

MANUFACTURING MATTERS

Kent Hughes

SUMMARY

Manufacturing plays a key role in the U.S. economy and will continue to do so. The private sector provides roughly 70 percent of total U.S. spending on research and development, and the bulk of that amount comes from manufacturing enterprises. Manufacturing generates 90 percent of U.S. patents. It also is central to the system that translates laboratory research into commercial products, thus generating jobs and creating wealth. Manufacturing also constitutes the single most important export sector of the economy and is thus critical to America's ability to pay its way in the international economy. Finally, manufacturing generates millions of jobs, which provide pay and benefits that exceed the national average. Looking ahead, the United States needs a manufacturing strategy that can support the emergence of advanced manufacturing processes that, in conjunction with low-cost energy, can revitalize the U.S. manufacturing sector.

The United States recently fell to second place behind China in terms of absolute manufacturing output. In 2011, manufacturing accounted for 12.2 percent of America's gross domestic output. Over the past decade, manufacturing employment has declined by 3.6 million jobs and now accounts for 9 percent of the nation's workforce. Manufactured products continue to account for the largest share of U.S. exports. However, manufactured products and energy together account for the bulk of the nation's imports and its large trade deficit.

MANUFACTURING AND INNOVATION

In the United States, the private sector accounts for roughly 70 percent of national spending on

research and development, with the bulk of that amount (72 percent) coming from manufacturing. Innovations in a university laboratory or in the proverbial garage or backyard shed depend on manufacturing as a bridge to the commercial market. As more manufacturing and design work have moved offshore, there is a risk that U.S. innovations will be commercialized elsewhere, resulting in the loss of future innovation, jobs, and wealth creation. Manufacturers also use innovation if they encounter problems with a product or process and are searching for a solution. In effect, manufacturing carries out the commercialization of an innovation and also drives future innovation.

MANUFACTURING AND EMPLOYMENT

In general, manufacturing jobs command higher wages and include better pension and health benefits than do many other occupations. However, manufacturing jobs have been declining for more than three decades, both in absolute numbers and as a percentage of the workforce. The United States has seen a loss in manufacturing jobs of about 38 percent between 1979 and 2012, with job numbers falling from 19.5 million to 12.0 million and manufacturing's share of the workforce declining from 22 percent to 9 percent. Much of that decline occurred over the past decade, with a loss of some 5.3 million manufacturing jobs. Since December 2009, however, 500,000 manufacturing jobs have been added to the employment rolls. Several trends account for the decline in manufacturing jobs: companies shifting production overseas; tepid economic growth since the bursting of financial bubbles in 2000 and 2008; and, in some cases, rapid growth of productivity.

MANUFACTURING AND EXPORTS

For decades, the United States has run large trade deficits, in effect borrowing hundreds of billions of dollars from the rest of the world. The deficit on manufactured products—importing more than we export—is the major factor in the overall deficit. Even more troubling is the U.S. deficit on advanced technology products. Oil is the second major contributor. The United States runs a surplus on services, but that surplus is not expected to pay its international bill.

If invested, borrowed money can leave the lender and the borrower better off. In the United States in the 21st century, however, the borrowing has had at least four distinct costs:

- Large flows of imported capital contributed to the trade deficit by driving up the value of the dollar, thus making exports more expensive and imports more of a bargain.
- Low-cost imports eroded part of the U.S. industrial base, which has affected everything from employment to innovation to national security.
- Much of the borrowing was used for consumption rather than for investment.
- The extensive purchase of U.S. bonds by international investors drove interest rates down, which contributed to the financial crisis as investors sought higher-yielding but much riskier assets.

MANUFACTURING AND SERVICES

The predominance of service-related jobs has led some economists to dismiss the importance of manufacturing. Yet when the United States exports a jet airliner, a large turbine, or earth-moving equipment, those exports include high-value services, including engineering, design work, supply-chain management, and quality control. If the manufacturing is lost, many of those services will be lost as well.

ADVANCED MANUFACTURING: A POSSIBLE PROMISE FOR THE FUTURE

In recent years, a growing focus on advanced manufacturing has included broader application of information technology and increased use of robots, along with the increasing use of additive manufacturing or 3-D printing. They may hold promise for a renaissance of American Manufacturing.

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The 3-D printers are used to construct prototypes and assist in real-time production of key parts, thus reducing inventory costs and speeding the return to full production. In the medical field, scientists are envisioning the possibility of actually printing cells or whole organs, greatly reducing the risk of immune system rejection. 3-D medical printing could be a natural complement to America’s strength in overall medical research.

MANUFACTURING AND NATIONAL SECURITY

Given the global U.S. role and interests, the U.S. government needs to monitor parts of the defense and civilian industrial bases that are critical to national security. A number of defense specialists have raised warnings about overdependence on imports for key components.

GLOBAL COMPETITION

Most advanced countries and more emerging-market countries have growth strategies that include an emphasis on manufacturing. In pursuing a manufacturing strategy, some countries use broad incentives that favor manufacturing, others concentrate on specific industries, and still other countries have done some of both. The United States is virtually alone in terms of having neither a national growth strategy nor a manufacturing strategy. As U.S. manufacturers often say with

regard to China, manufacturers are bargaining not only with a major company but also with the government as that company’s supportive partner.

STRENGTHENING MANUFACTURING

The United States can take several steps to strengthen and support manufacturing:

- **Know the competition.** The United States needs to pay close attention to the manufacturing strategies, policies, and innovations around the world. Knowledge of overseas strategies can inform everything from the U.S. research agenda to the need for new investments.
- **Benchmark U.S. policies to the international competition.** Federal and state policies often can be improved by observing the competition. Lessons to be learned often include education, training, promotion of new technologies, and approaches to export promotion.
- **Overcome the major gap between work done in research laboratories and the businesses that can turn an invention into a commercial product.** As the large industrial labs have shifted from research to development, a major gap, called the valley of death, occurs. Recent analysis points to the importance of using federal research to bridge

the gap by developing an idea to the “proof of concept” stage. At that point, the market should be able to take the next step.

- **Overcome the second major gap that occurs when small and medium enterprises cannot easily respond to challenges they encounter that require additional research.** Germany has developed an institution, the Fraunhofer Institutes, that conducts research for companies and can turn to universities for more basic solutions. The Obama administration has proposed the creation of a National Network for Manufacturing Innovation that is modeled on the German experience.
- **Develop a U.S. manufacturing strategy.** The U.S. manufacturing strategy would need to have at least three components: macroeconomic stability, enabling policies that strengthen all manufacturing (along with much of the rest of the economy), and a new foreign economic strategy.
 - Macroeconomic policies. Steady growth, relatively low interest rates, and a

competitive dollar would encourage investments in manufacturing facilities and exports of manufactured products.

- Enabling policies. Support for research and development, training and education, advice and research for small manufacturing plants, and generic export support would contribute to a stronger manufacturing base.
- A more level playing field. The United States still relies heavily on the market to drive everything from innovation to manufacturing. U.S. competitors may take a decidedly different approach in which government guidance, undervalued currencies, trade barriers, export subsidies, and intellectual property theft play major roles. The United States must secure agreements to a single set of rules—such as the Trans-Pacific Partnership, which seeks to establish some new rules—or it will have to take a fundamentally different approach to its own economy.

Kent H. Hughes is director of the Program on America and the Global Economy. He can be reached at Kent.Hughes@wilsoncenter.org.

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Woodrow Wilson International Center for Scholars
One Woodrow Wilson Plaza
1300 Pennsylvania Avenue NW
Washington, DC 20004-3027

