

**Spring 2014
Industry Study**

**Final Report
*The Manufacturing Industry***



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MANUFACTURING 2014

ABSTRACT: The 2013/2014 Eisenhower School for National Security and Resource Strategy Industry Study for Manufacturing believes that US Manufacturing is vital to our National Security. Manufacturing is the cornerstone of a strong economy. Although not the largest contributor to GDP, the manufacturing industry possesses the greatest multiplier effect. In other words the monetary investment in the industry yields a higher return of associated economic benefit to the economy as a whole. A capable, healthy economy provides multiple options to execute a National Security Strategy. As a result, The President’s Council of Advisors on Science and Technology (PCAST) was chartered to “secure US leadership in emerging technologies that will create high quality manufacturing jobs and enhance America’s global competitiveness.”¹ The PCAST report lays out a framework for a National Manufacturing Strategy; however, there is not a single organization responsible for executing the strategy. The current political and fiscal environment fails to facilitate the creation of such an organization to function as an executive agent. The USG and manufacturing industry must set the conditions now to compete. We offer the following recommendations to bridge the gap until an executive agent can be established:

- 1) Minimize Taxes and Regulations
- 2) Invest in Education while reforming Immigration
- 3) Improve the foreign and domestic environments to facilitate international trade
- 4) Invest in R&D

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INTRODUCTION

Historically, the US has boasted a strong manufacturing base with unmatched breadth and depth, fueled by investments in research and development that has long served as a source of strategic advantage for the nation. The US economy, which remains the largest in the world at the time of this writing, has thrived on its ability to innovate, develop and manufacture goods, and export them in the global market, creating millions of high skilled, high paying jobs. Today, however, America's historic leadership in manufacturing innovation is trending downward; the US now ranks 3rd in the 2013 Global Manufacturing Competitiveness Index² and 3rd in terms of research and development (R&D) investment as a percentage of GDP.³ The US is the 2nd largest manufacturer, behind China, whose investment in R&D is forecast to overtake that of the US by 2022.⁴ This paper provides an analysis of the current manufacturing environment and examines ways for the Government to help US manufacturing be globally competitive, by minimizing taxes and regulations; investing in education while reforming immigration; maximizing trade; and investing in R&D.

CURRENT MANUFACTURING ENVIRONMENT

There are two factors shaping the current manufacturing environment: a myriad of government led efforts that do not provide an overarching strategy and despite the number of jobs lost in manufacturing US productivity remains high.

During the past five years, economic recession and concern regarding national debt and employment have rejuvenated the focus on manufacturing within the American government as a lever for stimulating growth. During this time, the government established a plethora of working groups, spanning numerous government agencies producing more than a dozen strategic planning reports on US manufacturing. The America Competes Act of 2010, signed into law in 2011, established new initiatives for increasing basic research investment in the physical sciences, strengthening educational opportunities in the science, technology, engineering and mathematics (STEM) fields and developing a robust innovation infrastructure.⁵ The act directed the National Science and Technology Council (NSTC) to develop a national strategic plan to support advanced manufacturing research and development; it then established an Interagency Advanced Manufacturing (IAM) working group which produced the report in 2012, entitled *National Strategic Plan for Advanced Manufacturing*.⁶



In 2011, the President established the Advanced Manufacturing Partnership (AMP) steering committee, a standing working group operating within PCAST, that developed *Capturing Domestic Competitive Advantage in Advance Manufacturing* in 2012.⁷ This report, endorsed by PCAST, proposed a standing consortium of industry, government and academia as part of a needed framework for identifying and developing key manufacturing technologies, and provided a list of top technology areas that would promote US manufacturing competitiveness.⁸ President Obama highlighted manufacturing in his 2012 and 2013 State of the Union Addresses, wherein he announced public-private cooperative initiatives and the intent to establish more than a dozen federally funded regional centers for advanced manufacturing collaboration. The figure below depicts the myriad of organizations in a complex environment with no one executive agent to execute the national manufacturing strategy by setting priorities, maximizing resources through collaboration and minimizing redundancy.

Figure 1 – Organizations with Manufacturing Connections



Measures of US Productivity include inputs of labor and capital, while output is typically measured in revenues and other GDP components such as business inventories. The Bureau of Labor and Statistics (BLS) uses two types of primary labor statistics: 1) Labor Productivity, and; 2) Multi-factor Productivity.⁹ Labor productivity measures output per hour of labor, and Multi-factor Productivity measures output per unit of combined inputs, which consist of labor and capital, and, in some cases, intermediate inputs such as fuel.¹⁰

What is not evident in the description of productivity and in how BLS calculates productivity is that manufacturing employers are always searching for improved ways to operate more efficiently, thus reducing input costs while simultaneously increasing output of goods or

services. Often times, this translates into introducing improved technologies or systems that in turn reduce the requirement for paid employees.

The US manufacturing industry has always placed an emphasis on worker output. Over time, as depicted in Figure 2, manufacturing employees in the US have continued to become more productive. Figure 2 refutes claims that manufacturing in the US is on the decline. In fact, today's manufacturing worker produces nearly four times more than a manufacturing worker in 1947.

Figure 2 – Real Manufacturing Output per Worker, 1947-2010.¹¹

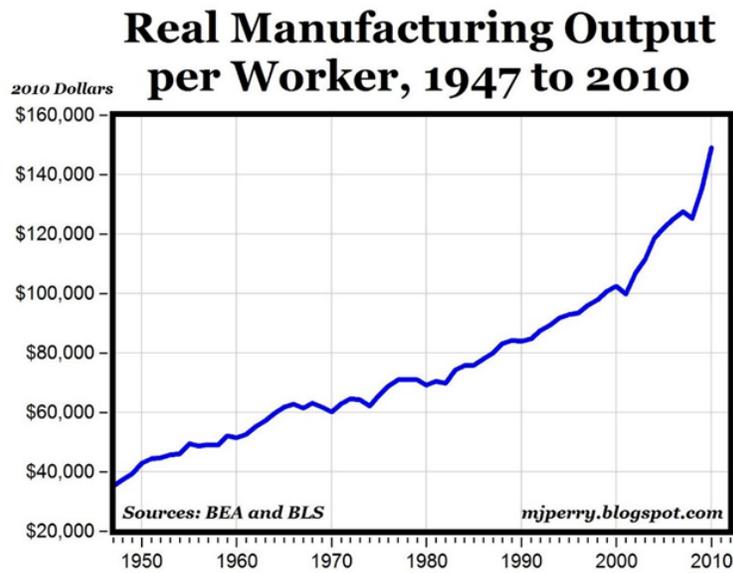
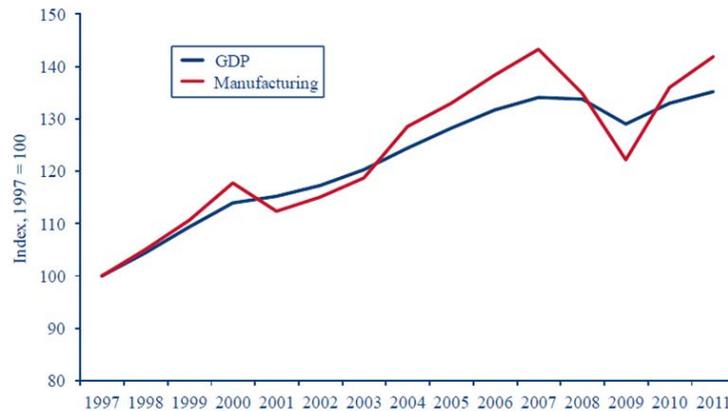


Figure 3 shows a direct correlation between U.S. manufacturing value added and US Real GDP. With the exception of recession time periods, growth in manufacturing value added outpaced Real GDP.¹²

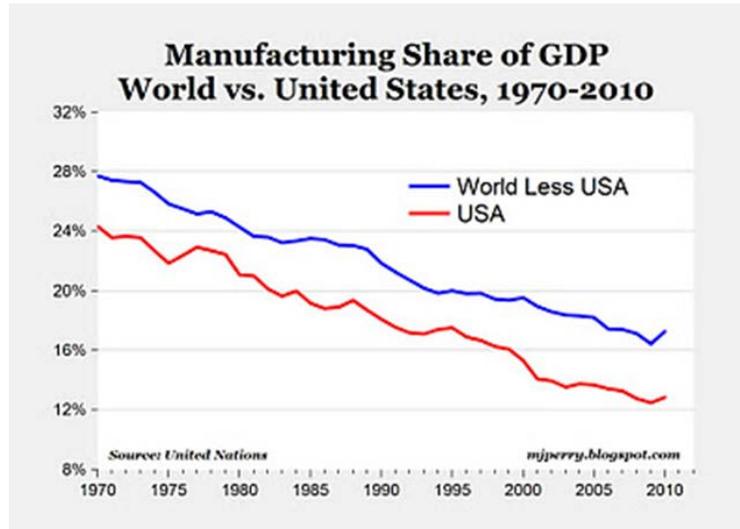
Figure 3 - Growth in Real GDP and Manufacturing Value Added, 1997–2011¹³



SOURCE: Bureau of Economic Analysis.

Generally, US Real GDP paralleled growth in manufacturing value added from 1997-2011. There is a strong relationship between manufacturing productivity and US GDP; however, manufacturing productivity as a share of US GDP has decreased over time. Figure 4 depicts manufacturing as a share of US GDP compared to the rest of the world from 1970-2010.

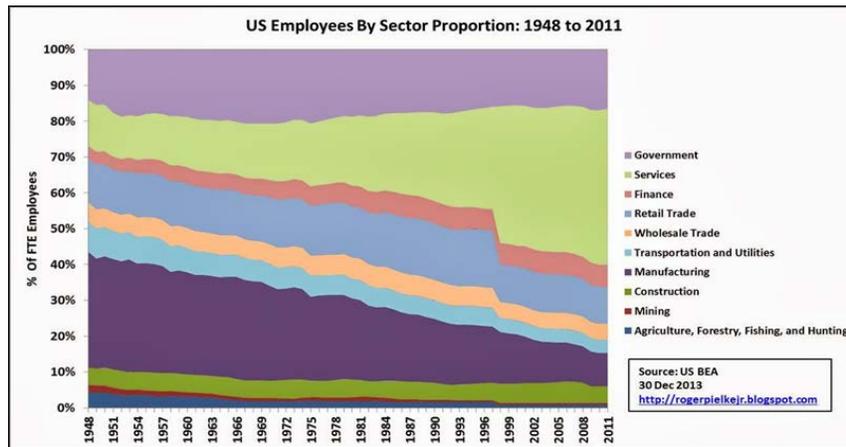
Figure 4 - Manufacturing Share of GDP, World vs. USA, 1970-2010¹⁴



This graph is encouraging in that US manufacturing as a share of the US economy is important and is not much lower than all other nations combined. On the other hand manufacturing as a share of GDP, for both the US and the rest of the world combined, has been on a downward trend since 1970. This graph refutes claims that manufacturing has migrated from the US as evidenced by the lines remaining parallel during the past 40 years.

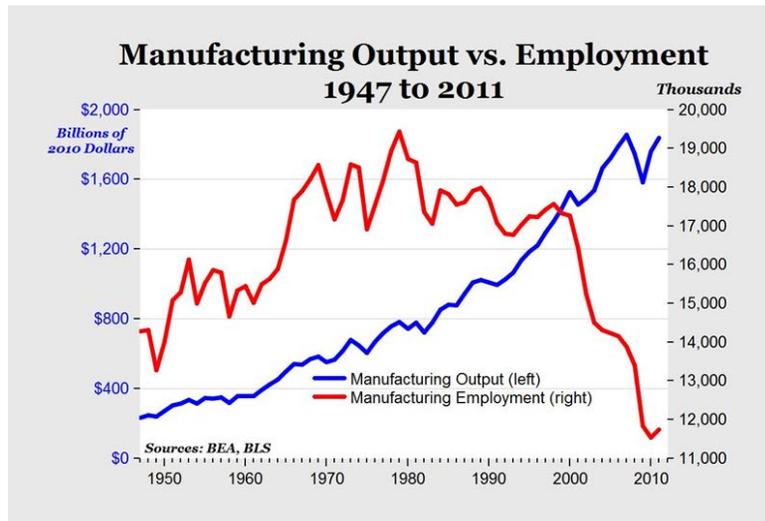
Figure 5 suggests that goods producing industry employees migrated to the services industry over nearly the past 50 years. The services industry ballooned from 1948 to 2011 capturing over 30% of US employees. Inversely, the US manufacturing industry, share of employment shrunk from 31% in 1950 to 9% in 2011.

Figure 5 – U.S. Employees by Sector Proportion: 1948-2011¹⁵



When comparing manufacturing’s output versus employment, there appears to be little reason for the industry to recapture previous employee numbers. Figure 6 shows output since 1947 steadily increased even after manufacturing employment numbers significantly declined in 2000.

Figure 6 - Manufacturing Output vs. Employment, 1947-2011¹⁶



Experts attribute this phenomenon to technology advancements and improved business practices that allow manufacturing companies to operate lean while simultaneously increasing output and productivity.

One final note on the current state of US manufacturing is the impact it has on the rest of the economy from a financial and employment impact. In 2012, manufacturers contributed over \$2.03 trillion dollars to the economy which was 12.5% of US GDP, up from \$1.93 trillion in 2011.¹⁷ This is important because of the multiplier effect. Due to the large manufacturing supply chain networks that support many other market sectors, manufacturing has the highest

economic multiplier effect of any other US economic sector. For every \$1 in US manufacturing value added, \$1.33 in additional value is created in other sectors.¹⁸

Figure 7 – Manufacturing Multiplier Effect

Manufacturing’s Multiplier Effect Is Stronger Than Other Sectors’
(Updated April 2014)



Source(s): U.S. Bureau of Economic Analysis, Annual Input-Output Tables



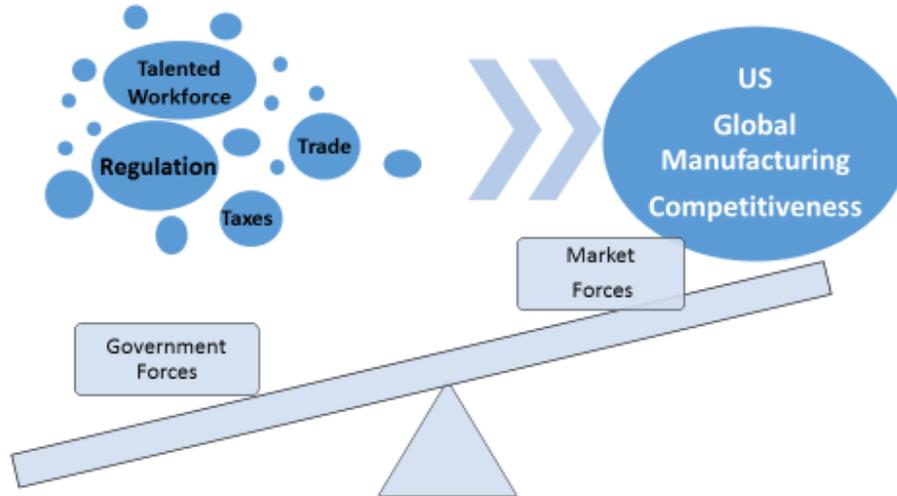
The manufacturing industry enables 17.4 million jobs in the US, which equates to approximately 16% of all private sector employment and 9% of the total workforce.¹⁹ These manufacturing jobs are higher paying according to the US Department of Commerce. On average, hourly wages and salaries for manufacturing jobs were \$29.75 an hour in 2010 compared to \$27.47 an hour for non-manufacturing jobs. These workers include scientists, engineers, and technicians, all of whom are more likely to have corporate-provided health care and retirement benefits than non-manufacturing sector workers, ultimately increasing the stability of the economy.²⁰

RECOMMENDATIONS

The 2013 Global Manufacturing Competitiveness Index (GMCI) ranked the US 3rd, and projects a drop to 5th by 2018, behind China, India, Brazil, and Germany.²¹ America remains the world’s top producer; however, there are important sectors within the industry where manufacturing has fallen behind other nations. The US lost these sectors because of skill gaps, taxes, excessive regulations, and infrastructure limitations making offshoring more competitive. The loss of advanced technology and complex production processes, threaten America’s strategic advantage in science, technology and innovation and the future of its national security. The springboard for future global competitiveness is the creation an ecosystem that will enable the US to improve its comparative advantage in manufacturing, creating wealth, and ultimately providing options to execute a national security strategy. The ecosystem should target the business environment by improving the major drivers of manufacturing competitiveness. The figure below depicts the imbalance that exists in the environment between Government and market forces.

Figure 8 – Relationship between Government and Market Forces

Improve four of the major drivers while balancing the two forces to be globally competitive



In order to balance these two forces we recommend minimizing taxes and regulation, securing an innovative, talented workforce by investing in education and reforming immigration, maximizing trade, and investing in R&D.

MINIMIZE TAXES

“The system is backfiring on itself. The US tax base is eroding, the US is losing its international standing as a desirable place to invest, and the US market in general is losing its capital base.”²² Three key findings underscore the decline:

- The marginal effective tax rate (METR) on corporate investment (i.e., the tax impact on capital investment as a portion of the cost of capital) is 35.3% in the U.S. - higher than any of its Organization for Economic Cooperation and Development (OECD) trading partners.
- The US has maintained the highest METR in the OECD since 2007, when Canada’s multiyear program of corporate tax reform brought its METR below the G-7 average.
- Excessively high US corporate tax rates have shrunk the US corporate sector and reduced corporate tax revenues.²³ The existing tax code is extremely complex, does not treat all corporations fairly and has resulted in a marked decline in the valuation of the US as a business friendly environment.

The top statutory federal rate of 35% is increased to nearly 40% when state taxes are taken into account. Deductions and tax credits result in an effective tax rate (ETR) that’s less than 35%, dipping as low as 29% as a METR, but despite these high rates, “corporate tax raises relatively

little revenue because the corporate tax base is relatively narrow when compared to the size of the business sector.”²⁴

Not only is the US METR the highest of all of the countries in the OCED, it features one of the lowest reductions in the past decade. Some countries have increased their rates, but the US has seemingly ignored the fact that its rates are the highest – a clear indication that there has been much talk and little action in the past. “Overall, the current corporate tax system contains numerous provisions that encourage businesses to invest in certain kinds of assets or to engage in certain kinds of activities for tax reasons rather than for reasons of economic efficiency.”²⁵ While self-preservation is understandable, what is most troubling is that corporations are incentivized to ignore the principles of good business ethics and are failing to anticipate the greater damage they will inflict on the economy in the years ahead.

The Tax Reform Act of 1986 reduced the upper statutory tax rate from 50% to 28% and reduced the effective corporate tax rate from 50% to 35%. The Act was not intended to raise or lower taxes, but it shifted some of the tax burden from individuals to businesses, and in many respects, added to the complexity of international business taxation.”²⁶ So what is the top priority for corporate tax reform? Simplification is a common refrain, as is lowering of the tax rate, and matching international norms with respect to foreign earned income. Included in this theme is the elimination of existing tax subsidies and loopholes, equal treatment of all manufacturing and service companies, and the adoption of a territorial system to address foreign earnings. Many proposed reforms include reducing the corporate tax rate but delay corporate investment deductions – a recipe that discourages investing. A better plan would be to offer a permanent tax credits for investments in R&D, as well as permanent tax credits for new equipment and physical infrastructure.

Viable reform requires concession and compromise. With this in mind, broadening the tax base could serve as the offset for the lost revenue brought about by a reduction in the tax rate. Additionally, reducing the tax rate would reduce the incentive for businesses to make risky investments by shifting their focus from tax advantages to that of economic return. The complexity of the existing tax code, complete with numerous loopholes and exemptions requires an exceptional level of effort to not only ensure compliance, but also to examine, research and exploit opportunities to reduce a corporation’s taxes. Finally, reform must include changing from a global tax system to a territorial one.

“At present, US multinational corporations (MNCs) have more than \$10 trillion invested abroad, including at least \$1 trillion of foreign earnings. Ending deferral could return \$11 billion to \$60 billion in annual US tax revenue.”²⁷ The most important task in the short-term is to begin recouping deferred tax revenue. Specifically, a one-year tax amnesty period should be enacted immediately, featuring a flat 5% tax rate for all deferred profits held by MNCs operating abroad.

Additionally, the US should adopt a Value Added Tax (VAT). In the August 2013 issue of Tax Management Financial Planning Journal, Michael Stumo advocated a VAT would be revenue neutral, retain the current progressiveness in the tax code, and setting a VAT rate at 12.3% could lower the corporate tax rate from 35% to 15%.²⁸ More than 150 countries have employed a VAT with an average rate of 17%. There is no reason the US should operate any differently.



Michael Boyle, former Director of the Tax Foundation Think Tank, asserted that four things matter with respect to tax reform: The tax system must remain competitive, tax rates matter, the tax base matters and complexity matters. In the past, responses to requests for corporate tax cuts have included the establishment of targeted corporate tax preferences (permanent and temporary preferences as well as tax rate cuts). Coupling permanent preferences (the manufacturing deduction, the research and development credit, tax-exempt interest, and deferral of income of foreign subsidiaries) with a corporate tax rate cut and a broadening of the tax base possesses the greatest potential to revitalize the U.S. Manufacturing Industry and enhance U.S. competitiveness.²⁹

Simplify tax code, implement VAT, convert to territorial tax system, and make deductions permanent

REDUCE REGULATIONS

Businesses face an increasingly burdensome business climate, one punctuated by ever-increasing regulation and its associated costs of compliance. This excessive application of rules and regulations, combined with their unpredictable nature, conspire to heighten business uncertainty. Although reducing regulations would go far in improving the business climate, new regulatory requirements continue unabated, as the Congressional Research Service explains:

“When Congress enacts legislation, it frequently delegates rule-making authority to federal agencies. For example, the number of final rules published each year is generally in the range of 2,500-4,500, according to the Government Accountability Office (GAO). Some of those rules have a large effect on the economy, and others have a significant legal and/or policy effect, even if the costs and benefits are minimal.”³⁰

Initially, the relative ease with which a firm can start a business is undermined by complex taxes and regulatory compliance concerns that can quickly stifle growth. Estimates reflect that structural costs (corporate tax rates and employee benefits, compliance with other federal regulations, such as environmental regulations) make it 20 percent more expensive to do business in the United States.”³¹ While each regulatory action may have merit, the ever-increasing list of actions is disproportionately burdensome on smaller firms that lack dedicated compliance staff. This diversion of resources results in time, energy, and effort not applied to business development.

Due to size and limited resources, small and medium size businesses face a disproportionate impact in complying with myriad regulations than do large businesses. Adherence may require a firm to address excessive compliance challenges pertaining to personnel management, tax expertise, fiscal policy adherence, health care options and environmental issues. Experts calculate that “...adhering to federal regulations alone cost \$1.75 trillion in 2008...\$10,585 per worker for businesses with 19 or fewer workers, but only 78 percent of that amount for businesses with 500-plus workers.” Indeed, smaller-firm tax compliance cost per employee is generally “...\$1,584 for businesses with 19 or fewer workers, but only \$517 per worker for companies with 500-plus workers. For compliance with environmental regulations, the



difference is a massive \$4,101 for businesses with 19 or fewer workers and \$883 per worker for companies with 500-plus workers.”³² Regardless of debate over merit of individual regulations, small businesses face an unbalanced proportion of compliance burdens.

Highlighting the scope of regulatory uncertainty faced by firms, the National Federation of Independent Business (NFIB) has petitioned the Supreme Court to weigh in on *Peri & Sons Farms, Inc., v. Victor Rivera*, which challenges current legal opinion that upholds each particular agency’s interpretation of a given regulation. NFIB contends that the court’s opinion encourages agencies to deliberately craft and implement ‘ambiguous’ rules, subject to their own selective interpretation, arguing that “constitutional principles require courts—not federal agencies—to determine what the law actually is.”³³

Another concern for the manufacturing industry is health care, ranked as its number one regulatory challenge.³⁴ In 1980, health care costs represented approximately 9% of the country’s gross domestic product. Today, health care costs represent approximately 17% of US GDP and continue to grow making it the single largest and fastest growing mandatory cost impacting the US budget deficit on an annual basis. It continues to reduce annually the percentage of the budget available for discretionary (defense, education and infrastructure) spending.

In 2010, the Patient Protection and Affordable Healthcare Act (PPACA) and the Health Care Education Reconciliation Act were enacted. In 2012, this law, commonly referred to as the Affordable Care Act (ACA), also known as “Obamacare,” was upheld by the US Supreme Court as constitutional. According to the ACA Facts website, “Obamacare’s goal is to give more Americans access to affordable, quality health insurance, and to reduce the growth in health care spending in the US.”³⁵

According to the Center for Healthcare Research and Transformation, the ACA will offset the costs associated with providing affordable health care to all Americans by reducing other federal spending and by implementing new taxes and fees. “Some tax and fee provisions are directed toward individual consumers, but most are directed toward insurers, employers, and certain manufacturers.” A large percentage of manufacturers, both large and small, provided health care insurance to their employees prior to the ACA. This, in addition to the fact that manufacturers represent one of the industries targeted to help offset the costs associated with ACA, make it difficult for manufacturers to be supportive of the law in its current state.

Manufacturers can only benefit from the ACA if actual health care costs, per individual, decrease substantially. It is unknown if the ACA will accomplish this objective. As of now, the Obama Administration reached its goal of 7 million enrollees; however, the demographics of the enrollees are key. In order for the cost per individual to decrease, the overall risks to insurance companies must decrease. The only way to achieve this goal is if the overall pool of the insured, particularly young, healthy individuals increases.

Currently, the greatest challenge to manufacturers in terms of the ACA is uncertainty. This impacts small manufacturers the most because they have less capital to set aside for unknown future health care costs. As a result, small manufacturing companies are unable to invest in growth. Many large manufacturers were surprised to find the actual cost of health care per



employee was over 11% less than they had predicted it would be in 2010 (prior to the ACA). According to Boeing, the cost of health care continued to rise from 2010 through 2014, but the rate of increase decelerated. In fact, Boeing published in the February issue of its “Frontier” newsletter that the company’s health care costs are “projected to decrease by 1% through September 2014.”³⁶ Policymakers must continue to monitor and assess the results and impacts of the ACA. Once insurance companies determine the actual impact on health care costs, policymakers must be willing to make necessary changes to reduce financial burdens on businesses while ensuring quality health care.

In addition to health care, energy is another regulatory and financial concern for the manufacturing industry. Consumption and cost are the two primary factors that govern energy expenditures. The US Energy Information Administration (EIA) conducted its most recent survey of US manufacturers’ energy consumption four years ago. In 2010, the US manufacturing sector consumed 18.82 quadrillion British thermal units.³⁷ This cost US manufactures \$154.7 billion (in 2005 dollars).³⁸

The US has implemented several policies to reduce pollution and global warming, both attributed to fossil fuels. The Obama Administration will establish standards that reduce carbon pollution by at least three billion metric tons by 2030, double wind and solar energy generation by 2020 and direct the Environmental Protection Agency (EPA) to work with states, the energy industry and other stakeholders to establish carbon pollution standards for both new and existing power plants.³⁹ The EPA’s vehicle greenhouse gas (GHG) rules will eliminate six billion metric tons of GHG pollution by 2025.⁴⁰

These laws have direct implications for US manufacturers. Specifically, growth in the manufacturing sector will be stifled if new technologies required to meet these mandates are too expensive. For this reason, the federal government must work in partnership with the energy and manufacturing sector to develop energy policies that encourage the use of traditional energy sources while reducing pollution, provide incentives for the manufacturing sector to switch to more efficient equipment and facilities, and expand the capacity of renewable energy sources.

Traditional energy will continue to provide the majority of electricity generation for at least 20 years. By 2035, experts predict coal will account for 39% of electricity generation, followed by natural gas at 27%, nuclear at 18% and renewable energy at 16%.⁴¹ New sources of traditional fuels will continue to drive energy prices down. Arguably the largest source of new fossil fuel is hydraulic fracturing or “fracking”, which extracts natural (shale) gas. The EIA expects US natural gas production will increase 44% between 2011 and 2040, attributing almost all this growth to shale gas.⁴² Fracking has led to a decrease in natural gas costs of approximately 50%.⁴³ Although there are concerns that fracking pollutes ground water there is currently no evidence to support this assertion.

Simply put, the structural cost of doing business in the US is too high. Oppressive regulations and associated compliance costs are nonproductive and inhibit development. The US must reconcile the fundamental disconnect between demand for job creation with its accompanying discouragement of a business environment conducive to economic growth.

***To become more business friendly, for every one regulation added,
remove at least two***



REFORM EDUCATION & IMMIGRATION

The Government, industry and academia should continue the robust dialogue on manufacturing to further refine and focus efforts on key areas which are most likely to deliver economic benefits and maintain technological advantages that enable competitiveness of the US economy.

Education and immigration policies must be changed to secure an innovative, talent-driven workforce that can support long-term growth in US manufacturing. Education statistics reveal the US lags other developed nations. The US produces fewer college graduates than its foreign counterparts and ranks 31st worldwide. America's pupil-to-teacher ratio in secondary education, at 13.8:1, is ranked 61st. In higher education, the US ranks 2nd in enrollment but 74th in students who graduate with science and engineering degrees.⁴⁴ To secure the most innovative and talented workforce, the US must improve its core education, to include vocational training, and not continue to solely encourage college attendance. One way to do this is through educational subsidies. A recent example is the American Opportunity Tax Credit which provided students a \$2,500 tax credit for attending colleges, universities, vocational and other post-secondary educational institutions.

Educational collaboration is another area that demands improvement from Government, academia, and private industry. Ireland is a great example of a nation that has created a coordinated strategy between these three organizations. Following its recession, Ireland recognized the need to invest in innovative applied research to enable economic growth. The best way to accomplish this is through public-private collaboration that provides internships and apprenticeships with industry, community colleges, and national laboratories.

In order to encourage America's youth to enter the manufacturing workforce, the image of the industry must appeal to men and women as challenging, high-paying and rewarding. Additionally, parents must be reassured that their sons and daughters can forgo a traditional four year degree and enjoy a successful career in manufacturing.

Historically, the US manufacturing industry has relied upon its robust immigrant base. Approximately 1.1 million immigrants legally enter the US annually.⁴⁵ Both low- and high-skilled immigrants impact the US socially and economically. Many immigrants enter the low-skilled labor market; however, a significant number of immigrants entering the US are highly skilled and thus compete in totally different markets, including STEM fields. The impact of immigration on the US labor force has been steadily increasing since 1970, a time when immigrants comprised approximately 5% of both the US population and its labor force. By 2010, immigrants made up approximately 13% of the US population and approximately 16% of the labor force. In 2013, President Obama stated the American immigration system was broken and that more than 11 million undocumented immigrants resided in the US. Although there are a number of differences associated with how the US should reform immigration, the vast majority of Americans believe the nation's current immigration policies are ineffective. In addition, the National Association of Manufacturers views immigration reform as a global competitiveness issue.

In the manufacturing industry, highly skilled immigrants have participated significantly in high-tech manufacturing, which is one of the top six industries where immigrants are vital. According



to a survey of US manufacturers, approximately 45% of the leaders in the US manufacturing industry rank “attracting and retaining a quality workforce” as one of the top four challenges facing the industry. The combination of the current US unemployment rate hovering around 6.5%, and the fact that employers are having difficulty finding qualified workers is evidence of a skills/jobs mismatch. This mismatch has led to a structural unemployment challenge within the US and highlights the need for immigration reform. In order for US manufacturers to remain competitive, they have to attract and retain these quality workers with the required skills from a global pool. It follows then, that, the ability for US manufacturers to successfully compete in the global market is directly linked to the success of US immigration policies.

US manufacturers await comprehensive immigration reform, particularly in relation to the much-needed, highly skilled immigrants. According to the Information Technology and Innovation Foundation, others nations have more attractive immigration policies aimed towards high-skilled workers than does the US, a fact that weakens US global competitiveness. The H1-B work visa allows an employer to petition to bring a highly skilled immigrant to the US for employment purposes. The government caps this program at 65,000 immigrants, but authorizes an additional 20,000 immigrants with US master’s degrees to participate. Manufacturers continue to lobby Congress to increase this limit. The US Senate passed legislation (Senate bill 744) in 2013 to help US manufacturers attract and retain highly skilled immigrant workers by raising the cap to at least 115,000. The House of Representatives needs to approve this important bill.

a. Industry must work with academia to establish recruitment strategies and apprenticeship programs

b. Congress must pass current immigration reform bill, Senate Bill 744, to attract and retain top talent, and provide necessary skilled workers to industry

INCREASE TRADE

With 95% of the world’s population outside the borders of the US, domestic manufacturing must be able to sell to export their goods to these markets. Free trade agreements allow nations the maximum gains of comparative advantages. As the world’s leading economies continue to struggle with an uneven recovery from the global economic crisis and recession, the US government continues to scrutinize industrial production as a measure of economic growth with an eye to capitalize on growth momentum. Recognizing a critical component of stimulating overall economic growth is ensuring US businesses are able to access and compete in international markets by increasing exports, President Obama announced the 2010 National Export Initiative as a Government-wide approach to export advocacy abroad.⁴⁶ With goals such as doubling exports by the end of 2014 (from \$1.8 trillion in 2010); working to remove trade barriers abroad; helping firms (particularly small businesses) enter new export markets with financial assistance, and investing \$2.4 billion in 45 manufacturing institutes under the National Institute of Science and Technology’s National Network for Manufacturing Innovation (NNMI), it appears that the Administration is on the right track.



Yet, when cast against globally competitive economies like Germany, whose export activities currently constitute nearly 50 percent of the country's GDP, current US export initiatives do not lend themselves to foster sustainable, strong economic growth in the decades to come. By networking state and local government, and private sector activities and investments into a collaborative, sustainable national strategy for cluster development, the US will best position itself to grow the economy with manufacturing export activities featuring prominently. Increased exports will translate to more job opportunities and serve to feed other avenues of GDP growth. The real benefit to the US economy will be the increase in innovation from knowledge spillovers with clusters, resulting in increased productivity, and competitiveness in the global market in the years ahead.

The World Trade Organization's (WTO) recent trade statistics indicating that the US is the world's second largest exporter of goods (after China) with 8.4% of the world's total export shares, outpacing Germany's 7.63%,⁴⁷ may lead some to believe that the US is currently well-positioned for competition and sustained future growth. However, a cross-examination of statistics from the World Bank shows that although the US commands more shares of the world's total exports compared to Germany, US exports represented only 14% of GDP in 2012 whereas German exports represented 52% of the country's overall GDP.⁴⁸ Understanding the significance of these facts and the opportunity to seize future growth, the Obama Administration has undertaken a series of complementary initiatives to boost exports with goals to reduce unemployment and increase overall GDP.

There is much to learn from Germany's export practices but it is naïve to believe that what works well for Germany will work in America. The foundation for Germany's manufacturing value chain is rooted in its culture. Its commitment to investing in and nurturing industrial clusters can be exported to the US, along with an action plan that is enduring across presidential administrations. As industry becomes more engaged globally, the USG must enhance its competitive advantage by assisting firms and entrepreneurs within clusters to move up the value chain through innovation and greater specialization.⁴⁹ Recent US investments in specific technology development such as nanotechnology, reflects what OECD cites as a "smart specialization" strategy that more national and regional governments are attempting to enhance the competitiveness of firms and clusters.⁵⁰ Such strategies should be informed through collaboration with the private sector in an effort to incorporate indicators, technology foresight and priority-setting to help firms strengthen existing scientific, technological and industrial prowess for future investment.⁵¹ Including state and local governments in such strategizing will also ensure that the US capitalizes on the individual and regional industrial strengths pocketed throughout the country.

While current government initiatives to support increased exports and to reform controls will position a number of US manufacturers to capitalize on global market resurgence and growth, these policies and initiatives are strategically insufficient to shape and sustain a competitive US position in the future global marketplace. The US should consider the effects of globalization on trade and the confidence of Germany, a key trade rival fueled by a strong tradition of manufacturing and export excellence, in examining the domestic competitiveness the German government fosters. The latter may very well be remodeled for US manufacturing and export benefit.



Additionally, another complementary policy recommendation that allows the US to continue to negotiate free trade agreements (FTA) is the trade promotion authority (TPA). Congress needs to pass TPA to allow the US Office of Trade Representative to expand the list of trade agreements to include the Trans-Pacific Partnership and the Transatlantic Trade and Investment Partnership. Competing on a level playing field is an important part of US trade policy. Its FTAs must address policies that give foreign nations an unfair advantage over US manufacturing. Two of the most important considerations for FTAs are currency manipulation and manufacturing externalities. The US government must advocate amending the International Monetary Fund (IMF) and WTO agreements so both organizations view these issues equally.⁵² Unilaterally the US can impose trade restriction on nations that manipulate their currency to gain an unfair advantage in international trade, but the IMF and WTO are better suited to address currency manipulation. Another component of fair international trade is the way in which negative externalities are handled by different nations. Addressing currency manipulation negative externalities must be included in the negotiation of free trade agreements and the policies of the IMF and WTO.

Along with negotiating FTAs, partnering and commercial advocacy with state, local, and private sector officials under the NEI, the US must commit to investing in and nurturing regional industrial clusters to exploit available natural resources, infrastructure, skilled labor, and knowledge. The government must develop an enduring collaborative, comprehensive strategy to support the competitive environment 25-30 years in the future. Calculated and sustained investment in programs like NNMI as well as higher education, research institutions, and national infrastructure are required to grow a sustainable US export base.

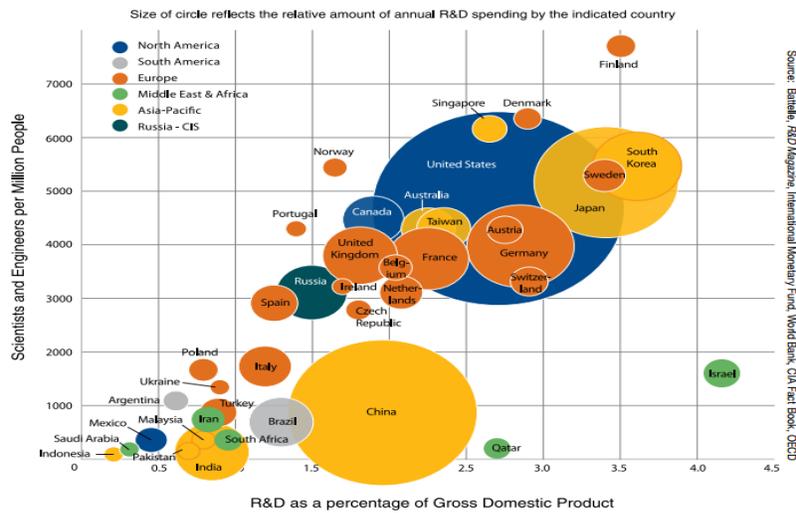
Improve the foreign and domestic environments to facilitate international trade through trade congressional approval of TPAs, FTAs, and NEI

INCREASE RESEARCH AND DEVELOPMENT

The final recommendation for the US to regain its dominant position is through increasing R&D. The US is competitive, but not dominant in terms of investment in R&D. A dramatic shift has occurred in terms of the globalization of research in the last five years, and Asia has now become the regional leader in R&D investment with nearly 40% of the global share, largely driven by China's increased spending, but also by growth in India, Japan, and South Korea. In the same five years from 2009 - 2014, the US share decreased from 34% to 31%, and Europe similarly from 26% to 22%. Current US expenditures lag Japan and Germany, with China closing in rapidly at 1.8%, and expected to increase to 2.2% by 2015.⁵³ At current rates of growth and investment, China's total funding of R&D is expected to surpass that of the US by 2022.⁵⁴ The figure below depicts a comparison of R&D spending and growth in terms of numbers of scientists and researchers to the ratio of R&D spending as a percent of GDP. It shows that many countries have research intensity at the same level as the US per capita. Although US investment and commitment to R&D is stable, other nations are catching up, and Asia as a region has surpassed the US in the level of research intensity.



Figure 9 – Percent of GDP vs Scientists and Engineers Per Capita



The most important example of long-term manufacturing and R&D investment impact is the significant growth of the US economy in the second half of the 20th century. This growth was the direct result of R&D investments made by the US Government and its defense industrial base, ultimately leading to world leading advancements in health, energy, and national security. These investments produced the world’s most advanced military systems and also spawned technologies with significant commercial applications. For decades, US military programs served as the development grounds for new technologies that later transitioned to commercial markets.

Today, however, US private industry leads investment in research, accounting for about 75% of US research spending.⁵⁵ Commercial domestic and international technologic advancements now significantly outpace USG funded innovations. This presents a paradigm shift as the USG must keep abreast of commercial technology advances for cost and competitiveness reasons, and engage a larger domestic and global private sector community.

USG must establish a more permanent framework, (including government, industry and academia) to identify key emerging technologies and needed investments

CONCLUSION

Despite employing significantly fewer workers than in previous decades and having lost its lead in industrial contribution to GDP to the rival service industry, it should not be assumed that manufacturing is in an irreversible decline. In fact, in a case for cautious optimism, the recent emergence of reshoring, whereby firms re-locate back to the United States from abroad due to rising labor and transportation costs overseas, has seen “50,000 jobs returned to the United States from 2009 to 2012; those 50,000 reshored jobs represent about 10 percent of all U.S. manufacturing jobs created over the last three.”⁵⁶

While reshoring will not see a return to employment of vast volumes of unskilled labor, the US cannot squander the opportunities presented by reshoring. Though appearing a catalyst for economic growth, the attractiveness of reentering the US market (or simply re-establishing domestic production) an increasingly unfriendly business climate could cool this movement.

Industry-wide, despite having a bevy of vacant, well-paying positions, manufacturing continues to fight an uphill battle on perception of the modern work environment. The historical context of dark, dangerous and dirty work has been mostly replaced by entirely modern, often high-tech facilities with significant automation. However, consistent gains in automation and the ruthless efficiency required to remain competitive will continue to see productivity gains coupled with commensurately declining employment.

Contributing to the difficulties of gaining and maintaining economic success while creating value, regulatory requirements can stifle innovation (such as requirements for prolonged environmental or safety reviews for new product approval) and can curtail export potential. For the manufacturing industry, success is hard won.

The fact there is significant opportunity cost to the disincentivizing of business in the US is captured by the prescient admonition that “Governments do not always seem to realize that they live in a competitive world, and that companies can go elsewhere if the regulatory climate is too harsh.”⁵⁷ Conversely, creating a more friendly business environment will improve manufacturing’s potential to increase its net contribution to the nation’s GDP.



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