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The Power of Knowledge and Leadership

DEFINING THE RESHORING DISCUSSION





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Reshoring American Jobs

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International Economic Development Council (IEDC)

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Introduction and Historical Perspective

In the late 1800's, the U.S. became a manufacturing power by developing the mass-production methods that allowed American manufacturers to increase output while decreasing production costs. American manufacturers benefitted from productivity and cost competitiveness that continued through the Industrial Revolution and up to the 1950s. However, as foreign countries strengthened their manufacturing competitiveness over the years, American manufacturers struggled to maintain their cost and productivity advantages on a global scale.

Some American manufacturers adjusted to foreign competition by shifting their focus to complex, high-value products and industries—and increasing manufacturing investment, output, and employment.¹ Others either closed U.S.-based factories or sought cost savings by offshoring some, or all, of their operations to less expensive foreign locations.

Shortly after China joined the World Trade Organization at the end of 2001, a large exodus of U.S. manufacturers occurred. Many American firms reported difficulty in competing with lower labor costs in China, especially when quota restrictions on goods entering the U.S. were phased out on certain products in 2005. Coupled with a supply of inexpensive labor in third world countries, other U.S. industries--such as IT and services--sought the benefits of lower-cost outsourcing abroad. In particular because of the advantages of their English speaking ability and relatively high skill, India and the Philippines particularly benefitted from IT outsourcing.

After a decade of significant offshoring in the 2000s, the cost savings that American firms had enjoyed began to erode around the year 2010. Changing macroeconomic factors, such as labor and transportation cost increases, absorbed much of the savings from which manufacturers had previously benefitted. Also, after experiencing offshoring firsthand, many companies found that hidden costs often outweighed the cost benefits of manufacturing overseas. Some of these hidden costs that were not always considered include factors such as increased costs of monitoring and quality control, uncertain protection of intellectual property, and lengthy supply chains.

As a result of increasing costs and other factors overseas, some of the manufacturing that previously took place away from U.S. shores has already returned—and continues to return—to the United States. This act of returning manufacturing, IT and service jobs to U.S. soil from offshore locations can be termed “reshoring.” While the term reshoring is now becoming common and has been receiving increased coverage in the media, there is still limited understanding of what reshoring actually is and what factors can help encourage it to benefit the U.S. economy.²

¹ Sirkin, Harold L., Michael Zinser, and Douglas Hohner. *Made in America, Again*. Publication. N.p.: Boston Consulting Group, 2011. Print.

² Free, Mitch. "Is The Re-shoring Of Manufacturing A Trend Or A Trickle?" *Forbes*. Forbes Magazine, 27 June 2012. Web. 10 Dec. 2014.

This white paper is meant to provide an overview of the discussion of reshoring. When reviewing the resources available on reshoring, some common themes emerge:

- 1) The decision to reshore is often described as a response by business to both macroeconomic and internal business-related factors.
- 2) The term reshoring is used to describe a range of activities that occur in numerous industries, not just manufacturing.
- 3) A company's decision to reshore can be encouraged through the creation of favorable business conditions, a skilled workforce, and incentives that encourage innovative manufacturing practices.
- 4) Reshored jobs will likely be different from the jobs that existed before offshoring gained momentum or jobs that currently exist offshore.

The impacts of reshoring extend beyond individual companies and provide benefits for entire regions as the effects multiply through local economies.

Reshoring as a Response to Macroeconomic and Internal Factors

Most of the information on reshoring cites macroeconomic factors—such as labor and currency rates—as the cause of both offshoring and later reshoring. For example, Van den Bossche et al. assert that several macroeconomic factors have “tipped the balance in favor of domestic manufacturing, at least for some industry sectors.”³ Most authors reference the years around 2010 as to when this shift occurred.

From 2004 to 2014, the Boston Consulting Group (BCG) studied data from 25 national economies—which account for nearly 90 percent of global exports of manufactured goods—in order to understand the shifting economics that drive global sourcing decisions. The study found, and supports the consensus, that manufacturing wages, labor productivity, energy costs, and exchange rates significantly impact manufacturing location decisions. These factors improved in terms of cost competitiveness in the U.S. from 2004 to 2014. Based on results from the study, Sirkin et al. assert that, of the national economies analyzed, these factors improved the most in the U.S. and Mexico. These factors are further explained below and may help to show how reshoring is a response, and an adjustment, to changing economic factors.

- **“Increased wages” is the most commonly cited reason for reshoring.** The BCG identified the U.S. as the lowest-cost manufacturing location when compared to other developed nations. While manufacturing continues to be less expensive in China, the cost differential lessened significantly from 2004 to 2014. The change in wages is considered to be a result of China's domestic minimum wage policies—requiring a 13

³ Van Den Bossche, Patrick, Pramod Gupta, Hector Gutierrez, and Aakash Gupta. "Solving the Reshoring Dilemma." *Supply Chain Management Review* January/February (2014): 26-33. Web. 11 Dec. 2014.

percent average annual minimum-wage increase—that took effect in 2011.⁴ According to Sirkin et al., “Wage and benefit increases of 15 to 20 percent per year at the average Chinese factory significantly diminished China’s labor-cost advantage.” At this rate, Sirkin et al. believe that the wage differential between the U.S. and China will disappear by 2020.

- **Fluctuating currency values also impact reshoring decisions.** The BCG study found that currency fluctuations over the past 10 years have rendered some locations favorable and others unfavorable. For example, when compared against the U.S. dollar, the Chinese yuan increased in value by 35 percent, while the Indian rupee devalued 26 percent from 2004 to 2014.⁵ The appreciation of China’s currency not only increases the cost of labor, but it also increases other costs associated with manufacturing operations such as the cost of land, utilities, and exports.
- **Labor productivity, which is measured as the gains in output per manufacturing worker, is also commonly cited as a significant factor of total manufacturing costs.** While labor productivity is increasing in China, BCG expects it to lag behind wage increases by approximately 40 percent of current U.S. productivity levels. This leads to a conclusion that Chinese productivity will no longer offset the wage increases of workers.
- **The reduction of energy costs from 2004 to 2014, especially in energy-dependent industries such as iron and steel and chemicals industries, rendered reshoring a cheaper option for some manufacturers.** Due to the large-scale production of shale gas in North America, prices for natural gas fell by 25 to 35 percent from 2004 to 2014. In some cases, “Overall energy costs in many countries outside of North America are between 50 to 200 percent higher than they were in 2004.”⁶ Less expensive natural gas also translates to more affordable electricity and raw materials that are used to make ammonia, hydrogen, methanol, and other materials needed in petrochemical sectors.⁷ This is a significant cost factor, because petrochemicals serve as the base for thousands of industrial and consumer products, including plastics, rubber, paints, fertilizers, detergents, textiles, dyes, and solvents.⁸

While the factors above have more obvious impacts on cost, there are other intangible factors and hidden costs to offshoring. Such factors include the ability to protect intellectual property, the length of supply chains, the difficulty in managing overseas operations, and the ability to ensure quality control. These “soft costs” are sometimes overlooked and are not factored into total cost valuations. Authors Gray et al. describe the tendency to overlook hidden costs.

⁴ George, Katy, Sree Ramaswamy, and Lou Rasse. "Next-shoring: A CEO's Guide." *McKinsey Quarterly* (2014): n. pag. Web. 23 Dec. 2014.

⁵ Sirkin, Harold L., Michael Zinser, and Justin Rose. "The Shifting Economics of Global Manufacturing." *www.bcgperspectives.com*. Boston Consulting Group, 19 Aug. 2014. Web. 10 Dec. 2014.

⁶ Sirkin et al., "The Shifting Economics of Global Manufacturing."

⁷ Welsh, Hugh. "Why Manufacturing Jobs Are Returning To America For The First Time In Decades." *Business Insider*. Business Insider, Inc, 27 Feb. 2013. Web. 20 Dec. 2014.

⁸ Lauzon, Michael. "Petrochemical Industry". *The Canadian Encyclopedia*. Toronto: Historica Canada, 2013. Web. 2 Jul 2013.

“...we believe the latter—changes in managerial valuations—is often the driver [of reshoring]. Through anecdotal discussions with managers, we have heard consistently that the original offshoring decision was based on a tempting per-unit price with little consideration for total cost analysis, which includes hidden costs. Based on this finding, a plausible narrative of the offshoring-reshoring path is that firms have moved activities offshore based on easily measurable costs (e.g., price quotes) and have reshored upon experiencing and learning firsthand about the risks and hassles of offshoring.”⁹

According to the Reshoring Initiative, an industry-led effort to reshore manufacturing jobs, most companies make sourcing decisions solely based on price. This approach, however, is believed to result in a “20 to 30 percent miscalculation of actual offshoring costs.”¹⁰

In an effort to correct the miscalculation of total offshoring costs, Harry Moser, founder of the Reshoring Initiative, developed the **Total Cost of Ownership Estimator™**. The estimator is meant to help decision-makers estimate total costs of outsourced parts or products by aggregating, then quantifying all cost and risk factors into a single cost. Common inputs used in the Total Cost of Ownership Estimator include overhead, the manufacturer’s balance sheet, corporate strategy, and other external and internal business costs. According to Moser, the tool helps inform objective decision-making and is useful for “companies currently or considering offshoring, local suppliers competing with offshore sources, [and] salesmen or economic development groups advising on the benefits of reshoring.”¹¹

While the popular press publicizes reshoring as a return of American jobs, it is important to understand that reshoring is fundamentally a location decision. In this sense, a company’s decision to stay in the U.S. or relocate will be based on its total operation costs in a given location. Gray et al. contend that reshoring should be considered more than just a buzzword.¹² Rather it should be considered “an economically driven correction to a supply chain that had become unbalanced.”¹³

Definitions of Reshoring

As author Ken Cottrill explains, there seems to be “some confusion over the definition of reshoring.”¹⁴ Most of the information refers to reshoring in general terms—the return of manufacturing to the U.S.—or as an action motivated by national pride (i.e., the return of

⁹ Gray, John V., Keith Skowronski, Gökçe Esenduran, and M. Johnny Rungtusanatham. “The Reshoring Phenomenon: What Supply Chain Academics Ought to Know and Should Do.” *Journal of Supply Chain Management* 49.2 (2013): 27-33. Web. 22 Dec. 2014.

¹⁰ “The Reshoring Initiative.” *Total Cost of Ownership Estimator*. The Reshoring Initiative, n.d. Web. 21 Dec. 2014.

¹¹ “Reshoring.” *Services and Initiatives*. NIST, n.d. Web. 22 Dec. 2014.

¹² Gray. “The Reshoring Phenomenon: What Supply Chain Academics Ought to Know and Should Do.”

¹³ Deligio, Tony. “The Truth About Reshoring : Plastics Technology.” *The Truth About Reshoring : Plastics Technology*. Plastics Technology, Mar. 2014. Web. 22 Dec. 2014.

¹⁴ Cottrill, Ken. “Reshoring: New Day, False Dawn, or Something Else?” *Supply Chain MIT*. MIT Center for Transportation & Logistics, 17 Oct. 2014. Web. 22 Dec. 2014.

“American jobs”). The general definitions tend to explain reshoring solely from the standpoint of manufacturing and do not delineate the practice along the lines of strategic business decision-making that assesses production, processes, or operations.

Cottrill holds that reshoring definitions are often broad and have “general ambiguities that need to be resolved.” Take, for example, Mitch Free’s definition of reshoring as simply “manufacturing that was previously done outside of America and has been moved back to America.”¹⁵ Such a definition does not provide a scale or scope and does not clarify whether reshoring is a return of some or all of the manufacturing that moved abroad. According to Gray et al.:

“The popular press deems reshoring to be ‘bringing manufacturing back home...’ from a current location that is, de facto, not home. The term is agnostic as to whether the manufacturing being brought home occurred in a wholly owned facility in an offshore location or in the factory of an offshore supplier.”

These definitions do not specify where or what type (outsourced or insourced) of manufacturing activities are being performed. Furthermore, these definitions restrict reshoring to the manufacturing sectors and do not suggest reshoring as a strategic business location decision influenced by costs or other factors. As expressed by Gray et al. above, these definitions are often found in articles and press releases meant for the general public and are not usually directed at subject-matter experts and industry professionals.

As mentioned above, many of the definitions of reshoring in the media have a patriotic tone that implies that reshoring is a decision concerned with improving American lives and the American economy. Take, for example, the definition found in a press release from the City of Dayton, Ohio: “[Reshoring] refers to returning economic activity and jobs to areas that have suffered resulting from offshoring of manufacturing facilities.”¹⁶ In this and similar instances, reshoring is addressed as an action meant to reverse the negative social and economic impacts of offshoring on the larger economy and communities instead of as a business decision based on costs or other factors.

While general definitions of reshoring are common, Cottrill holds that useful and clarifying distinctions of reshoring do exist. However they are typically found in academic and professional circles and are not easily understood. For simplicity sake, Cottrill describes reshoring as “a manufacturing location decision that is a change in policy from a previous decision to locate manufacturing offshore from the firm’s home location.”¹⁷ In this sense, reshoring is not only considered a business decision but a correction or reversal of a previous location decision.

¹⁵ Free. "Is The Re-shoring Of Manufacturing A Trend Or A Trickle?"

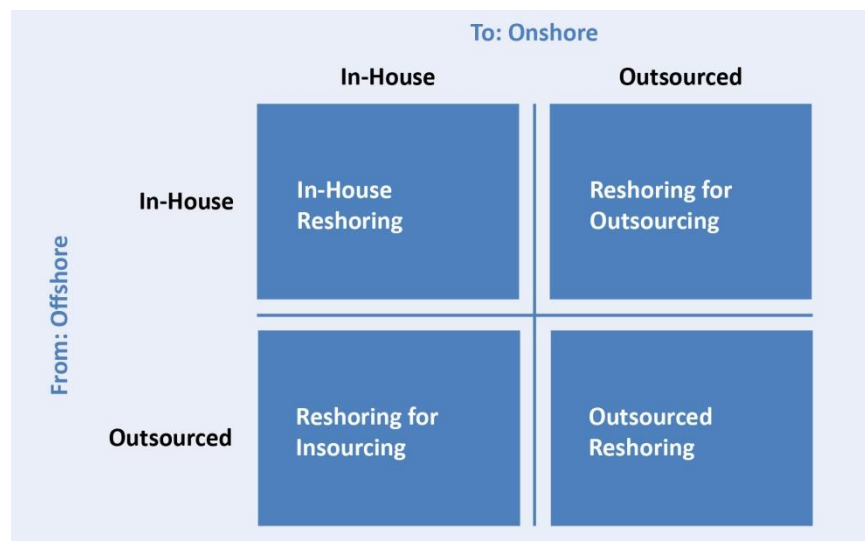
¹⁶ City of Dayton, Ohio. Office of the City Commission. *Commissioner Whaley to Testify in Support of Manufacturing* . Press Releases. City of Dayton, 18 Mar. 2013. Web. 15 Dec. 2014

¹⁷ Cottrill, "Reshoring: New Day, False Dawn, or Something Else?"

Zhuplev and Liuhto define manufacturing reshoring similarly as the “relocation of previously off-shored (in-sourced or outsourced) production, independently of the new destination.”¹⁸ With this definition, it is important to take note of three points. First, the authors specify this definition as manufacturing reshoring, not simply reshoring. Second, they include both in-sourced production that is carried out by the company and outsourced activities that are contracted out to U.S.-based suppliers. Third, they consider reshoring as relocation that is independent of the new destination. This means that reshoring does not only refer to returning activities to the previous location, rather it simply means moving activities to another location. The authors do, however, define manufacturing back-reshoring in a manner more in line with the common understanding of the term “reshoring.”

Zhuplev and Liuhto define manufacturing back-reshoring as a “voluntary corporate strategy regarding the partial or total relocation of previously off-shored (in-sourced or outsourced) production into the home country.”¹⁹ Based on this definition, they consider manufacturing back-reshoring what most label as reshoring. In fact, some authors use the terms interchangeably.

As a location decision, the term “reshoring” has been used to describe a range of processes that exist on a continuum and span numerous industries. To fully understand reshoring and the broad range of activities the practice encompasses, Gray et al. suggest that it is useful to think



Source: Gray et al. "The Reshoring Phenomenon: What Supply Chain Academics Ought to Know and Should Do."

of reshoring along the axes of the sourcing and location. In this case, the authors consider “sourcing” to be the process of searching, selecting, and managing suppliers as a means for securing inputs for a desired outcome, while they consider “location” to be simply domestic or

¹⁸ Zhuplev, Anatoly, and Kari Liuhto. "Geo-Regional Competitiveness in Central and Eastern Europe, the Baltic Countries, and Russia." IGI Global, 2014. 1-458. Web. 18 Dec. 2014. doi:10.4018/978-1-4666-6054-0

¹⁹ Zhuplev and Liuhto, "Geo-Regional Competitiveness in Central and Eastern Europe, the Baltic Countries, and Russia."

foreign suppliers or facilities.²⁰ Under these conditions, reshoring encompasses two types of sourcing activities—in-house or outsourced—that take place within domestic or international facilities or suppliers. Thinking about reshoring in this way creates four working definitions or iterations of reshoring, as illustrated in the graphic above and further detailed below.²¹

In-house reshoring

In-house reshoring refers to the relocation of manufacturing activities, which were being performed in facilities owned abroad, back to facilities in the U.S. In other words, in-house reshorers simply reverse the decision to locate their facilities abroad while keeping all or part of production in-house. Keep in mind that this relocation may or may not include a resizing or reconfiguration of the facility, the related workforce, and the processes performed at that facility.

General Motors (GM), for example, announced plans to move the full production of its Cadillac SRX sport-utility vehicles to its Tennessee factory from the GM factory in Ramos Arizpe, Mexico. On a smaller scale, GM also plans to move the production of the electric drive unit for the Chevrolet Volt from Ramos Arizpe to its factory in Michigan. The production of all other parts for the Volt will remain abroad.²²

Reshoring for outsourcing

Relocating in-house manufacturing activities, which were being performed in facilities abroad, back to U.S.-based suppliers is labeled “reshoring for outsourcing.” Here, the company ceases in-house activities that are being carried out in facilities owned abroad and then contracts out, or outsources, manufacturing activities to U.S.-based suppliers. Reshoring for outsourcing not only involves a change in location; it also involves a change in the company’s sourcing activities or process.

Reshoring for insourcing

When a company relocates manufacturing activities being outsourced to offshore suppliers back to its U.S.-based facilities, it is considered reshoring for insourcing. In this case, the manufacturer creates a leaner supply chain by not only moving activities back onshore, but by also moving their manufacturing activities in-house.

For instance, General Electric decided to relocate the production of its GeoSpring water heater from a Chinese factory back to the company’s Appliance Park in Louisville, Kentucky. GM CEO Jeffrey Immelt believes that outsourcing is “quickly becoming mostly outdated as a business model for GE Appliances.” Since 2009, the company has made increased efforts to streamline its manufacturing at its Appliance Park. As of year-end 2014, the park was expected to employ

²⁰ Lockström, Martin. "Frame of Reference on Low-cost Country Sourcing." *Low-cost Country Sourcing Trends and Implications*. Wiesbaden: Deutscher Universitäts-Verlag, 2007. 16-17. Print.

²¹ Gray et al. "The Reshoring Phenomenon: What Supply Chain Academics Ought to Know and Should Do."

²² Higgins, Tim. "GM Moves Cadillac SRX Production to Tennessee Plant From Mexico." *Bloomberg Business*. Bloomberg, 27 Aug. 2014. Web. 21 Dec. 2014.

3,600 hourly employees—more than twice the amount as of 2013—500 of which are new designers and engineers hired to support the new manufacturing.²³

Outsourced reshoring

Outsourced reshoring describes the process of relocating manufacturing activities from offshore suppliers back to U.S.-based suppliers. In this case, the firm still outsources parts of its manufacturing operation; but, instead of outsourcing overseas, the company contracts with U.S.-based suppliers.

Reshoring is not just for manufacturing

Not only does reshoring span the scope of sourcing, but it also spans a range of industry sectors and firm sizes. The vast majority of recent reshoring cases—approximately 93 percent—are related to manufacturing, and most of the sectors exhibiting reshoring are influenced by similar macroeconomic factors and cost models.²⁴

At the end of 2014, A.T. Kearney found that the top three reshoring industries are: electrical equipment, appliances, and component manufacturing; transportation equipment manufacturing; and apparel manufacturing.²⁵ Similarly, the Reshoring Initiative found the top three reshoring industries to be: electrical equipment, appliance and component manufacturing; transportation equipment manufacturing; and computer and electronic product manufacturing. The discrepancy between both studies is due to the difference in cases reported to each organization. For this reason, only the top two industries will be discussed further in this paper.

According to a report published by CORE PA, electrical equipment, appliance, and component manufacturing companies make heavy-duty industrial products such as transformers, motors, generators, and industrial controls. As a result, the end users of these products often work in nonresidential construction, manufacturing facilities, and utilities.²⁶ The second most common reshoring subsector, transportation equipment manufacturing, produces machinery that transports people and goods. These products include aircraft, aerospace equipment, railroad equipment, motor vehicles and auto parts, motorcycles and bicycles, ships and boats, and other related parts. End users range from businesses such as airlines and shipping companies to individuals.

It is important to emphasize that reshoring applies to more industries than manufacturing. Take for example, the information technology (IT) sector. Offshore outsourcing became a common staffing strategy for IT companies that were looking to cut costs and maximize return on investment in the early 2000s. Lower-cost labor and a skilled labor pool drove many IT companies to outsource labor-intensive IT services such as legacy software maintenance and low-level coding. The primary markets for the offshoring of these activities included India, China,

²³ Fishman, Charles. "The Insourcing Boom." *The Atlantic*. Atlantic Media Company, 28 Nov. 2012. Web. 22 Dec. 2014.

²⁴ Van Den Bossche et al., "Solving the Reshoring Dilemma."

²⁵ "2014 A.T. Kearney Reshoring Index: Down 20 Basis Points Year-over-Year From 2013. Uncovers What Manufacturers Are Actually Doing." *News Releases*. PRNewswire, 15 Dec. 2014. Web. 10 Jan. 2014.

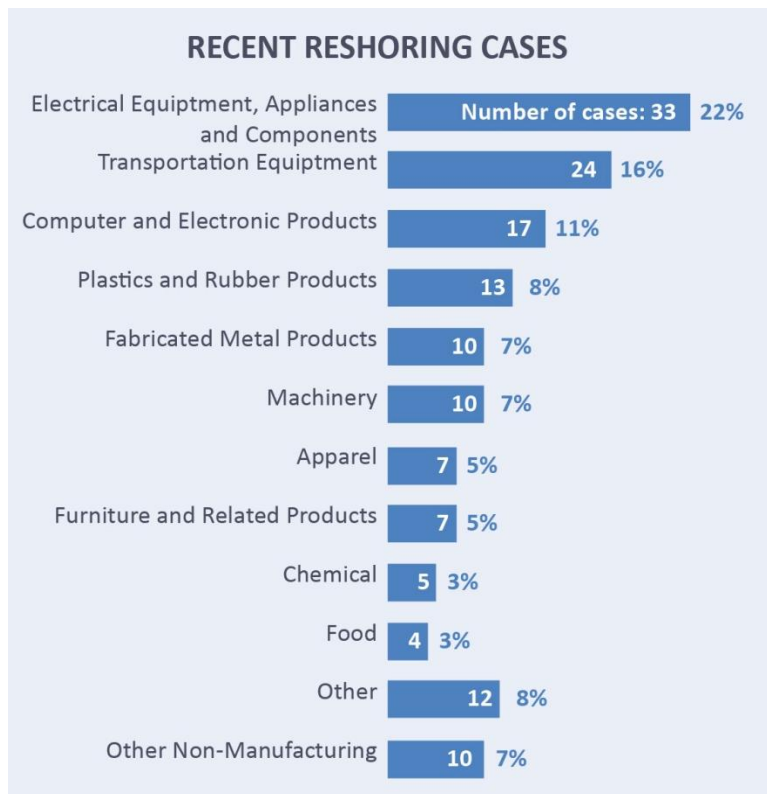
²⁶ *Reshoring Readiness Report 2014: Electrical Equipment Manufacturing*. Rep. N.p.: Core PA, 2014. Print.

Malaysia, the Philippines, Brazil, Peru, and Vietnam. However, challenges such as time zone differences, identity theft, privacy concerns, and issues with utility infrastructure abroad led more companies to return their IT operations to the U.S.

In a special report from *The Economist*, Tazmin Booth argues that reshoring IT services—and, more specifically, what was described above as “outsourced reshoring”—took place in the IT sector before manufacturing firms began reshoring. According to Booth, the reshoring of IT services is merely leveling off or has already been completed. Booth also offers that IT companies are not reshoring services as quickly as seen in manufacturing because the digital nature of IT does not hold it “victim to skyrocketing transportation costs.” However, Booth contends is that an increasing number of IT companies want core activities to be carried out locally and take a more complex and strategic approach to sourcing staff.²⁷

One strategic approach to staffing IT and services jobs is called “rural outsourcing.” Rural sourcing allows companies access to lower cost labor in rural towns— where labor rates are often as much as 25% to 50% lower than in urban locations—and the peace of mind of keeping their operations onshore. In fact, rural sourcing is becoming a growing practice among smaller outsourcing firms that offer specialized IT services and customer service. By establishing their offices in the less costly areas of the U.S., these domestic companies provide a cost-effective alternative to offshore IT outsourcing.

It is becoming more commonplace for IT vendors to source staff by assigning routine tasks to offshore locations while onshoring higher-value work such as managing human resources and complex multi-faceted projects. Much of this higher-value work requires that these companies are located near their clients. For example, the IT outsourcing vendor Cognizant only outsources 60 percent of its workforce, which is a low proportion of the firm’s total workforce when compared to the 80-90 percent rate of other outsourcing vendors. Cognizant’s



Source: Reshoring Initiative

²⁷ Booth, Tamzin. "Here, There and Everywhere." *The Economist*. The Economist Newspaper, 19 Jan. 2013. Web. 22 Dec. 2014.

staffing strategy is simply based on the demand from clients that found value in having “local voices answering the telephones.”²⁸

Reshoring varies in reach and in scale

Current literature also points to the fact that reshoring varies in reach and scale. As Tazmin Booth puts it, reshoring examples “range from the tiny, such as ET Water Systems, to the enormous, such as General Electric, which last year moved manufacturing of washing machines, fridges, and heaters back from China to a factory in Kentucky, which not long ago had been expected to close.”

The amount of work reshored also varies widely. For example, the contract manufacturer Mitchell Metal Products reshored one outsourced job in 2009. The value of work reshored to make this product is estimated at \$245,900 per year. At the other end of the spectrum are industry giants like General Electric and Apple that have reshored a greater number of jobs and a more substantial value of work.

As shown above, reshoring applies to both insourced and outsourced activities. Reshoring also applies to industries besides manufacturing and varies in terms of scale. These facts are important to understand in order develop policies, programs or initiatives aimed at increasing reshoring.

Reshoring can be Encouraged

As shown above, reshoring applies to various industries. However, much of the information on incentivizing reshoring applies to the manufacturing sector. Mark Muro, Senior Fellow and Director of the Metropolitan Policy Program at the Brookings Institution, argues that offering incentives focused solely on manufacturing reshoring is not enough. Rather, Muro believes the focus should be on building the vibrancy of the critical advanced manufacturing industry sector. Muro argues that the U.S. must strengthen the depth of the nation’s regional advanced industry ecosystems. Furthermore, he calls for governments, companies, and individuals to work collectively to rebuild the nation’s local skills pools, industrial innovation capacity, and supply chains.²⁹

Recommendations for public efforts

In addition to creating policies that incentivize and reduce the cost of producing of goods in the U.S., former Senator Joseph Lieberman commissioned a white paper on the impacts of offshoring. The authors, Koehler and Hagigh, suggest that policymakers think of manufacturing through the lens of America’s competitiveness strategy over the long-term. In this sense,

²⁸ Booth. "Here, There and Everywhere."

²⁹ Muro, Mark. "Reshoring: Strong Regions Will Determine Where, How." *Series: Advanced Industries Series*. The Brookings Institution, 02 Oct. 2014. Web. 23 Dec. 2014. <<http://www.brookings.edu/blogs/the-avenue/posts/2014/10/02-reshoring-strong-regions-muro>>.

policies and initiatives would provide the support needed to revive manufacturing and develop the supports needed to sustain this sector.

Koehler and Hagigh also call for the federal government to increase investment in research and development.³⁰ They suggest that increased federal funding for science and technology can help accelerate the development of useful technology and materials that support the manufacturing industry. The authors also recommend greater investment in broadband infrastructure, which they believe will help support the services sector by allowing companies to better meet consumer demands at a lower cost.

Much of what has been written about reshoring also calls for an increased focus on workforce development and building the nation's talent pool through training and education. More specifically, a strategic approach that considers industry demands and bridges gaps in education and industry is necessary.

According to a 2011 survey from Deloitte and the Manufacturing Institute, the estimated manufacturing skills gap is roughly 600,000 workers. Out of all survey respondents, 67 percent reported a moderate to severe shortage of qualified available workers, 56 percent anticipated the shortage to worsen in the next three-to-five years, and 5 percent of current jobs at respondent manufacturers are unfilled due to a lack of qualified candidates.³¹ Furthermore, the study found that the hardest jobs to fill are skilled production jobs that have been found to have the most significant impact on performance.

Closing the gap, however, will likely take concerted effort. Koehler and Hagigh offer the following actions as potential solutions.

- Research and development tax credits to encourage collaboration between private industry and education institutions
- Workforce development alliances for manufacturing that include community colleges, economic development and industry
- K-12 science and math education via initiatives
- Transfer of knowledge between practitioners and the education systems³²

³⁰ Koehler, Elka, and Sara Hagigh. *Offshore Outsourcing and America's Competitive Edge: Losing Out In The High Technology R&D And Services Sectors*. Rep. N.p.: Office of Senator Joseph I. Lieberman, 2004. Print.

³¹ "Morrison, Tom, Bob Maciejewski, Craig Giffi, Emily Stover DeRocco, Jennifer McNelly, and Gardner Carrick. *Boiling Point? The Skills Gap in U.S. Manufacturing*. Rep. The Manufacturing Institute, n.d. Web. 22 Dec. 2014.

³² Koehler, Elka, and Sara Hagigh. *Offshore Outsourcing and America's Competitive Edge: Losing Out In The High Technology R&D And Services Sectors*. Rep. N.p.: Office of Senator Joseph I. Lieberman, 2004. Print.

Current government efforts to promote reshoring

Federal

In addition to encouraging foreign direct investment, the Make It in America Challenge promotes the development and growth of domestic businesses. The \$40 million competition, which the Administration announced on October 22, 2013, is a bottom-up approach that engages state, regional, and local partners in order to strengthen the national economy. Federal funding partners for the Challenge include the Economic Development Administration (EDA), National Institute of Standards and Technology Manufacturing Extension Partnership (NIST-MEP), U.S. Department of Labor's Employment and Training Administration (DOL-ETA), and the Delta Regional Authority (DRA).

The role of each Make It in America Challenge partner is as follows:

- EDA targets distressed regions and helps them create a competitive manufacturing environment.
- DOL-ETA develops a skilled labor pool in target industries with H-1B Technical Skills Training Grant funds.
- NIST-MEP helps MEP centers provide technical assistance that is designed to encourage manufacturers to keep, expand or re-shore their operations in the U.S.³³
- Finally, the DRA provides more localized support by directly working with winners from the agency's congressionally designated area.

In FY 2013, 10 awards were disbursed to nine states. The awards ranged from \$1.5 million to \$3.5 million. The respective MEP centers in each state will also each receive \$125,000 per year for three years from NIST-MEP to support their efforts.

The U.S. Department of Commerce also offers the [Assess Costs Everywhere \(ACE\) Tool](http://acetool.commerce.gov/) (<http://acetool.commerce.gov/>) to support the resurgence of the U.S. manufacturing sector. The ACE tool was developed within the Economics and Statistics Administration, in partnership with the NIST-MEP, and with support from various agencies within the U.S. Department of Commerce, the United States Patent and Trademark Office, and SelectUSA within the International Trade Administration.

The tool provides a framework for manufacturers to assess total costs by identifying and discussing 10 cost and risk factors. These include: labor wage fluctuations; travel and oversight; shipping time; product quality; inputs such as energy costs; intellectual property protection; regulatory compliance; political and security risks; and trade financing costs. ACE also provides

³³ "The H-1B Technical Skills Training Grant Program funds projects that provide training and related activities to workers to assist them in gaining the skills and competencies needed to obtain or upgrade employment in high-growth industries or economic sectors. Funds are used to provide job training and related activities to assist workers in gaining the skills and competencies needed to obtain or upgrade employment positions in high-growth industries and economic sectors."

[case studies](http://acetool.commerce.gov/case-studies) (<http://acetool.commerce.gov/case-studies>) and links to public and private resources.

By way of funding, the EDA has also supported the development of resources for manufacturers. One such resource is the [National Excess Manufacturing Capacity Catalog](http://www.edastayusa.org) (NEXCAP: <http://www.edastayusa.org>), which was developed by the University of Michigan. NEXCAP provides a catalog of vacant manufacturing facilities as well as critical data on skilled workforce supply, community assets, and other information pertinent to location decision-making.

Another tool funded by the EDA is the [U.S. Cluster Mapping Project](http://www.clustermapping.us) website (<http://www.clustermapping.us>). Harvard Business School's Institute for Strategy and Competitiveness leads the project by conducting research and publishing data records on industry clusters and regional business environments in the United States. In addition to providing information, the website also users to share and discuss best practices in economic development, policy and innovation.

The National Network for Manufacturing Innovation (NNMI) is another example of federal efforts to encourage U.S. manufacturing. NNMI aims to create effective manufacturing research infrastructure by convening industry, academia, and government partners to solve problems in the manufacturing sector. The initiative encourages partnerships that help to nurture manufacturing innovation and accelerate commercialization in the United States. Commercialization (i.e., bringing to market innovative technologies) can help manufacturers to become more competitive by assisting businesses in expanding existing product lines or services.³⁴

States

According to an article published by The Council of State Governments, "States are working to position themselves for attracting these reshoring industries."³⁵ However, most of the examples of state-level reshoring efforts stem from grant winners in the Make it in America competition. Two of 2014 grant winners are provided below.

Make it in America: The PA Made Again Initiative

PA Made Again is a statewide initiative to create jobs through the retention and expansion of Pennsylvania's manufacturing economy. The initiative is primarily funded with grants from the federal Make it in America Challenge; the EDA contributes \$500,000, DOL-ETA provides \$1,300,000, and NIST-MEP provides \$375,000. EDA

³⁴ Connolly, Martha J., Ph.D. et al. "Technology Transfer and Commercialization." *Technology-Led Economic Development*. Washington, D. C.: International Economic Development Council, 2011. 85-95. Print.

³⁵ Branham, Mary. "Made in the USA: Reshoring Brings Manufacturing Back." *Capitol Ideas*. The Council of State Governments, Mar.-Apr. 2014. Web. 26 Jan. 2015.

funds are used to provide site selection, deal negotiation, and financing assistance. The EDA also provides relevant research information to include demographic data, regulatory requirements, and statistics. NIST-MEP hosts industry professionals that help familiarize manufacturers with the concept of total costs of ownership, ACE and other reshoring tools for educated decision making. NIST-MEP also offers free supplier identification and technical assistance to companies considering reshoring. DOL-ETA builds the workforce pipeline and helps align the available skills in the workforce with employers' demands. Pennsylvania's Industrial Resource Centers— seven business assistance centers— first identify and analyze the state's industry clusters and then develop and implement workforce development strategies. Workforce Investment Boards then reference target industry clusters to develop the labor force training needed to meet companies' requirements.

Make it in America Challenge: Mississippi State University

With \$1.9 million in funds from the U.S. Department of Labor's "Make it in America Challenge," Mississippi State University launched a statewide campaign to help advanced manufacturers return to, and remain in, the United States. Clay Walden, the director of MSU's Center for Advanced Vehicular Systems Extension and principal grant investigator, believes the funds will "increase competitiveness of the state's advanced manufacturing enterprises, which in turn, makes these companies a more attractive sourcing solution."³⁶ The program aims to tap into regional supply chains to find sourcing opportunities for small- and medium-sized manufacturing enterprises while engaging advanced manufacturers in reshoring summits, technical assistance projects, and intensive certificate-based workshops.

Private efforts to encourage reshoring

Walmart

In 2013, Walmart announced its U.S. Manufacturing Innovation Fund, a 10-year \$250 billion initiative in which the retailer committed to purchasing more U.S.-made goods. The fund is made possible by a partnership between Walmart, the Walmart Foundation, and the United States Conference of Mayors. To date, it is the largest private initiative in support of reshoring, and while its impacts are yet to be fully seen, the Boston Consulting Group predicts that Walmart's commitment will create one million jobs. In the tenth year (2023) of the program, the company is forecasted to buy approximately \$50 billion more U.S. products per year.³⁷

³⁶ "Mississippi State Receives \$1.9 Million in Job Accelerator Grant." *MSU Receives \$1.9 Million in Job Accelerator Grant (Mississippi State University)*. Mississippi State University, 22 Oct. 2013. Web. 11 Jan. 2015.

³⁷ Taylor, Bart. "U.S. Industrial Output Is at an All-time High, MFG GDP an All-time Low. Decline or Revival?" *Company Week*. Company Week, 6 Jan. 2015. Web. 6 Jan. 2015.

Reshoring Initiative

Harry Moser established [The Reshoring Initiative](http://www.reshorenw.org) (<http://www.reshorenw.org>) in 2010. Moser has over 45 years of manufacturing experience and developed the initiative to help manufacturers recognize their profit potential and the critical role they play in strengthening the economy by utilizing local sourcing and production.³⁸ The initiative was founded on the premise that American companies do not consider all of the costs, including opportunity costs, and risks of offshore manufacturing. In other words, manufacturers often do not consider the total costs of ownership. As such, the initiative aims to help U.S. manufacturers realize the potential cost savings to be found in local production and sourcing.

In addition to providing the [Total Cost of Ownership Estimator™](http://www.reshorenw.org/tco-estimator) (<http://www.reshorenw.org/tco-estimator>) mentioned above, the initiative trains suppliers, provides resources such as case studies and articles, and collaborates with industry partners on reshoring projects. The initiative takes a proactive approach by educating suppliers on “how to more fully meet the expressed needs of their local customers and then brings the large companies and the local suppliers together to bring orders back.”³⁹ With a library of articles, white papers, and case studies relevant to reshoring, the initiative’s website is a central location for information on the topic.

The initiative also works to convene relevant stakeholders in the reshoring efforts. For example, it spearheaded efforts to improve the skilled manufacturing workforce by collaborating with the National Academies of Sciences and Engineering, the Manufacturing Institute/Clinton Global Initiative, the Association for Manufacturing Excellence and economic development groups.

The Initiative’s reshoring and workforce recruitment programs also help economic development organizations, Manufacturing Extension Partnerships, universities, community colleges, and other organizations strengthen local communities by showing them how to reshore previously offshored work. By suggesting specific actions, the initiative helps these groups to identify reshoring opportunities, educate offshoring companies on reshoring benefits, and close cost gaps that may hinder reshoring. As of December 2014, this program has been used in Pennsylvania, Mississippi, and central New York State.⁴⁰

Creating an Environment that Sustains Reshoring

As companies begin to return their operations to American shores, it is essential that the U.S. work to improve and sustain environments that support the competitiveness of America’s

³⁸ Weissman, Rich. "Reshoring Initiative's Harry Moser: Bring Manufacturing Back Because of the Economics." *Industry Market Trends*. Thomas.net, 13 Feb. 2014. Web. 12 Jan. 2015. <<http://news.thomasnet.com/imt/2014/02/13/reshoring-initiatives-harry-moser-bring-manufacturing-back-because-of-the-economics>>.

³⁹ "Illinois Reshoring Initiative Launches Response to President Obama's Call to Create Jobs." *TheFabricator.com*. Fabricator and Manufacturers Association, Intl., 08 Feb. 2011. Web. 06 Jan. 2015.

⁴⁰ "The Reshoring Initiative Blog." *Reshoring Initiative's Economic Development Program*. The Reshoring Initiative, 8 Dec. 2014. Web. 12 Jan. 2015. <<http://reshorenw.blogspot.com/2014/12/reshoring-initiatives-economic.html>>.

manufacturing economy. Van Den Bossche et al. contend that, “most domestic supplier networks have evaporated or followed their customers overseas” to locations such as China, Japan, and India.⁴¹ This implies that as manufacturers return, they will face challenges in locating suppliers and possibly cost competitive suppliers. Secondly, Van Den Bossche asserts that the current American manufacturing workforce is aging and younger generations are not interested in replacing them or trained to replace them.⁴² Furthermore, a shift toward more advanced manufacturing process—without an adequately trained workforce—causes further workforce shortages.

From domestic supplier shortages to technological and workforce deficiencies, larger market changes will be necessary to meet the demands of reshoring companies. However, it is important to note that even if jobs and processes return to U.S. shores, they will not likely look the same as they did in the 1970s or even as they currently run in foreign locations. As the market shifts to accommodate reshoring activities, modern U.S. manufacturing will undoubtedly incorporate advanced manufacturing methods which require a different type of skilled workforce.

The Industrial Commons

As mentioned above, Van den Bossche et al. hold that one major impediment to increasing reshoring activity is the relative lack of suppliers in the U.S.⁴³ When companies first began relocating overseas, much of the supporting supplier base and network moved along with them. As with manufacturing companies, suppliers will strategically locate their operations to places that are more profitable. So, from logistical and cost standpoints, it only makes sense for the supplier to remain close to its customer base.

If the majority of a supplier’s customers are located abroad, it is only a matter of time before suppliers relocate and create “industrial commons” closer to their customers. Around 2009, Harvard Business School’s Gary P. Pisano and Willy C. Shih coined the term “industrial commons” to refer to a foundation of knowledge and capabilities that is shared within an industry sector in a particular geographic area. This includes technical, design, and operational capabilities as well as “R&D know-how, advanced process development and engineering skills, and manufacturing competencies related to a specific technology.”⁴⁴

Industrial commons also provide economies of agglomeration, or the benefits achieved by firms that are located close to each other. This is clustering of activities closer to each other, and to assembly plant customers, allows for lower costs of production for suppliers.⁴⁵ Clustering, however, does not happen instantaneously. There is typically a delay of a few years between

⁴¹ Van Den Bossche et al., "Solving the Reshoring Dilemma."

⁴² Hans, Joel. "Barriers to Re-Shoring: A Detailed Look." *Articles*. Manufacturing.net, 3 Mar. 2013. Web. 12 Jan. 2015.

⁴³ Van den Bossche et al., "Solving the Reshoring Dilemma."

⁴⁴ Pisano, Gary P., and Willy C. Shih. "Restoring American Competitiveness." *Harvard Business Review Magazine*. Harvard Business Publishing, 01 July 2009. Web. 10 Jan. 2015.

⁴⁵ Klier, Thomas, Paul Ma, and Daniel P. McMillen. *Comparing Location Decisions of Domestic and Foreign Auto Supplier Plants*. Working paper no. WP 2004-27. Chicago: Federal Reserve Bank of Chicago, 2004. *Comparing Location Decisions of Domestic and Foreign Auto Supplier Plants*. Federal Reserve Bank of Chicago, 2004. Web. 12 Dec. 2014.

company relocation and their supply base following.⁴⁶ This delay is a factor that manufacturing companies must keep in mind if they plan to rely on supplies from foreign-based suppliers.

Until the supplier relocates closer the manufacturer, this distance would lessen the proximity-related benefits of reshoring. In other words, the end-to-end supply chain could still be as long as before, and the manufacturer may even incur additional costs. For example, a manufacturer may choose to stock up on supplies or parts to offset the disadvantages of a longer supply chain. This adjustment would mean more capital would be tied up in parts and materials inventory rather than being reserved for storing finished goods. Therefore, it is necessary to create a manufacturing ecosystem by attracting the companies that support manufacturers.

Impact of innovation

Statistics regarding U.S. manufacturing output over time must be analyzed in order to better understand the impacts of technology on U.S. manufacturing. Manufacturing outputs have more than doubled since 1972, in constant dollars, even with a 33 percent reduction in employment.⁴⁷ From 1997 to 2008, the value of U.S. manufacturing output also increased by one-third. Improved output and efficiency is largely attributed to technological advancements that increase productivity and decrease labor-intensive activities. As gaps between wages in developed and developing economies continue to shrink, U.S. manufacturers will need to focus on innovation, using technology to improve productivity and reserving labor for value-added activities.

The Advanced Manufacturing Partnership has identified areas of technology that are considered crucial to U.S. competitiveness in manufacturing. The group believes the following areas should be the focus of national research-and-development efforts.⁴⁸

- **Sensors, measurement, and process control**—These devices capture and record data which enables intelligent, flexible, reliable, and highly efficient manufacturing techniques.
- **Materials design, synthesis, and processing** — Advanced machines will require new materials. However, significant challenges exist in the commercialization of new coatings, composites, and other materials. In 2011, the federal government launched the multi-agency Materials Genome Initiative (MGI) in order to halve the time it takes to identify a new material and bring it to market. From 2011 to 2014, the federal government has invested over \$250 million to support the use and development of advanced materials in existing and emerging industrial sectors.⁴⁹

⁴⁶ Van den Bossche et al., "Solving the Reshoring Dilemma."

⁴⁷ Sirkin et al., "Made in America, Again"

⁴⁸ Kotten, John. "What's Hot in Manufacturing Technology." *Journal Reports: Leadership*. Wall Street Journal, 10 June 2013. Web. 11 Dec. 2014.

⁴⁹ "About the Materials Genome Initiative." *The White House*. The White House, n.d. Web. 12 Dec. 2014.

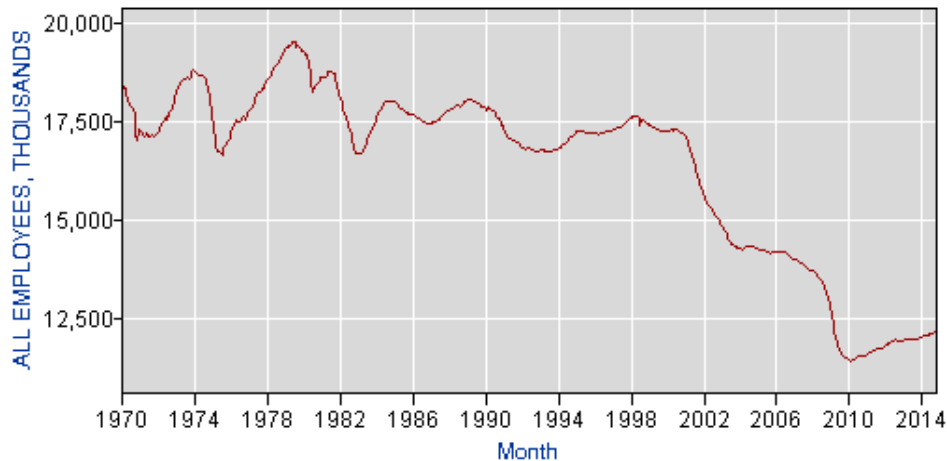
- **Digital manufacturing technologies**—This includes computer-aided modeling that can design, test, modify, and improve products digitally. Cloud computing, 3D scanners, and CAD software programs are tools believed to help bypass more costly and slower physical testing.
- **Sustainable manufacturing**—This refers to energy-efficient manufacturing processes that maximize energy use and reduce waste are the goal. For example, there are "lights out" factories that can operate in the dark, without heating or cooling, because they are primarily run by robots and other machines. In an overseas example, Philips uses lights-out manufacturing to produce electric razors in a factory in the Netherlands. About 128 robots assemble the razors and nine quality assurance workers complete the manufacturing process.⁵⁰
- **Nano-manufacturing**—This refers to the ability to manipulate materials on molecular and atomic scales. This type of manufacturing would be applicable to products such as high-efficiency solar cells, batteries, and biosystem-based medical applications.
- **Flexible electronics manufacturing**—This applies to the production of technologies that bend and adapt to body temperature. These products are believed to be the next generation of consumer and computing devices, but they will likely require highly advanced manufacturing processes.
- **Bio-manufacturing**—These applications use all or part of a biological organism to produce a products such as drugs and medical compounds, improvements in energy efficiency, and new methods of nanomanufacturing.
- **Additive manufacturing**—Also known as 3D printing, additive manufacturing can create three dimensional objects using over 1,000 materials including hard plastic, flexible plastic, ceramics, and metals.
- **Industrial robotics**—Robots allow for greater industrial productivity, as they can operate around the clock, carry out processes with great precision, self-generate progress reports, and work in less space. As robots become more common, they have also become less expensive: "The expense associated with industrial robots has fallen as much as 50% compared with human labor since 1990."⁵¹

⁵⁰ Markoff, John. "Where's My Robot? - Techonomy." Techonomy. Techonomy, 12 Nov. 2012. Web. 12 Jan. 2015.

⁵¹ Koten, John. "What's Hot in Manufacturing Technology." *Journal Reports: Leadership*. Wall Street Journal, 10 June 2013. Web. 15 Dec. 2014.

- **Advanced forming and joining technologies**—These processes remain largely traditional, but the AMP believed this segment is overdue for innovation and new ways of joining a wider variety of materials with greater energy and resource efficiency.

Author Eric Schaeffer holds that manufacturers can use technology to support manufacturing processes, quality control activities, administrative functions, and forecasting activities such as planning resources, requirements, production rates, and lead times. While automation usually conjures up images of machines performing routine activities, Schaeffer contends that another major advantage of automation is the data this technology generates. Automated processes provide valuable information on production starts and finishes, line slowdowns, downtime, and quality issues. This type of information helps firms improve the overall manufacturing process by detecting and resolving problems quickly. It can also help manufacturers structure and schedule maintenance activities to have the least impact on production while also proactively identifying and avoiding costly breakdowns.⁵² Furthermore, industrial manufacturers have been found to value this type of data. “When asked, 67 percent of industrial manufacturers responded that Performance Management was one of the initiatives they had planned. This was followed by 47 percent for Quality Assurance.”⁵³



Source: U.S. Bureau of Labor Statistics

Changes in the Manufacturing Workforce

Skills availability in the U.S. manufacturing sector dwindled due to years of widespread offshoring and technological changes in manufacturing processes. According to the Bureau of Labor Statistics, and shown in the graph below, U.S. manufacturing jobs peaked in 1979 at just over 19.5 million jobs. Then, from 2001 to 2010, there was a steady decline of these jobs. At the

⁵² Schaeffer, Eric. "Automation and Analytics Can Help Sustain a Manufacturing Revival." *Technology Blog and Community from IT Experts*. Accenture, 11 Dec. 2014. Web. 15 Dec. 2014.

⁵³ Schaeffer. "Automation and Analytics Can Help Sustain a Manufacturing Revival."

end of 2014, just over 12 million individuals held manufacturing jobs.⁵⁴ While this chart is useful in understanding the shift in employment in the manufacturing sector, it does not show the supply of manufacturing labor or the number of jobs that have been reshored. These factors are important, because much of the discussion on reshoring suggests the supply of labor is lacking, while some are of the view that the number of reshored jobs will only be a small fraction of the offshored jobs.

First, research points to a disparity between supply and demand in the manufacturing labor market. Here, the supply of available skills in the workforce does not align with the skills demanded by employers. As Moutray et al states, “A fair share of this challenge is due to the changing dynamic in manufacturing that emphasizes a higher-skilled workforce.”

A 2012 survey conducted by the National Association of Manufacturers (NAM) also confirms that over 62 percent of small- and medium-sized manufacturers had positions that they were unable to fill because of a shortage of qualified candidates.⁵⁵ The literature suggests that the U.S. workforce currently lacks the skills that manufacturers demand, and this shortcoming is only expected to worsen over time. According to Steve Minter, over 75 percent of manufacturers reported at the end of 2013 that they have a need to fill certain skill gaps over the next 12 to 24 months, and the skills gap is only expected to widen in coming years.⁵⁶

Reshoring will return jobs to U.S. shores; but, as mentioned in the previous section, the quality of jobs will likely outweigh the quantity of jobs. Automated manufacturing will increase the demand for middle- and high-skill employees, but automation will likely lessen the need for lower-skill employees. As Minter states, “The return of manufacturing activity to the U.S. will have to be accompanied by increased productivity, probably through investments in technology that eliminates jobs.”⁵⁷

However, it is important to note that even if jobs and processes return to U.S. shores, they will not look the same as they did in the 1970s or even as they currently run in foreign locations. As the market shifts to accommodate reshoring activities, modern U.S. manufacturing will look very different from the old view of manufacturing.

⁵⁴ United States. Bureau of Labor Statistics. Employment, Hours, and Earnings from the Current Employment Statistics survey (National): Manufacturing sector. 29 Dec 2014. Web. 29 Dec 2014. <http://data.bls.gov/timeseries/CES3000000001>

⁵⁵ Moutray, Chad, and Kevin Swift. "Looking Ahead: Opportunities and Challenges for U.S. Manufacturers." *Business Economics* 48.2 (2013): 121-33. Web. 29 Dec. 2014.

⁵⁶ Minter, Steve. "The Critical Shortage Facing US Manufacturers." *The Global Manufacturer*. Industry Week, 15 Oct. 2013. Web. 15 Dec. 2014. <<http://www.industryweek.com/blog/critical-shortage-facing-us-manufacturers>>.

⁵⁷ Heskett, James. "Harvard Business School." *Can We Bring Back the "Industrial Commons" for Manufacturing?* — *HBS Working Knowledge*. Harvard Business School, 3 Oct. 2012. Web. 15 Dec. 2014.

Benefits from the Spillover Effects of Reshoring

Those who believe reshoring has larger positive impacts on the U.S. economy make their case citing indirect benefits. These indirect impacts include:

Innovation and competitiveness

Moser and Kelley contend that reshoring improves the U.S. economy by increasing competitiveness and reducing intellectual property loss.⁵⁸ More specifically, they believe that reshoring increases U.S. competitiveness by strengthening research and development (R&D) activities. So, as firms endeavor to compete in a growing global economy, they will need to constantly modernize manufacturing processes, thereby resulting in innovative products and processes. However, it is still unclear how much increased investment in R&D by individual companies will impact economic growth on a national level.

Harvard Business School Professors Pisano and Shih theorize that exporting manufacturing weakens the nation's industrial commons. Pisano and Shih believe the nation's industrial commons embodies the "collective capability to sustain innovation."⁵⁹ Industrial commons sustain innovation by first creating powerful knowledge networks that are in turn supported by a constant flow of knowledge sharing within an industry.

Furthermore, it has been found that the innovation developed from an industrial commons can even spur completely new industries. In a 2013 report, the Council on Competitiveness illustrates this point:

"A historical example of this is when the U.S. military decided to establish armories—arguably the most successful public-private partnership in history—and have them produce weapons with interchangeable parts. This resulted in the development of the American system of manufacturing and the development of an industrial commons that provided the foundations for the manufacture of sewing machines, textile machinery, furniture, locks, clocks, bicycles, locomotives, machine tools, and eventually automobiles."⁶⁰

This example suggests that the innovation that stems from an industry may increase the nation's development of or global competitiveness in more industries.

Impact of Reshoring on American Jobs

Research suggests that reshoring has created jobs for Americans. However, the scale or number of jobs gained is rarely quantified. Thus far there is only a 2013 analysis, conducted by

⁵⁸ Moser, Harry, and Millar Kelley. "The Reshoring Trend Is Good for U.S. Engineers and America." *Feature*. Institute of Electrical and Electronics Engineers, Mar. 2013. Web. 11 Dec. 2014.

⁵⁹ Thompson, Roger. "Why Manufacturing Matters." *Research & Ideas*. Harvard Business School, 28 Mar. 2011. Web. 11 Dec. 2014.

⁶⁰ *Rebuilding the Industrial Commons*. Rep. Washington DC: Council on Competitiveness, 2013. Print.

the Reshoring Initiative, which estimates that 50,000 manufacturing jobs were reshored between 2010 and 2013—about 10 percent of the total increase since January 2010.⁶¹ There are, however, several forecasts on how many jobs certain scenarios or reshoring efforts could return to the U.S. The table below shows the potential impact of reshoring on jobs given four sources and scenarios.

Scenario Description	Source of the Scenario	Cumulative Number of Manufacturing Jobs Reshored*	Total Cumulative Number of U.S. Jobs Created**
Companies use total cost analysis in sourcing decisions	Reshoring Initiative	500,000	1,000,000
By 2015: If Chinese wage trends continue at 18% per year	Boston Consulting Group	1,000,000	2,000,000
Adoption of: better U.S. training; increased process improvements and automation; competitive corporate tax rates	Federal Government's Advanced Manufacturing Partnership	2,000,000	4,000,000
End of foreign currency manipulation	Almost all manufacturing groups	3,000,000	6,000,000

* Number of jobs and scenarios are cumulative. ** Assuming a 1.0 multiplier effect

Source: The Reshoring Initiative

It is worth noting that much of the literature that touts the economic benefits of reshoring relies on arguing the disadvantages of offshoring. For example, Koehler and Hagigh state that on the company level, offshoring sparks a loss of innovation, knowledge, and talent development that perpetuates itself.⁶² Similarly, Harvard Business School Professors Pisano and Shih hold that national innovation will invariably suffer when companies offshore manufacturing, because the engineering knowledge that supports the manufacturing process will likely follow.⁶³

Conclusion

As shown by trends in U.S. manufacturing, manufacturing is a challenging and competitive industry. Given the global changes discussed above, it is safe to say that not all U.S. manufacturers will find their home location a favorable place to do business. The brightest reshoring prospects involve those that can profit from the current manufacturing environment.

⁶¹ Moser and Kelley, "The Reshoring Trend Is Good for U.S. Engineers and America."

⁶² Koehler and Hagigh, "Offshore Outsourcing and America's Competitive Edge: Losing Out In The High Technology R&D And Services Sectors."

⁶³ Moser and Kelley, "The Reshoring Trend Is Good for U.S. Engineers and America."

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This would include manufacturers that depend on natural gas, require minimal labor, and need flexibility in production to meet changing customer needs. In this case, there are opportunities for various levels of government, the private sector, and partnerships between the two to create an environment to support the manufacturers who can reshore.

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