

Manufacturing's Wake-Up Call

Prepared by:

Booz & Company

Arvind Kaushal, Thomas Mayor, Patricia Riedl, Siddharth Doshi,
Mustafa, Al-Shawaf, Jeffrey Rothfeder

and

Tauber Institute for Global Operations, University of Michigan

Matthew Brady, Lucas Harmer, John Seaver, Michael Trent
under supervision of Professors Wally Hopp and Roman
Kapuscinski

booz&co.

M | **TAUBER INSTITUTE**
FOR GLOBAL OPERATIONS



A new study shows how the decisions
made today by goods producers and policymakers
will shape U.S. competitiveness tomorrow.

by Arvind Kaushal, Thomas Mayor,
and Patricia Riedl

MANUFACTURING'S WAKE-UP CALL

A debate over the future of U.S. manufacturing is intensifying. Optimists point to the relatively cheap dollar and the shrinking wage gap between China and the U.S. as reasons the manufacturing sector could come back to life, boosting U.S. competitiveness and reviving the fortunes of the American middle class. Whenever production statistics in the U.S. surge, it seems to bolster that hope; as *New York Times* columnist and Nobel laureate Paul Krugman put it in May 2011, “Manufacturing is one of the bright spots of a generally disappointing recovery.”

But then when disappointing economic growth indicators are released, the pessimists weigh in. They argue that the U.S. has permanently lost its manufacturing competitiveness in many sectors to China and other countries, that the sector is still declining after years of

offshoring and neglect, and that it might never return to its role as the linchpin of the U.S. economy.

Both the optimists and the pessimists are partially correct. U.S. manufacturing is at a moment of truth. Currently, U.S. factories competitively produce about 75 percent of the products that the nation consumes. A series of identifiable smart actions and choices by business leaders, educators, and policymakers could lead to a robust, manufacturing-driven economic future and push that figure up to 95 percent. Alternatively, if the U.S. manufacturing sector remains neglected, its output could fall by half, meeting less than 40 percent of the nation’s demand, and U.S. manufacturing capabilities could then erode past the point of no return.

Those findings emerge from a recent sector-by-sector analysis of U.S. industrial competitiveness,

Arvind Kaushal

arvind.kaushal@booz.com
is a partner with Booz & Company based in Chicago. He leads the firm's North American manufacturing team and specializes in manufacturing and product strategies and assessing relative competitive positions across the value chain.

Thomas Mayor

thomas.mayor@booz.com
is a senior executive advisor with Booz & Company based in Cleveland. With more than 20 years of consulting experience, he focuses across industries on supply and manufacturing strategy, operations turnaround, purchasing, and supply base management.

Patricia Riedl

patricia.riedl@booz.com
is a principal with Booz & Company based in Chicago. She works with manufacturers and retailers, specializing in driving value through manufacturing and supply chain strategies.

Also contributing to this article were Booz & Company senior associate Siddharth Doshi, associate Mustafa Al-Shawaf, and *s+b* contributing editor Jeffrey Rothfeder. We wish to thank the following individuals from the University of Michigan, Ross School of Business, Tauber Institute for Global Operations: professors Wally Hopp and Roman Kapuscinski, and Matthew Brady, Lucas Harmer, John Seaver, Michael Trent, and Ashish Vatsal. We also thank Conrad Winkler, executive vice president of the Long Products group at Evraz Inc.

along with a survey of 200 manufacturing executives and experts, conducted by Booz & Company and the University of Michigan's Tauber Institute for Global Operations. (So researchers could best analyze the relationship between U.S. employment and the future of manufacturing, plants located in the United States were counted as American, regardless of where the company that owned them is headquartered.) The studies — which included comparisons to similar Booz & Company studies of China and Switzerland — found that the U.S. has a much more productive manufacturing base than many people think. But no single country, not even China or the U.S., can claim to be the factory of the world, in the way the United States was after World War II.

Instead, for the foreseeable future, manufacturing will largely be regional. To be sure, exports play a critical role in any strong economy, and as we'll see, a global play (including offshoring) can be viable, especially when there are challenges at home. But for many manufacturers, economics and market dynamics increasingly suggest that they locate factories close to their major markets, including the United States. This type of region-oriented footprint is a clear way to provide adequate scale and volume, minimize transportation and logistics costs, increase market responsiveness and innovation, and customize products for the unique preferences of different regions and cultures.

If factory labor costs and currency rates were the sole enablers of manufacturing success, then the West could not compete with emerging nations or offshoring. More and more, though, these factors play a smaller part in manufacturing decisions. Four other considerations, all more complex, drive manufacturers' choices

about where to place and expand factories:

1. The skill level and quality of factory employees, especially for high-tech facilities.
2. The presence of high-impact clusters, in which many companies can learn from one another and innovate more readily.
3. Access to nearby countries with emerging consumer markets and lower-cost labor (for the U.S., this means building a future with Mexico).
4. A reasonably competitive regulatory and tax environment (for the U.S., this means simplifying and streamlining the current tax and regulatory structure).

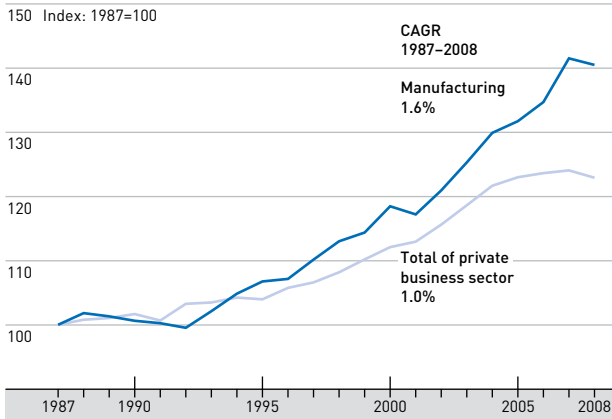
Will U.S. business leaders and policymakers rise to the challenge and create the conditions that would support manufacturing? Or will they fritter away the opportunity now being presented to them?

Why Manufacturing Matters

As trade policy expert and author Clyde Prestowitz points out, manufacturing is critical to prosperity for several reasons: its economies of scale, impact on innovation, and multiplier effect on the rest of the economy. (See "The Case for Intelligent Industrial Policy," by Art Kleiner, Arvind Kaushal, and Thomas Mayor, page 10.) In the United States, manufacturing directly accounts for 11 percent of the nation's GDP: an absolute figure of US\$1.47 trillion, larger than Spain's entire domestic product. When all economic activity expressly linked to manufacturing is accounted for — including equipment maintenance, transportation, scientific and technical services, and construction — the share of GDP attributable to manufacturing grows to 15 percent. That means one in seven U.S. private-sector jobs, or 13.5 percent, is directly linked to manufacturing. The sector's share of

Exhibit 1: Productivity in the United States

For more than 20 years, the U.S. manufacturing sector disproportionately propelled growth in multifactor productivity (the changes in economic output per unit of combined inputs) — a critical key to prosperity.



Note: CAGR is compound annual growth rate.

Source: Bureau of Labor Statistics, Booz & Company

GDP increases to as much as 25 percent when second-order linkages such as retail sales near plants, systems development, and legal services are included.

Historically, manufactured goods are more tradeable than other categories. Thus, a strong manufacturing base is essential to reducing the U.S. trade deficit, which hit \$497 billion in 2010 and is an unnerving drag on GDP. Unless steps are taken to revitalize manufacturing, up to 50 percent of the “value add” of the U.S. economy — the value of manufactured goods beyond their raw material costs — is at risk of disappearing. If that happened, the U.S. trade deficit would top \$1 trillion, a troubling level for any country seeking economic growth.

Perhaps the least understood benefit of manufacturing is how closely it is related to innovation in design, product development, quality control, and factory processes. In 2008, 67 percent of all private-sector R&D was conducted by manufacturing companies, according to the National Science Foundation. And from 2006 to 2008, 22 percent of U.S. manufacturing companies reported a new or significantly improved product, service, or process, compared with 8 percent of nonmanufacturing companies. Innovation propels improvements in worker output, capital flow, usage of materials and energy, energy conservation, and other components of productivity. Increased productivity, in turn, leads to faster economic growth and a higher standard of living. Between 1987 and 2008, productivity grew in the U.S. manufacturing sector 65 percent faster than in business as a whole. (See Exhibit 1.)

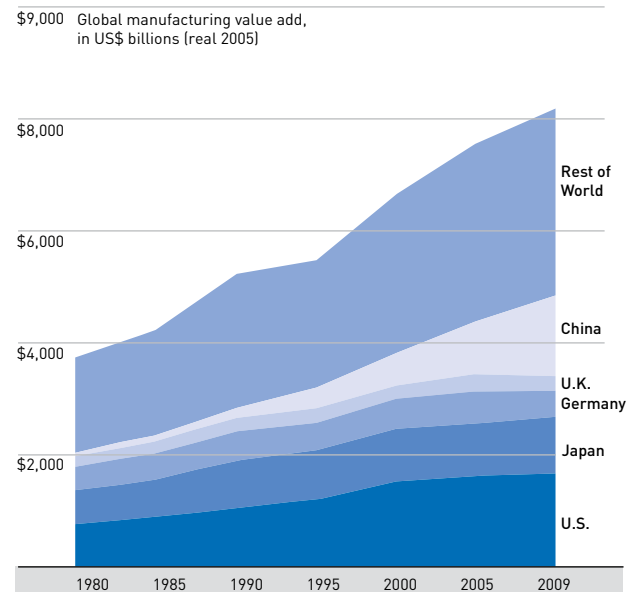
Many U.S. manufacturing leaders are well aware of the role that innovation plays in a nation’s economy, and in their own performance. “The labor component — the need to choose where to set up manufacturing facilities based primarily on where the wages are cheapest — is not the major driver anymore,” says Eric Spiegel, president and CEO of Siemens Corporation. “Instead, other factors — access to skilled labor, modern infrastructure, the ability to drive innovation with world-class R&D, and capabilities like new manufacturing technologies or innovative lean production systems — propel decisions about new factories. These play well to the U.S.’s strengths. So we’re adding new manufacturing in the U.S.”

America’s Lost Decade

The conventional wisdom says that the decline of U.S. manufacturing began in the late 1970s, when Japanese automakers and electronics companies outpaced their U.S. rivals in design, quality, efficiency, and costs. But a

Exhibit 2: Global Manufacturing by Country

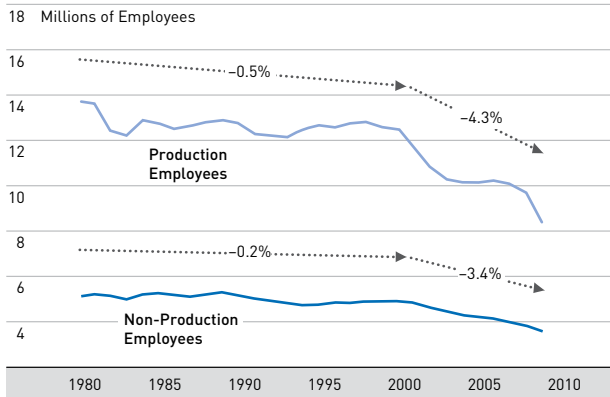
Manufacturing’s contribution to worldwide production value — its “value add,” calculated as the revenues generated minus the costs of raw materials — has grown most not in Germany and Japan, as some assume, but in China and the United States.



Source: UN National Accounts Main Aggregates Database, Booz & Company

Exhibit 3: U.S. Manufacturing Employees, 1980–2010

Manufacturing employment fell only slightly during the 1980s and 1990s — but has fallen sharply since 2000, a consequence of technological change as well as offshoring and other factors.



Source: Bureau of Labor Statistics, Booz & Company

closer examination of the historical data covering 1980 through 2010 presents a somewhat different picture.

During the 1980s and 1990s, although there were high-profile problems in specific sectors such as autos and textiles, U.S. factories as a whole held their own. Even manufacturing employment held steady. Between 1980 and 2000, production jobs fell by only 0.5 percent annually; in fact, the U.S. outperformed both Germany

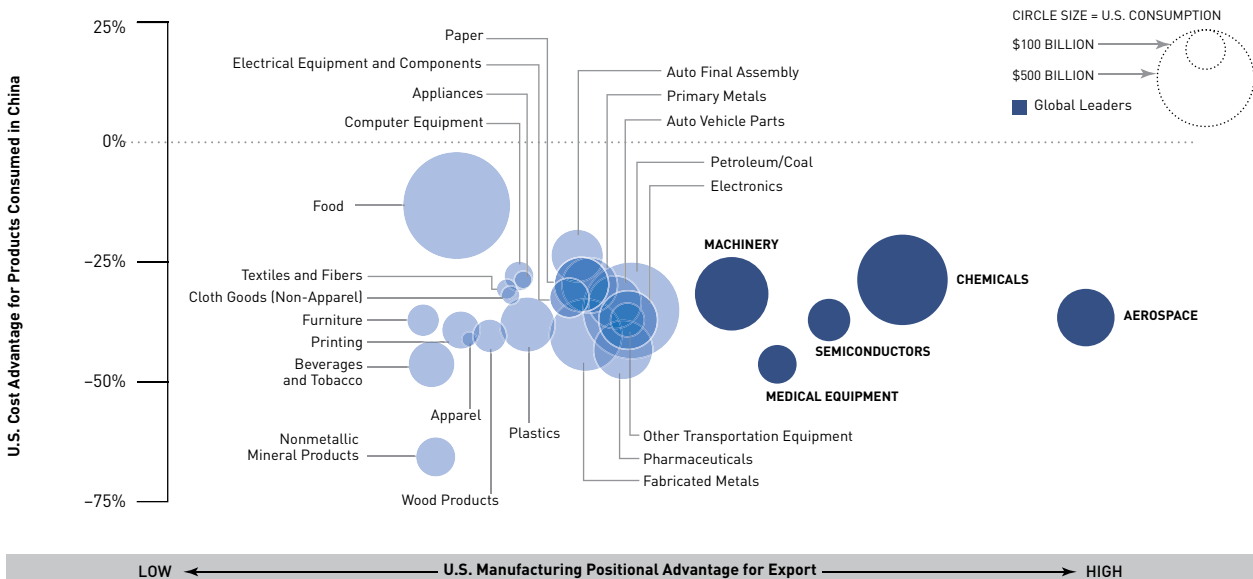
and Japan in the value of manufacturing output as a percentage of global production. (See Exhibit 2, page 33.)

However, in the 2000s, U.S. manufacturing output as a percentage of global production fell dramatically. The ratio of exports to imports, a critical sign of manufacturing viability, also fell. The number of manufacturing jobs dropped as well, by 4.3 percent per year, and 3.4 percent of non-production jobs were eliminated annually. (See Exhibit 3.) Many factors contributed to a relentlessly troubling decade for U.S. manufacturing. Capital investment in new and old plants slowed, dropping below replacement levels. In some industries, innovation lagged, and some U.S. companies faced a shortage of critical skills. The rapid pace of globalization and competition from emerging economies exacerbated these effects.

Still, the data shows clearly that U.S. manufacturing as a whole has great potential to rebound. When considered sector by sector, many U.S. companies can and should be the supplier of choice for the vast majority of goods sold in North America — and some can still be a primary source of production for global markets. This resilience was evident in the survey of manufacturing professionals; more than 65 percent of respondents said that it was unlikely they would stop investing in new U.S. manufacturing assets and technologies by

Exhibit 4: U.S. Manufacturing Competitiveness for Exports

A number of U.S. industries stand out as global leaders, based on two key indicators of manufacturing export competitiveness: costs compared with Chinese manufacturers for products consumed in China (the y-axis) and general worldwide export advantage (the x-axis).



Note: The U.S. cost advantage represents the labor and logistics costs compared with those of Chinese manufacturers, for products consumed by people in China.

Source: U.S. Census Bureau, Bureau of Labor Statistics, UBS Research, CapitalIQ, Energy Information Administration, World Bank, Eurostat, World Trade Organization, IRS Statistics, Tauber Institute for Global Operations, Booz & Company

2025. Many of them are shifting manufacturing activities back to North America from Asia and other off-shore locations.

Four Kinds of Industries

With unit labor costs playing a smaller part in manufacturing decisions, other factors — including talent availability, market accessibility, innovation, regulations, intellectual property protections, barriers to entry and exit, and scale of operations — increasingly drive decisions about where to place and expand factories. Based on the relative economics for each segment, we charted which U.S. industries can compete as exporters, which can be dominant in the regional North American market, which can survive but are threatened by foreign competitors, and which are already mostly overseas but can still manufacture in the U.S. to serve niche markets. (See Exhibits 4 and 5.)

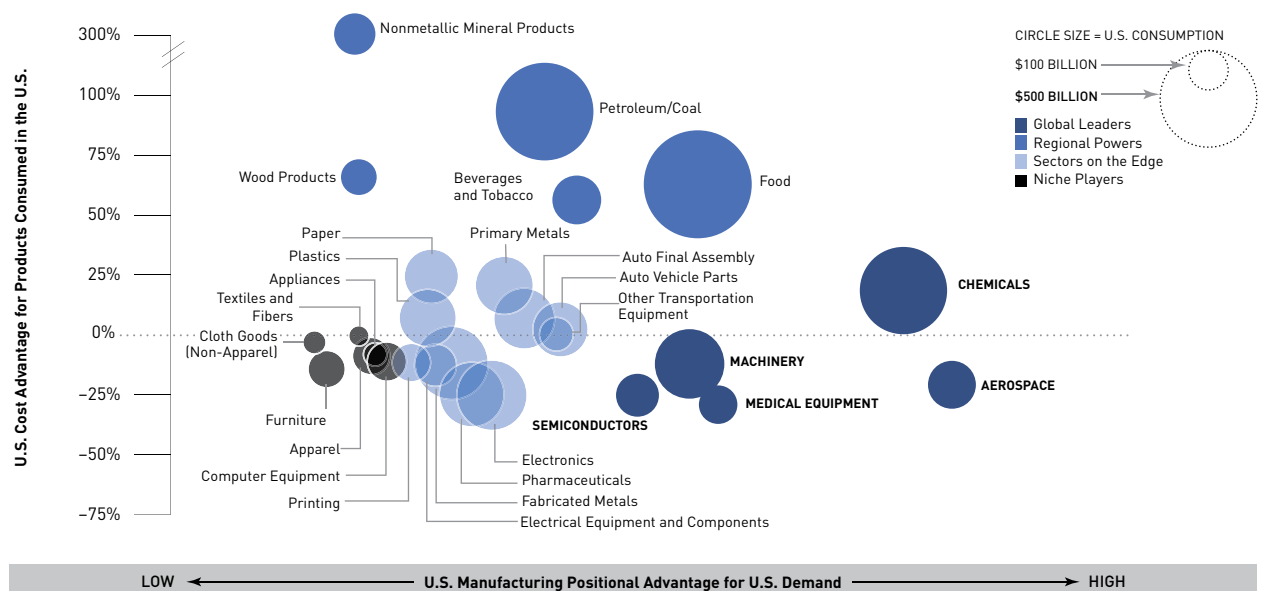
- **Global leaders: aerospace, chemicals, machinery, medical equipment, and semiconductors.** Companies

in these industries have a critical worldwide advantage stemming from their high investment scale, established intellectual property, skilled workforces, and close ties with customers. For example, the U.S. commercial aerospace segment (primarily Boeing Company and its suppliers) benefits because aircraft development is so costly and knowledge-intensive that few new companies can compete. In addition, aerospace manufacturing requires uniquely qualified labor, substantial participation from corporate R&D, and proprietary technology efforts, often with national security implications. Thus, much overseas production is ruled out. However, even this sector could lose manufacturing to overseas sites if demand in emerging markets skyrockets, providing a sound economic rationale for some global leaders to establish manufacturing bases in China or elsewhere.

- **Regional powers: food, beverages and tobacco, nonmetallic mineral products, wood products, and petroleum/coal.** Focusing on North American demand will continue to be a lucrative strategy for many U.S.

Exhibit 5: U.S. Manufacturing Competitiveness in Domestic Markets

Based on two key indicators of manufacturing competitiveness within the U.S. — cost and positional advantage — U.S. manufacturers sort into four groups. Global leaders and regional powers are well positioned to compete; sectors on the edge and niche players are more challenged.



Note: The U.S. cost advantage represents the labor and logistics costs compared with those of Chinese manufacturers, for products consumed by people in the United States.
Source: U.S. Census Bureau, Bureau of Labor Statistics, UBS Research, CapitalIQ, Energy Information Administration, World Bank, Eurostat, World Trade Organization, IRS Statistics, Tauber Institute for Global Operations, Booz & Company

Revitalizing Education for Manufacturing

by Wally Hopp and Roman Kapuscinski

Conversations about the future of manufacturing often become conversations about education. A host of factors are raising the skill levels required for employment in this sector.

- **Technology:** Any job that involves fully prescribed tasks is at risk of being taken over by a machine.

- **Globalization:** As manufacturing has moved to regions with low-cost labor, the huge comparative advantages enjoyed by the U.S. workforce have dissipated.

- **Economics:** In many sectors, the financials do not favor either local or overseas production. Manufacturers increasingly base their location choice on non-financial factors, such

as the quality of the workforce.

Thus, in today's flat world, an economy can justify high wages only in return for high skill levels. Indeed, whereas total manufacturing employment in the U.S. has declined since 1980, the number of high-skill manufacturing jobs has increased by roughly 40 percent.

It is well known that the quality of a nation's education affects its manufacturing prowess. Between 1850 and 1940, compulsory universal education and a broad system of public universities, community colleges, and other schools ensured that the U.S. workforce was better trained than the rest of the world. This fueled a period of unparalleled productivity and economic growth, led by the manufacturing sector.

But in 2011, the United States no longer has the best-trained workforce. Most countries have passed the U.S. in such metrics as hours spent in school each year, math and science scores, literacy rates, and high school graduation rates. Al-

though enrollments in U.S. community colleges have increased recently, the graduation rates at these schools have fallen below 40 percent.

To remain globally competitive for manufacturing, U.S. education at all levels must be improved in four fundamental ways. First, there must be more relevant instruction, starting with a revitalization of the industrial arts curriculum. Once common, "shop" and other vocational courses have been crowded out of most high schools thanks to a preoccupation with college preparation. We must provide a better, more technologically astute avenue for the large number of students who are not college-bound but who will need to participate in the economy of the future. Revitalized industrial arts courses would also benefit college-bound students who are interested in engineering. Beyond this, because K-12 education cannot fully equip workers for the technical demands of high-skill manufacturing jobs, community colleges and technical schools must adapt their

manufacturers. The United States is the world's largest market — wealthy and still growing (albeit not as fast as emerging economies) — and Mexico and Canada offer additional opportunities. For food, beverages, tobacco, and many other consumer products companies, the incremental disadvantages of importing (for example, the cost of transporting products to the U.S., plus long shipment lead times and product safety concerns) outweigh pro-offshoring factors such as the higher cost of U.S. production. For nonmetallic mineral and wood products segments, product transportability requirements and proximity to the supply base give U.S. factories a leg up.

- **Sectors on the edge: paper, plastics, electrical equipment and components, fabricated metal products, pharmaceuticals, automotive vehicle parts, other transportation equipment, final assembly of motor vehicles, printing, and electronics.** These manufacturing segments

feel the presence of low-cost overseas rivals nipping at their heels. To compete effectively, they need simplified government regulations and permitting processes, as well as more certainty and speed in gaining approval to expand old plants and build new facilities. In addition to better government support, many companies in these sectors must rethink their strategies, investing in the specific U.S. markets where they are best suited to compete. Some industries, such as printing, can maintain a foothold in the U.S. for specialized or customized products targeted at the North American market. Meanwhile, they can produce mass-quantity products with less stringent delivery schedules in lower-cost countries.

- **Niche players: textiles, apparel, furniture, computer equipment, and appliances.** Most companies in these sectors have moved production outside the United States. The remaining activity generally serves small-

curricula in response to the needs of industry.

Second, schools must improve the quality of their execution; better classroom instruction for non-college-bound students is desperately needed. Third, schools must become more effective at engineering and vocational guidance, ensuring that students know about the continually evolving career paths in manufacturing. Fourth, access to learning should be expanded. The U.S. might consider subsidizing tuition for technical training programs, thus competing more effectively with the established practice in other countries.

An excellent model for achieving all these goals is South Carolina's state-funded ReadySC program (www.readysc.org), which maintains regular communication between industrial leaders and local colleges about the skills needed in industry. This program benefits both employers and students.

In addition, higher education can and must do more to highlight

manufacturing-related career opportunities. Although U.S. universities still set the standard for the world in terms of quality of research and education, they are struggling to lure domestic students into science and engineering fields related to manufacturing. These programs are filled with international students who excel in their studies, but then have difficulty obtaining visas to remain in the United States. We need to promote manufacturing as a field of study, and relax U.S. visa policies to allow more well-trained students from overseas to work in the United States. The University of Michigan (our own institution) is addressing the former issue through the Tauber Institute for Global Operations, which provides students with an integrated engineering and business curriculum. To ensure that they acquire the skills that manufacturers and manufacturing consulting companies are looking for, the institute maintains an active advisory board consisting of senior executives from 30 major

companies. Not surprisingly, Tauber graduates are in high demand.

When it comes to the future of manufacturing, all roads lead to education. But education infrastructure takes a long time to build and is difficult to maintain. The countries that strengthen and reinforce it most rapidly and effectively will be winners in the global economy.

Wallace (Wally) Hopp

whopp@umich.edu

is the Herrick Professor of Manufacturing at the University of Michigan's Stephen M. Ross School of Business and a faculty member at the Tauber Institute.

Roman Kapuscinski

roman.kapuscinski@umich.edu

is a professor of operations and management science at the Ross School and a co-director of the Tauber Institute. For more on the institute, see www.tauber.umich.edu.

scale, highly specialized niche markets. For example, the small company Timbuk2 Designs Inc. allows customers to design their own briefcases, backpacks, and totes; it has a strong customer community among cyclists on the West Coast. The furniture segment is similarly bifurcated. Flat-pack furniture for the U.S. market is mostly made in China, whereas preassembled furniture is more likely to be made domestically.

In short, nearly 50 percent of the value added by U.S. manufacturing and more than 50 percent of U.S. manufacturing jobs are at risk. (See Exhibit 6, page 38.) In these sectors, on the basis of labor and logistics trade-offs, many U.S. manufacturers have opted to build plants in emerging markets such as the BRIC countries (Brazil, Russia, India, and China). They also feel pressure from investors and other influential internal players to be proactive in the fastest-developing regions, where billions of people are joining the consumer economy.

(See "Competing for the Global Middle Class," by Edward Tse, Bill Russo, and Ronald Haddock, page 62.)

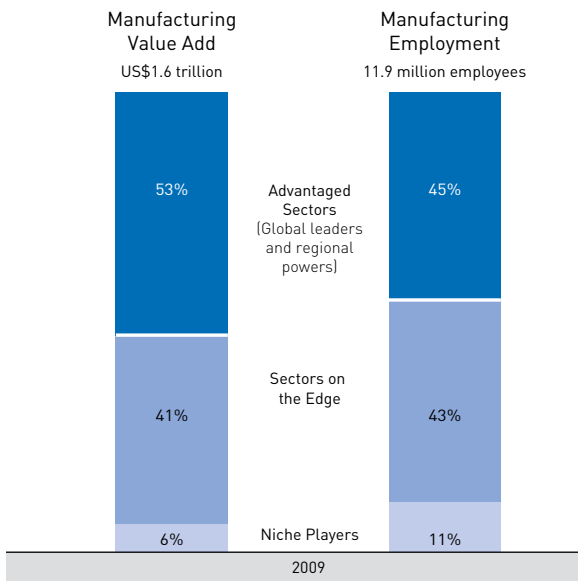
This strategy has paid off for global players and for those who target specific emerging markets in a well-planned way. But it hasn't worked out for all manufacturing businesses; for example, it can leave them more exposed to competition in the United States, which is still their largest market. Nonetheless, if the trend continues unabated — that is, if U.S. companies rush toward emerging economies without continuing to invest in their own country — then U.S. manufacturing could fall woefully behind in new plant and production technologies, losing important links to high-value innovation and making revival more difficult.

Manufacturing Momentum

Our analysis translates into clear recommendations for improving the competitiveness of U.S. manufacturing.

Exhibit 6: U.S. Manufacturing Jobs at Risk

Advantaged sectors (those that are global leaders and regional powers) represent about half of manufacturing employment; the rest (sectors on the edge and niche players) are more vulnerable to job loss.



Note: Due to rounding, percentages may not total 100.

Source: Bureau of Economic Analysis, Bureau of Labor Statistics, Annual Survey of Manufacturers-U.S. Census Bureau, Booz & Company

The following strategies can provide the greatest momentum in both the public and private spheres:

1. Attract the best workers. Qualified manufacturing employees are surprisingly scarce in the United States. As companies transform their plants from hubs of manual work to automated facilities with complex control systems and sophisticated processes, they struggle to fill multiple holes in their workforce: technical (programmers, IT developers, designers), professional (engineers, scientists, functional support), and skilled

(equipment operators, specialized maintenance experts, craftsmen). A contributing factor to this employee scarcity is traditional manufacturing’s lack of appeal to students. A recent Booz & Company survey of more than 200 engineering, science, and math undergraduates found that although 80 percent of the engineering students had some exposure to manufacturing— through either firsthand experience, college courses, or conversations with factory workers — only 50 percent regarded it as an attractive career. That number dropped to 20 percent among the science and math students. Around the same time, Siemens reported having nearly 3,500 open manufacturing positions in the U.S. requiring high-level science, technology, engineering, and math skills, with low expectations of filling many of them.

The talent issue is particularly pronounced in the pharmaceutical and high-tech sectors, where science and engineering graduates are needed for many operations positions. Manufacturing recruiters must compete with R&D for qualified individuals, and some have relocated to higher-cost cities because such places attract people.

Many companies — especially those in electronics, medical equipment, pharmaceuticals, and other sectors requiring high levels of knowledge on the factory floor — find that the shortage of qualified employees in the U.S. leaves them no choice but to shift some operations to other countries. This is particularly disturbing because these job categories often involve innovation and are thus essential catalysts for productivity increases and economic growth. The shortage of technical, professional, and skilled labor also contributes to substantially higher wages in U.S. manufacturing than in other countries, including other developed economies.

Educational initiatives that promote engineering

Many companies find that the shortage of qualified employees in the U.S. leaves them no choice but to shift some operations to other countries.

can increase the talent pool. China already graduates more engineers each year than the U.S., and a number of other countries graduate a higher proportion of their population as engineers. It would also be helpful to relax federal immigration regulations for trained knowledge workers: for example, liberalizing H-1B visa restrictions to allow foreign national students in science, technology, engineering, and math programs to remain in the U.S. more easily after finishing their education, rather than returning to their home countries. State governments are well positioned to abet manufacturing education with scholarships and programs such as South Carolina's ReadySC program, which establishes partnerships with businesses to provide customized training in colleges. (See "Revitalizing Education for Manufacturing," by Wally Hopp and Roman Kapuscinski, page 36.) "The philosophy [here] has been that if you invest in South Carolina, South Carolina will invest in its people to prepare them to work in your plant," says Bobby Hitt, South Carolina's secretary of commerce and a former BMW executive, who was a leading figure in the automaker's 1994 decision to build its only U.S. factory in Greenville.

Manufacturing companies must also offer a more collaborative workplace experience, engaging workers and giving them opportunities to continuously improve and seek productivity gains. They can also attract workers by showcasing their latest technology at campus recruitment events and industry job fairs, increasing college internships, forming partnerships with local colleges and universities to identify and sponsor talent, inviting students of all ages on factory tours to show that manufacturing can be a rewarding career, and partnering with other manufacturers to jointly support

specialized training programs or attend faraway recruitment events.

2. Invest in high-impact clusters. Since Michael Porter coined the term in his 1990 book, *The Competitive Advantage of Nations* (Free Press), *clusters* have been a widely recognized way to spur economic growth and development. In the context of manufacturing, clusters are essentially geographic concentrations of interconnected companies, suppliers, service providers, and associated institutions (such as university research labs). Silicon Valley; the collection of life sciences companies in eastern Massachusetts; and the aerospace cluster in Wichita, Kan., are good examples.

Clusters have several benefits. They increase productivity and efficiency because they bring together suppliers with customers, designers with engineers, and university researchers with corporate production managers to better share information and new ideas. This collaborative ecosystem helps new companies and innovative business models emerge. Because they represent strong, self-supporting communities — where interactions among employees inspire enthusiasm for their work and help them gain more diverse skills — companies located in manufacturing clusters tend to have lower turnover and attract better talent than non-clustered companies.

State and local governments can encourage clusters by investing in infrastructure — roads, ports, rail lines, and communication links — for centers that have begun to form organically. Policymakers can also provide up-front tax incentives or other inducements to attract companies. Both the state and federal governments can fund research institutes and university programs, but studies have shown that governments should not seek to micromanage cluster creation. They are better suited

France Faces a Dilemma

by Kaj Grichnik and Jerome Pellan

The United States is not alone in its manufacturing malaise. In virtually every Western country, factory employment is disappearing and trade deficits are dangerously on the rise. Take France, for example. Between 1999 and 2009, the country moved from a positive trade balance of €17.8 billion (US\$25.4 billion) to a deficit of €21.1 billion (\$30.1 billion), a disturbing change in direction that took 30 percent of France's manufacturing jobs with it.

And although these numbers mirror trends in the U.S., one very big distinction hidden in these statis-

tics provides important clues about whether France and other western European countries are more likely to enjoy a manufacturing recovery, or whether the U.S. is — and that distinction clearly favors the United States. Unlike U.S. losses, the lion's share of France's losses in manufacturing capacity are not due to China and other low-cost nations; instead, French production and jobs are moving primarily to Germany.

In other words, the deterioration in France's manufacturing capacity is the result of a shift within its region. Of the €38.9 billion (\$55.5 billion) total decline in France's trade balance, only about €7.2 billion (\$10.3 billion) is directly attributable to the growth of its trade deficit with China. Yet between 1999 and 2009, France's trade imbalance with Germany increased

by a whopping €13 billion (\$18.5 billion). By contrast, the United States' trade imbalance with China grew more than threefold in that period while the U.S. trade deficit with Germany held steady.

The implications of this for France and for the United States could not be more different. If manufacturing does, in fact, become more and more regional, the United States stands to gain from the movement back to North America of Chinese and other low-cost production facilities. France, though, doesn't have that luxury.

Moreover, France's worsening trade deficit with China has been driven chiefly by manufacturing losses in lower-tech, lower-margin products, such as apparel, furniture, and office machines. France's trade

to supporting and promoting these industrial networks while allowing them to develop naturally.

Individual companies (or trade groups associated with clusters) can also take steps to fashion clusters and attract businesses and talent. They can set up improved connections between suppliers and buyers, and maintain up-to-date standards and innovative practices in infrastructure, renewable energy, and plant processes and technology.

3. Build a future with Mexico. For many companies on the edge, Mexico offers a cost-conscious and attractive alternative to China and other distant offshoring sites. By developing production facilities there, manufacturers can tap a relatively low-cost labor pool and maintain tight links with R&D talent and facilities in the United States. A Mexican footprint also helps companies tailor their supply chains: shifting less-demanding, high-labor products or components with relatively stable designs to Mexico while keeping highly skilled work or rapidly evolving technology in the U.S., where the workforce is generally more educated. Then products can be shipped around the Western hemisphere at relatively low expense.

“When you combine the U.S. and Mexico as a

manufacturing partnership, for the most part it wins over [a combination of] the U.S. and China, especially in terms of economics, demand proximity, and responsiveness of the supply chain,” says Ron Weller, vice president of global operations and power solutions at Johnson Controls Inc. (JCI), a maker of vehicle electronics, batteries, and interiors.

Of course, to build a viable U.S.-Mexico manufacturing base, substantial obstacles must be addressed by the public and private sectors of both countries. Narcotics-related violence along the border has hurt manufacturing companies' ability to produce and ship without disruption. Mexico's rail and road infrastructure is subpar, the country produces few basic raw materials and needs better access to inexpensive commodities (which might be supplied from the southern U.S.), and Mexican workers need further training and skills development. It may take concerted collaborative effort by government and business leaders in both countries to address these problems, but the payoff could be immense.

4. Simplify and streamline the tax and regulatory structure. At 39 percent, the official U.S. statutory corporate tax rate is the second-highest of all countries

imbalance with western European nations has come at the expense of higher-value products such as automobiles, advanced chemicals, and industrial machinery. Consequently, for France, the regional manufacturing model could turn out to be a very expensive development.

France's inability to compete effectively against other countries in its backyard for factory capacity is linked to a set of labor and cost dynamics that are increasingly antiquated in a more globalized and malleable manufacturing environment. For example, France's 35-hour workweek, imposed in 2000 just as other countries were liberalizing production shift rules, increases the overall cost of labor. Further, because of France's generous medical, unemployment, and pension benefits for residents,

companies pay an amount equal to about 83 percent of net salaries in so-called social charges, compared with only 47 percent in Germany. And industrial labor relations in France are extremely adversarial.

By addressing these and other equally problematic issues adroitly, France could possibly dissuade some CEOs from closing French factories. But if France doesn't address these issues in the next 10 years, the country stands to lose an additional 7 percent of its manufacturing workforce, or about 200,000 jobs.

There are some indications that improving the fortunes of manufacturing is increasingly important to French politicians of all stripes. One of the more audacious proposals calls for taxing sectors that are not exposed to international competition to help in-

dustries that are. But it will take more than new fiscal measures for France to regain its former manufacturing glory; a 21st-century cultural and social transformation is needed for France to again resemble the country that spawned such legendary industrial figures as Peugeot, Eiffel, Citroen, Hussenot, Renault, and Schlumberger.

Kaj Grichnik

kaj.grichnik@booz.com

is a partner with Booz & Company in Paris and the coauthor (with Conrad Winkler) of *Make or Break: How Manufacturers Can Leap From Decline to Revitalization* (McGraw-Hill, 2009).

Jerome Pellan

jerome.pellan@booz.com

is a senior associate with Booz & Company in Paris.

in the Organisation for Economic Co-operation and Development; only Japan has a higher rate. Because of tax credits, deductions, and tax law complexities, the federal government collects only about 28 percent. But manufacturers spend much of the difference on compliance costs and sophisticated tax minimization strategies. Unfortunately, many companies use the 39 percent figure for evaluating investment options, because it is too risky otherwise; in cost-benefit calculations, they can't assume that deductions will be available in the future. This often dissuades them from opening or expanding factories in the U.S.

Reducing taxation levels and tax code complexity would be a revenue-neutral way to put U.S. manufacturing on a more level playing field with other leading economies. This step alone would encourage new investments in manufacturing assets, which in turn would expand the tax base, potentially resulting in higher government income. Another step would be changing tax rules to allow manufacturers to move dollars from overseas back without a tax penalty. This would make many companies more likely to reinvest foreign profits in U.S. manufacturing.

"We operate in a lot of places outside the United

States, and if you're in our position you might want to repatriate money to invest in an asset or to fund an expansion," says Michael Rajkovic, chief operating officer of auto supplier Tower International Inc. "So if you need money in the United States and you already paid taxes on that money in another country, you have to pay taxes on it again before you can invest in your business in the U.S. What kind of sense does that make?"

The U.S. regulatory system also contributes unnecessarily to complexity and uncertainty. In 2008, federal regulations — including economic, workplace, environmental, and tax rules — cost companies an estimated \$1.75 trillion, or 14 percent of national income, according to the U.S. Small Business Administration Office of Advocacy. In the Booz & Company survey, 61 percent of respondents cited government regulations and policies as having a negative impact on their companies' U.S. manufacturing output. This was, by far, the survey respondents' most frequently cited risk. In general, many executives complain that the regulatory process has become paperwork-driven rather than outcome-driven, requiring companies to navigate an expensive labyrinth just to gain approval for, say, a plant expansion. The associated delays make opening up facilities

overseas much more desirable. “If your market window is 18 months and it takes you 18 months to get a permit in the U.S. and eight weeks to get one in Taiwan, where are you going to go?” asks Jack McDougle, senior vice president of the U.S. Council on Competitiveness.

To move forward, current and new regulations should undergo a regulatory process analysis to ensure that they are necessary to deliver health, safety, environmental, or other benefits to the community. A number of manufacturing leaders have commented that other countries have even higher environmental and regulatory standards than the U.S., but with fewer bureaucratic hurdles.

Creating Competitive Capabilities

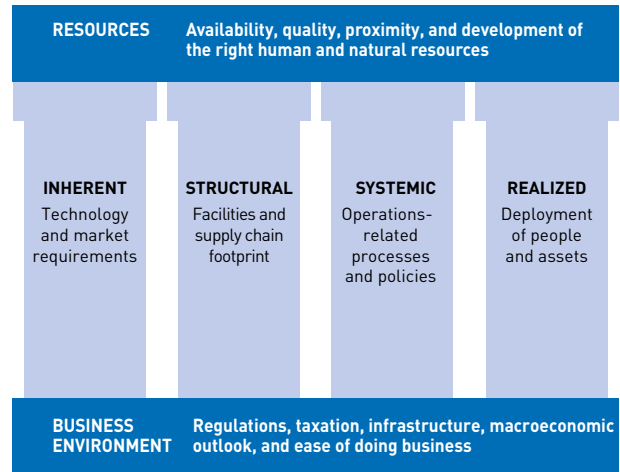
Within companies, manufacturers can make the most of their U.S. footprint by building up their company’s bedrock capabilities. Basic manufacturing capabilities are needed in many sectors just to stay in business. However, in each company, some capabilities will deserve extra investment, to help ensure that manufacturing prowess is tightly aligned with the company’s competitive strategy and helps to set its line of products apart from the crowd.

The capabilities that manufacturers need are captured in the “ISSR” framework developed by Booz & Company. (See Exhibit 7.) *Inherent* capabilities involve technological excellence and market understanding. *Structural* capabilities cover the makeup of a company’s manufacturing footprint, the structure of its supply chain, and the efficiency of its distribution network. *Systemic* capabilities address manufacturing and cross-functional processes, including lean production systems. *Realized* capabilities focus primarily on aligning employees with the overall strategic thrust of the organization and driving efficiency improvements.

Supporting these four pillars of manufacturing prowess are other capabilities that both the private sector and federal and state governments have a hand in developing. Among them: finding and developing the right human and natural resources at the right cost, as well as ensuring that the business environment — taxes, regulations, and labor and trade rules, for starters —

Exhibit 7: A Framework for Manufacturing Capabilities

In the ISSR framework, the vertical pillars represent activities undertaken by manufacturers. The horizontals represent contextual enablers, generated by government and the business environment (the floor) and the mix of available resources (the roof).



Source: Booz & Company

enhances manufacturing innovation and growth.

To be truly distinctive and to sustain a competitive advantage, manufacturers must go beyond basic operational capabilities; they must develop specific and unique capabilities that match their strategic goals. “You’d better focus on reinventing manufacturing and process technology and on finding the next breakthrough process that’s going to be leaving everyone behind, a process that the rest of the world can chase,” notes JCI’s Weller.

For example, a Tier One auto supplier that was a firm believer in a “small plant philosophy” was losing its competitive position as product designs standardized and more rivals with advantaged cost positions emerged. The company went through a “no constraints” strategy process to focus its effort on the winning technology and build a footprint that leveraged global scale. This dual strategy — enhancing the company’s capabilities in both the inherent and structural pillars — differentiated the supplier from its closest competitors and turned around its fortunes.

Toyota is well known for its attention to the systemic pillar; its acclaimed lean production system has led to substantial quality and productivity gains and a leadership role in the industry. Many other auto manufacturers have followed suit, building their quality and reliability. But lean initiatives are hard to sustain unless the realized pillar is well developed. One global diversified manufacturer learned this when its

Designing production systems that align employees' activities with the company's overall strategy and that empower employees to improve manufacturing processes can unlock productivity and innovation.

attempt to build efficiency and eliminate waste fell flat at first. Then, by segmenting its products into “stable and predictable” and “variable and customizable” buckets, the company created two production streams, simplifying the assembly line for its workers. The employees' motivation rose as supervisors gave them more freedom and responsibility. The result was significant inventory reduction and substantially improved worker productivity.

In general, designing production systems that align employees' activities with the company's overall strategy and that empower employees to improve manufacturing processes can unlock the productivity and innovation potential of the well-educated U.S. workforce. For at least a generation to come, this in itself could provide a competitive advantage for manufacturing in the United States.

Chief Manufacturing Optimists

This is a defining moment for U.S. manufacturers — and, indeed, for the U.S. economy. Although the challenges may seem daunting, the executives who responded to the Booz & Company survey are generally optimistic. In stacking U.S. manufacturing facilities against plants in other countries, only 5 percent viewed offshore plants as better in quality, and only 14 percent said that other countries' facilities would respond more effectively to volatile demand.

Every country needs creative, engaged, and profitable manufacturers if it hopes to have a healthy economy that supports the aspirations of all of its citizens. If you are a manufacturing leader in the United States, you shouldn't have to go it alone. You should have support at all levels of government and culture — from

Washington to the local cluster. Like all businesspeople, you must come to terms with the fact that the world has changed. But as the data shows, the U.S. has a strong base to build on. The future of U.S. manufacturing in general, and of your company in particular, can be extremely bright. The current wake-up call represents an opportunity for you to clarify your strengths, channel your investment, and create your own distinctive direction. +

Reprint No. 11306

Resources

Joni Bessler, Stephen Li, and Sophia Pan, “China Manufacturing Competitiveness 2009–2010,” Booz & Company and AmCham Shanghai, 2010: Forecast of prospects and dangers for the burgeoning manufacturing industry of Greater China.

Kaj Grichnik and Conrad Winkler, with Jeff Rothfeder, *Make or Break: How Manufacturers Can Leap from Decline to Revitalization* (McGraw-Hill, 2008): Explains the ISSR framework in more detail and how to foster a manufacturing renaissance.

Ronald Haddock, Niklas Hoppe, Olaf Bach, and Martin Naville, “A Renaissance at Risk: Threats and Opportunities for Swiss Manufacturing,” Booz & Company and Swiss-American Chamber of Commerce, 2010: Analysis similar to this one for a country with great strengths and some vulnerabilities in manufacturing.

Wallace (Wally) J. Hopp and Mark L. Spearman, *Factory Physics* (McGraw-Hill/Irwin, 2008): Influential textbook articulating ways in which manufacturing leaders can develop stronger capabilities and higher strategic performance.

For more on this topic, see the *s+b* website at: www.strategy-business.com/operations_and_manufacturing.
