

DIY Producer Society

When most people in the United States hear the word “manufacturing,” two images come to mind. The first recalls traditional assembly lines, men sweating over machines, and long trains of mass-produced goods coming out the other end, smoke billowing from their stacks. Automobile plants circa 1950 embody this image. The second image—epitomized by automobile plants circa 2012—is of shuttered factories and blue-collar workers displaced by foreign competition.

Consequently, policy discussions about manufacturing tend to follow this same dichotomy and to rely on conventional terms, regardless of their applicability. Most debates about the future of manufacturing focus on recovering a bygone era and become a discussion of what the U.S. economy is supposed to look like: Should we have more production and less consumption? How can the United States boost exports and reduce imports? Where will the good jobs come from?

What is most disappointing about this state of affairs is that it obscures a new type of producer society that is taking shape in the cracks in the old system. This do-it-yourself (DIY) producer society, driven by grassroots movements in tinkering, entrepreneurship, and small-scale manufacturing, has the potential to transform how we think and talk about American manufacturing—as well as its role in the U.S. economy.

This, of course, is not the first article to proclaim that manufacturing is changing. Accelerating manufacturing job losses during the Great Recession have spurred much talk about restoring the U.S. position as a country that makes things. Although the United States has never stopped making things in terms of output—it remains one of the top manufacturing countries in the world and exports billions of dollars of goods each year—there is a popular notion that we have left behind the golden age of American productivity and moved away from producing physical items, choosing instead to export that function. There are frequent indignant outcries that products like the iPhone and iPad are designed but not manufactured in America or that the U.S. Olympic team uniforms carried “Made in China” labels,

Dane Stangler is the Director of Research and Policy at the Ewing Marion Kauffman Foundation in Kansas City. In this capacity, Stangler serves on the Foundation's Senior Leadership Team and engages in research and writing on a wide variety of topics.

Kate Maxwell is a Research Analyst at the Ewing Marion Kauffman Foundation.

implying that such facts reflect America's downward economic spiral. These cries often emerge from those who wave the ever-popular banner of needing to save American jobs. However, a close examination of this claim reveals a much more complicated economic story than that of savings-driven outsourcing.

Visions of the revival of traditional American manufacturing often include the return of lucrative jobs to American communities. However, the future of American manufacturing shouldn't be circumscribed by a discussion of "re-shoring" jobs. There is already a great deal of false hope around the re-shoring

Visions of the revival of traditional American manufacturing often include the return of lucrative jobs to American communities. However, the future of American manufacturing shouldn't be circumscribed by a discussion of "re-shoring" jobs.

debate. For example, Boston Consulting Group released a report last year purporting to have found that, within half a decade, millions of lost manufacturing jobs would return to the United States because of rising labor costs in China. While it's true that labor costs in China are rising consistently relative to the United States, it's also true that labor costs constitute a falling share of manufacturing costs. The mix of labor, shipping, and energy costs will probably mean that some jobs once sent to China will return to

North America; for many others, however, that calculus will not change. This is due in part to the fact that the decision of where to locate a manufacturing center is not determined by such cost measures alone.

The expectation that rising Chinese labor costs will result in the wholesale relocation of millions of jobs to the United States simplistically assumes that there is no other reason manufacturing jobs have been created elsewhere. Economists and others have long realized that the benefits of co-location—when engineering, design, and manufacturing jobs exist in the same geographic place—go well beyond job numbers. Spillovers and returns to proximity matter; moreover, when manufacturing jobs leave, the innovative potential of the remaining workers is undermined and, hence, the skills and knowledge level of the surrounding area go untapped. A recent article in *Technology Review* noted that A123 Systems, one of the most celebrated lithium-ion battery companies in the United States, originally located its production in China "to acquire the needed manufacturing know-how." The company eventually opened a plant near Detroit, bringing with it knowledge it couldn't have gained if it had been located initially in Detroit. The company was later rescued from bankruptcy through a large investment by a Chinese firm, further illustrating that traditional narratives about doing business abroad isn't a com-

prehensive picture of today's manufacturing ecosystem. We probably shouldn't expect more than a trickle of manufacturing jobs to return to the United States from China or Vietnam—or from anywhere else.

This raises the question of whether these are in fact the types of jobs we want to create. As Vaclav Smil, one of the world's preeminent thinkers on global issues and development, points out, "We cannot boost manufacturing by trying to repatriate millions of lost apparel, furniture, or electronics jobs."¹ Manufacturing is far from homogeneous in today's economy, and any debate that tends to treat it as such is not well informed. There is wide variation in the types of employment skills, wages, productivity, and innovation different manufacturers need, and between firms within the same manufacturing subsector. A Brookings Institution report issued in February 2012 pointed out that over the past decade the United States has experienced greater job losses in several low-wage manufacturing areas, including textiles, apparel, leather goods, and furniture compared than in other manufacturing areas.² High-wage sectors, including petroleum and chemicals (which includes pharmaceuticals), had fewer job losses. While some of the lower-wage manufacturing industries have seen modest job growth since 2009, the Brookings report states that "the United States remains most likely to retain or grow employment in high-wage manufacturing industries and those with high shipping costs . . . Absent a dramatic policy shift, most clothing-related industries, printing, and furniture will probably continue to lose jobs."

The popular focus on lost jobs tends to gloss over how vital manufacturing remains to the American economy and the technology sector. The idea of "high-tech" normally calls to mind such companies as Google and Apple and jobs in software programming, but on the ground, advanced technology is still primarily tied to manufacturing. Take research and development: the Brookings report noted that, while aggregate manufacturing constitutes only 11 percent of America's gross domestic product, manufacturing companies account for nearly 70 percent of its domestic research and development outlays. Sectors such as pharmaceuticals, auto and airplane manufacturing, computers, semiconductors, and machinery employ disproportionate numbers of scientists and engineers. This only makes sense, of course, but it shows that American manufacturing has moved well beyond the traditional image of how things are made. This also underscores where manufacturing is headed—further into high technology, not backward into low technology.

Most importantly, the conventional debate over American manufacturing—consumption versus production, imports versus exports, good jobs versus bad jobs—tends to discount the possibility that new frontiers will emerge. If we have learned one thing from American economic history, it is that we should not lose faith in our own ability to create completely new trajectories that alter our sense of what is possible. We are in the early stages of a manufacturing transformation and renaissance in the United States, but it will look nothing like 20th-century mass production and will have little to do with Washington's conventional tools of tax credits and subsidies. As so often happens, reality is running ahead of policy discussions—which signals the emergence of a do-it-yourself producer society.³

The DIY producer society is certainly not a new phenomenon and its manifestations are beginning to penetrate the popular consciousness. In his new book, *Abundance*, Peter Diamandis—who, as the founder of Singularity University, has a great deal of insight into current trends in technology and education—identifies the DIY movement as one of the primary forces driving the world toward a new era of abundance. Small collections of “dedicated DIY innovators can now tackle problems that were once solely the purview of big governments and large corporations.”⁴ In this article, we will briefly cover five examples of this emerging producer society and then discuss its broader attributes. At least two of the following examples will not appear to be related to a discussion of manufacturing, but that is part of our point: we are entering a new economics of manufacturing that includes a broader concept of what manufacturing can and should encompass.

We will not dwell on the first example here because it is covered in depth elsewhere in this issue. Open Source Ecology has created a Global Village Construction Set that dramatically lowers the barriers to farming, construction, and manufacturing. The ramifications of this for developing countries are clear, but this type of innovation will also be very important for the United States, which has massive amounts of “legacy” infrastructure—prior investments in building and construction—as well as engineering talent.

The second manifestation is Maker Faire, a festival celebrating the DIY spirit, which can perhaps be credited with kicking off the entire “maker movement.” Dale Dougherty, the founder of Maker Faire, explores this later in the issue. Diamandis, for one, sees “serious abundance potential” in this movement: “Makers are now impacting just about every abundance-related field, from agriculture to robotics to renewable energy.”⁵ Maker Faire is a joyous gathering of tinkerers, hobbyists, garage inventors, and others. Pick up any issue of *Make* magazine and you will see an amazing array of projects, from the frivolous to the serious. This is a mechanism, moreover, to engage the skill left idle by the slow decline of many manufacturing industries. Last year, a Maker Faire drew 70,000 people in Detroit—a place that in fact could experience a return to its manufacturing roots. In the late 19th century, many regions of the United States competed to host the incipient automobile industry. The Northeast, the nation’s industrial powerhouse up to that point, had obvious advantages, while areas like Ohio, where bicycle manufacturers were converting to automobiles, were also at the forefront. But Detroit became the center of automobile manufacturing in part because of a local culture of tinkering—hobbyists and mechanics rushed to create dozens of new car companies. (The city’s riparian location and links to the rapidly growing western United States also didn’t hurt.)

The maker movement’s most formal institution thus far is TechShop, another harbinger of the DIY producer revolution. If you are willing to pay \$100 a month to be a member, TechShop will give you access to technologies you would never be able to afford on your own: 3D printers, laser-cutting machines, welding equipment, and so on. Not surprisingly, TechShop originated in Silicon Valley but now has locations in Raleigh, North Carolina, and Detroit (where it is backed by Ford

Motor), with several other locations planned. TechShop also has not escaped Washington's attention; as *Bloomberg Businessweek* has described, the Pentagon is partnering with TechShop on two locations with the intention of linking it with the Defense Advanced Research Projects Agency, or DARPA, which has always been the government's hothouse for innovation.⁶ Several notable innovations have come from people using TechShop, including an infant warmer for developing countries, an iPad case, and the first prototype of Square's mobile payments device, which led the company to a recent \$3 billion valuation.

Another example occurs every weekend in locations all around the world, when thousands of people participate in an event known as Startup Weekend. It is almost exactly what it sounds like: 54-hour crash courses in pitching ideas, forming teams, building products, and pitching to a panel of judges. From a handful of events only a few years ago, Startup Weekend has expanded to over 200 events per year in more than 200 cities around the world, with projected participation of over 50,000 people in 2012 alone.⁷

Like Maker Faire and TechShop, Startup Weekend is not to be considered frivolous. Real, sustainable companies emerge from Startup Weekend, and the events foster new networks among founders, mentors, and those who might not have considered entrepreneurship an option.

To date, most Startup Weekends have generated mobile and Web-based ideas. In the near future, however, Startup Weekend will hold an event centered on 3D printing and other specific verticals. While Startup Weekend obviously bears no resemblance to Henry Ford's River Rouge plant, it is at the heart of the new producer society because, as discussed below, it expands the meaning of "producer." In the first place, the Startup Weekend ethos is the same one that underlies Open Source Ecology and TechShop—the desire to create, to build something. Second, a software program or line of code is a product that is increasingly important to manufacturing—your car, for example, is basically a computer—and has market value. It might not exist in the same sense as a piece of furniture, but it can otherwise play a role similar to the traditional factory widgets.

Another program that echoes Startup Weekend and embodies the DIY producer spirit is The Launch Pad, a program for university students that began at the

Each of these examples, quintessential embodiments of the new production economy, is marked by three concepts: a culture of DIY, new learning and teaching of knowledge, and the democratization of technology—and indeed of production and entrepreneurship.

University of Miami and has added locations in North Carolina and Detroit, where they have had tremendous take-up, with help from the Blackstone Foundation. The Launch Pad essentially provides an open door for students interested in entrepreneurship, a place they can go to receive feedback on their ideas and tap into a network of mentors and advisors.

Ultimately, this new producer movement has great implications for both our manufacturing industry and our broader economy. Each of these examples, quintessential embodiments of the new production economy, is marked by three concepts: a culture of DIY, new learning and teaching of knowledge, and the democratization of technology—and indeed of production and entrepreneurship. All three are intricately related and represent important threads in the new economy of production.

The cultural piece of DIY is exhibited across each program, and is perhaps the most obvious but most difficult to define piece of the movement. From TechShop to Startup Weekend, the concept is clear: activities like inventing, innovating, and starting a business are not reserved for a special set of “others” but are in the realm of you and me. One need not be an expert to create something, and this shift in attitude and culture is one of the resounding lessons these programs are teaching us. In this sense, there is a very rich human element.

A new style of learning is manifesting itself within these concepts—one that emphasizes learning by doing. The Launch Pad and Startup Weekend demonstrate that what is really underway is a movement in which experiential learning is pivotal. The essential elements, as with OSE, TechShop, and Maker Faire, are low costs, rapid learning, and (ideally) a higher quality of knowledge—all of which embody what Carl Schramm, former president of the Kauffman Foundation and renowned thinker on economics and entrepreneurship, calls the “just-in-time model of skill transmission.”⁸

This new economy both creates these new learning models and necessitates their presence. This is not the first article to point out that there are new demands on America’s talent pipeline that our traditional education system fails to prepare people to meet. Many feel that high schools and colleges are not adequately preparing students to face the challenges they will encounter in the workforce, particularly with the near-disappearance of vocational education.

The good news, however, is that entrepreneurs are addressing these challenges and creating mechanisms to provide this new learning. People have called for schools to offer software programming skills as one of the basic lessons, right alongside writing, reading, and arithmetic. In response, organizations like Codecademy have sprung up to teach how to write code. Moreover, at the high school level, FIRST Robotics competitions encourage students to study engineering and learn how to build things—which could be seen as the earliest lifecycle phase of the maker movement. Further down the pipeline, apprenticeships are reemerging in America. In New York City, for example, E[nstitute] has started a two-year apprenticeship program that places college-age students with entrepreneurs as “founder’s apprentices,” enabling them to learn by being tossed into a

high-pressure environment. Each of these reflects the learning-by-doing spirit that defines the DIY producer society, and their effects as they scale will be twofold. They will help fill needs in current sectors and lay the groundwork for entirely new types of economic activity, both of which will lead to the creation of new frontiers of innovation.

The last hallmark of the new producer economy is that it democratizes technology and, more importantly, the ability to become a producer. An excellent example of this is probably the best-known element of the DIY revolution: 3D printing. Also known as additive manufacturing, this technology has already been featured in *Technology Review*, *The Economist*, and elsewhere, and it promises to turn economies of scale on their heads. Most relevant for our purposes is the fact that 3D printing helps democratize manufacturing. The maker movement and TechShop enable ordinary people to have access to 3D printing, which enables them to build cheap models of their ideas and products. This is the biggest lesson of the DIY producer society—it forces us to expand our notion of “producer.”

On a larger scale, the DIY producer society will have two effects on American manufacturing. Because innovations like TechShop and Startup Weekend have specific geographic locations and are plugged into larger movements, they have the potential to re-create co-location spillover effects that were eroded by the loss of manufacturing jobs. These new producer elements also may help reinvigorate manufacturing productivity. Productivity gains often have been touted as offsetting lost jobs, but economist Michael Mandel and others have shown how these gains may be overstated, if not distorted.⁹ Various statistical adjustments actually reduce the last 20 years’ annual productivity rate by nearly half. The innovations and skills that come out of the maker movement, and from TechShop and The Launch Pad, are accompanied by lower costs, rapid learning, and potential scale effects that have the potential to create massive gains in productivity.

Tracing the history of American manufacturing, or indeed of production more generally, we witness an evolution from the small craftsmen and shops of the pre-Industrial Revolution to the large and concentrated production systems of the Industrial Age and the 20th century. In many fields, specialized knowledge was replaced with machinery and skilled workers with interchangeable ones, who were easily replaced and eliminated. This economic shift, which yielded large gains in productivity and social welfare, was spurred to a great extent by new technology. But no economic organization exists in perpetuity—as the market changes, so does its organization. In this new producer movement, we can see a shift back to the small and skilled producer. This revolution is again technology driven, yet the difference from earlier revolutions is stunning because potential scale effects remain. The new technological knowledge is not centralized or proprietary, which provides each individual with both the opportunity and the capability to enter the production economy—not as a cog in a machine but as an innovator.

Author's Note

A shorter version of this essay first appeared at *Progressive Fix* for the Progressive Policy Institute. See Dane Stangler, "Do It Yourself: Creating a Producer Society," *Progressive Fix*, September 12, 2011.

-
1. Vaclav Smil, "The Manufacturing of Decline," *Breakthrough Journal*, Fall 2011.
 2. Susan Helper, Timothy Krueger, and Howard Wial, "Why Does Manufacturing Matter? Which Manufacturing Matters?" Metropolitan Policy Program at Brookings Institution, February 2012.
 3. The idea of doing more to foster a "producer society" was also advanced in Will Marshall, "Labor and the Producer Society," policy brief, Progressive Policy Institute, August 2011.
 4. Peter Diamandis, *Abundance: The Future Is Better than You Think*. New York: Simon & Schuster, 2012.
 5. Diamandis, *Abundance*.
 6. Ashlee Vance, "TechShop: Paradise for Tinkerers," *Bloomberg Businessweek*, May 23, 2012.
 7. Dane Stangler, "Europe's Hope: Entrepreneurs," *The American*, July 28, 2012.
 8. Carl Schramm, "Expanding the Entrepreneur Class," *Harvard Business Review*, July-August 2012.
 9. Michael Mandel, "The Myth of American Productivity," *Washington Monthly*, January/February 2012.