increased business so much it was able to double its workforce. Since plastic jugs are both bulky and inexpensive, it's not economical to produce them overseas and ship them to the United States to fill them with local milk and food products. "Is this just an odd little story?" says Berger. "Actually, no." Conglomerates like Procter & Gamble have kept similar forms of manufacturing in the United States, too. With that in mind, she asks, "How can we imagine enabling these firms to branch out into more innovative activities as well?"

The answers are not instantly forthcoming. But seemingly quirky discoveries like this help fuel Berger's enthusiasm for PIE research—especially when they raise the prospect of more jobs. Can manufacturing

renew itself in the United States? Such a revival would require some major changes. But then, Berger has witnessed plenty of changes in more than four decades at MIT. Now she would like to create a few more of them.