2016 Top Markets Report Manufacturing Technology

Overview and Key Findings

Introduction

The United States is a major global supplier of manufacturing technology products. In 2015, U.S. companies exported over $8.1 billion worth of machinery to foreign markets. This, however, was down from approximately $8.5 billion in 2014, and is the third year in a row since 2012 to experience year-on-year declines.

There are a number of global economic factors that are responsible for this decline. To begin, according to Gardner Media, world production and consumption of machine tools have fallen over the last three years.[i] As one of the largest sectors and bellwethers for manufacturing technology, machine tool sales are indicative of a country's production capacity. Much of this has been a result of the slowing Chinese economy, whose machine tools consumption declined from $40.8 billion in 2011 to $31.8 billion in 2014.[ii] In 2015, China, the second largest global economy, suffered significant losses in the stock market. Analysts fear that China is in the beginning of a prolonged economic slump, and this will continue to affect manufacturing technology exports. In the currency markets, the U.S. Dollar has grown significantly in value against the Euro, the Canadian Dollar, the Brazilian Real, the Chinese Yuan and more. A strong U.S. dollar affects exports across all sectors, as it decreases the relative purchasing power of foreign buyers. Other factors also include historically low prices of crude oil and commodity iron ore.

Despite these contractions and expected headwinds through the short-term, it is important that companies consider developing export strategies to compete over the long-term in the global marketplace. Economic recessions end, and currency values change. Businesses looking to increase sales and reduce domestic market dependency over the long-term are likely to benefit from developing export strategies now. Nearly 96 percent of consumers, as well as two thirds of the world's purchasing power, live outside the United States.

Key Findings: Top Markets and Methodology

This ITA *Top Markets* report assesses the global market for manufacturing technology products by analyzing U.S. exports in this sector and determining: what products they are, where they are going, and the dollar value attached to them. To establish a priority of foreign markets that offer the best prospects for U.S. producers of manufacturing technology equipment, four criteria were used:

- total volume of U.S. manufacturing technology exports in 2015, as measured by the U.S. Census Bureau, Foreign Trade Division
- compound annual growth rate (CAGR) of U.S. manufacturing technology exports between 2009 and 2015, as measured by the U.S. Census Bureau, Foreign Trade Division
- most up-to-date ranking (2012) of markets by the United Nations Industrial Development Organization (UNIDO) "Competitive Industrial Performance Index"
- level of growth in industrialization, as measured by the rate of improvement in 2009-2012 UNIDO "Competitive Industrial Performance Index" rankings

U.S. exports are defined as products originating in the United States, which is an important distinction to make in an increasingly globalized economy.

Figure 1: Projected Top Markets for 2016-2017

1	Mexico	8	Poland	15	Taiwan	22	Israel	29	Ireland
2	Canada	9	Netherlands	16	Turkey	23	Chile	30	Spain
3	China	10	Saudi Arabia	17	Thailand	24	Russia	31	Argentina
4	Germany	11	United Kingdom	18	France	25	Indonesia	32	Hong Kong
5	Japan	12	Czech Republic	19	Brazil	26	Australia	33	UAE
6	Belgium	13	Costa Rica	20	Italy	27	India	34	South Africa
7	South Korea	14	Singapore	21	Switzerland	28	Malaysia	35	Colombia

Products that do not meet the minimum threshold of content made in the United States are not taken into account.

In ranking markets, ITA placed the most emphasis on total volume of exports in 2015. It is presumed that markets with historically high U.S. exports will continue to have high volumes in the future for a variety of reasons. Historic export trends indirectly take into account factors specific to the United States, such as geography, Free Trade Agreements (FTA), and size of market opportunity.

Some may contend that size of market is the most important factor in ranking. In other words, the largest markets should present the greatest opportunities. While valid to an extent, this calculation does not take into account the variety of economic, historic, and political factors that shape global trade. For example, top-ranked Mexico may not be the "largest" global market for manufacturing technology, a position held definitively by China.

However, Mexico does present unparalleled opportunities for U.S. exporters because of its shared border and lack of tariffs. China, on the other hand, may be the largest importer of manufacturing technology products in the world, but its close geographic proximity to established regional competitors, particularly Japan and Korea, can make it a more challenging market to enter for U.S. exporters. Other factors like tariffs may put U.S. exporters at a price disadvantage. Market size also does not take into account policy prescriptions like export controls, which may apply to U.S. exporters. As a result, while the information provided in this report may be of general use to companies across the industry, its utility is truly intended for U.S. exporters of manufacturing technology.

Based on aggregate trade data and global industrial indices, this report ranks global markets based on their export potential. These rankings represent the best current understanding of market opportunities. Paired with on-the-ground market intelligence from

U.S. Foreign Commercial Service Officers, this report aims to assist exporters in better determining global sales opportunities in their industry.

This report focuses on the export forecast for manufacturing technology products that fall broadly into eight categories. These categories focus on machinery used to fabricate products out of metal, plastic, rubber, and composites. They exclude machinery used for creating wooden products. With the exception of additive manufacturing equipment, these sectors generally align with industry groupings specified by the North American Industrial Classification System, which are:

- **Machine tools used for *cutting* metal** through processes like milling, turning, or grinding
- **Machine tools for *forming* metal** pieces through processes like pressing, punching, or bending
- **Machine tool *parts***, both OEM and after-market
- **Tools, dies, jigs, and fixtures** used for various manufacturing applications
- **Welding and soldering equipment**, including arc-welding and laser-welding equipment, but excluding hand-held equipment
- **Plastics and rubber manufacturing equipment**, such as compression, extrusion, and injection-molding machines
- **Industrial molds** primarily used for casting or forming materials like metals, plastics, and rubbers through a variety of processes like injection, compression, blowing, or thermoform.
- **Additive manufacturing equipment**, popularly known as "3D printers"

This report does not take into consideration exports of services, such as those provided by systems integrators, nor does it account for software solutions related to machinery, like Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), or others. Trade data derived from services is not readily available or consistent across markets, and therefore, statistics used for manufacturing technology products could be used a proxy indicator for services exports. If a country is a major recipient of U.S. equipment exports, it will likely have associated trade in related services.

This *Top Markets* report ranks 35 geographically and economically diverse countries that account for over 93 percent of all U.S. exports of manufacturing technology. The minimum threshold for exports to each market was $30 million annually in 2015. While many of the industrialized markets of Western Europe stand-out prominently, growth has been more widespread and taking root more strongly in Asia and Latin America. For U.S. exporters, the greatest export opportunities are not only in the largest markets, for many other considerations may be taken into account, including geographic and cultural proximity, ease of doing business, tariffs and market access, technical barriers to trade, and more. By ranking markets based on aggregate trade flows, this report helps to account for these considerations while offering further detailed information in the five country case studies.

The five country case studies that were selected for further reference have been chosen to illustrate a variety of points. Canada and Mexico, for example, are highly dependent on U.S. manufacturing technology exports, a fact related to their close geographic proximity and ease of market access through the North American Free Trade Agreement (NAFTA), which is now in its 21st year of existence. Across the Pacific, China is both the world's largest producer and consumer of manufacturing technology products. However, going into 2016, the country appears to be gripped in recession. A number of other factors also affect trade with China, including ineffective intellectual property protection, content localization requirements, and export control classifications. Germany, the largest European market and top-ranked by United Nations industrial indices, is seen as one of the most strict but most rewarding destinations to do business. Entering into the German market is often seen as key to entering Europe as a whole. Finally, in South Korea, trade is bolstered by the U.S.-Korea Free Trade Agreement (KORUS). Despite headwinds to the country's export-driven economy as a result of China's slowdown, sales of U.S. products have grown steadily. While these five countries are specifically highlighted, the U.S. Commercial Service maintains a presence in all of the Top Markets ranked in this report.[iii]

Policymakers should appreciate the different competitiveness issues and market characteristics that impact exporters in each sector. This section will provide a general overview of the manufacturing technology industry, which will be augmented by individual sector snapshots at the end of the report. Each offers sector-specific market trends and an assessment of near-term and mid-term export opportunities.

Industry Overview and Competitiveness

At its base, the manufacturing technology products described in this report are the equipment used to make durable and consumable goods out of various metals, plastics, rubbers, and composite materials. In economics, manufacturing machinery can be framed as one of the many "inputs" to a finished product, or "output." Durable or "hard" goods are products that can be used over the span of several years, such as parts for cars, airplanes, or consumer electronics. On the other hand, consumable or "soft" goods generally last a shorter amount of time, and include products such as cosmetics or pharmaceuticals. While some consumable goods are built using metals or plastics, most notably in the packaging industry, tying the performance of manufacturing machinery to the performance of certain durable goods sectors provides an accessible framework for discussion on manufacturing machinery market drivers.

By and large, the U.S. manufacturing technology sector is highly fragmented and made up of thousands of small-to-medium sized enterprises (SME's) and a handful of larger corporations. Most companies are family-owned, and many are in the second or third generation of family ownership. To illustrate this point, according to Gardner Media's Machine Tool Scoreboard, the two largest U.S. machine-tool manufacturers are Haas Automation of Oxnard, CA, and Gleason Corporation of Rochester, NY. Both are privately held corporations. Gardner estimates Haas' 2012 annual revenue was just under $1billion,[iv] while Hoover's estimates Gleason's 2014

annual revenue was roughly $853 million.[v] A small number of machinery companies are publicly-traded, but even those fall in the small- to mid-cap spectrum. For example, Hardinge, Inc. (NASDAQ: HDNG), based in Elmira, NY, is one of the largest publicly traded U.S. machine tools manufacturers, and had a 2014 annual revenue of $312 million. 3D Systems (NYSE:DDD), the inventor of additive manufacturing technology and the largest U.S.-headquartered additive manufacturing company, also trades publicly and had annual revenues of $654 million in 2014. To put this in perspective, the largest U.S. auto manufacturer in 2014, General Motors (NYSE: GM), had annual revenues of almost $156 billion. In the United States, most manufacturing technology companies are located in fairly close geographic proximity to each other. Companies based in the Great Lakes region (Michigan, Ohio, Illinois, New York, Wisconsin, Pennsylvania, Minnesota, and Indiana) accounted for almost half of the U.S. exports in this sector in 2014. Along with California and Texas, companies in these ten states accounted for almost 70 percent of U.S. exports in this sector.

Market Drivers: End-Use Industries

While the performance of manufacturing technology exports generally mirrors the economy at large, a more precise statement would be that the industry is tied to the performance of many end-use industries through their respective supply chains.

One of the largest end-use sectors for manufacturing technology products is automobile production, and increasing global production of motor vehicles will undoubtedly contribute to the expanding market for manufacturing technology. In 2013, almost 76 million new vehicles were produced outside of the United States, up from 73.1 million in 2012 and 70.1 million in 2011.[vi] Market reports estimate the value of the automobile and auto-parts manufacturing industry to be between $1.2 trillion to $2 trillion.[vii][viii]

Automobile producers and their multi-tiered supply chains rely extensively on machine tools, dies, jigs, molds, and a host of other types of equipment. Most global automobile manufacturers try to utilize just-in-time production. Therefore, producers of auto components tend to be concentrated near the markets that they serve.[ix] As a result, it is not surprising that this report's top 10 markets accounted for two-thirds of the total automobile production outside of the United States in 2013.[x] The top 35 markets recommended in this report accounted for over 90 percent of the total automobile production outside of the United States in 2013.[xi]

Over the next two years, automobile production is projected to slow down in several key markets, particularly in China and Japan.[xii][xiii] With auto production being the largest end-use segment for manufacturing technology, and China and Japan accounting for nearly 28 percent of global auto production outside of the United States, this will likely produce headwinds for U.S. manufacturing technology exporters.

Civil aircraft is another major end-use industry. According to Gale Business Insights, global aircraft and parts manufacturing accounted for over $285 billion dollars in revenue.[xiv][xv] At the end of 2013, the combined backlog for the two largest civil aircraft manufacturers, Boeing and Airbus, was 10,639. When compared with the 1,273 aircraft that both companies delivered in 2013, one can see that the demand for civil aircraft parts will continue well into the future.[xvi]

In the aerospace industry, top international companies like Italy's Finmeccanica have over 30,000 global suppliers.[xvii] The Dutch-based Airbus Group relies on over 2,000 suppliers based in 20 different countries to deliver components, parts, and hardware for their completed aircraft.[xviii] The list of metal and plastic components used in aircraft is extensive, and as individual parts will often require special manufacturing processes, the opportunities for specialized equipment providers are many.

Other major end-users of manufacturing technology are producers of equipment for upstream oil and gas operations. Field tools, oil derricks, drilling rigs and tools, well logging and surveying devices and other products often require a variety of machine-tools and other machinery to produce. Outside of the United States, upstream oil and gas equipment accounted for over $124.4 billion in global export revenue in 2013.[xix] Exports originating from this report's top 10 markets accounted for over 62 percent of this revenue, while sales from the top 35 markets in this report accounted for over 87 percent of 2013 revenue.[xx]

Oil and gas equipment producers have been hurt by falling crude oil prices, which reached a six-year low of $37.04 per barrel in December, 2015.[xxi] Crude oil

prices heavily influence oil and gas companies' ability to invest in new equipment, with lower prices leading to less investment. Global revenue for upstream oil and gas equipment has been declining since 2011, as well.[xxii] As a result, machinery companies will face fewer opportunities in the upstream oil and gas equipment sector.

There are obviously many other end-use sectors to consider, but the point to emphasize is that virtually any foreign durable goods manufacturer is a potential customer for U.S. manufacturing technology products.

Global Competitive Landscape

Competition by and large will come from suppliers in the Asia-Pacific region and Europe. In 2014, the United States was the fourth largest supplier of manufacturing technology products in the world, behind Germany, Japan, and China. For decades, the United States has trailed both Germany and Japan. Germany and Japan have frequently alternated as the number one and number two suppliers but both generally hold a combined 30-35 percent of global market shares. According to U.N. trade data, in 2009, China surpassed the United States as the third largest supplier. China held roughly 10.3 percent of the global export market in 2014. The United States, meanwhile, held 6.7 percent of the market share in 2014, and was followed closely by Italy at 6.3 percent and South Korea at 5.3 percent.

Asia-Pacific

Japan has held a commanding position ahead of the United States over the last two decades. However, over the past decade, the rise of China has arguably posed the greatest challenge to the U.S. manufacturing technology industry. In 2004, China held only 3.5 percent of global market share and was the seventh largest supplier compared with the United States at 10.2 percent. China has since overtaken South Korea, Taiwan, Switzerland, Italy, and the United States. But while those countries' shares in the global import market have only risen or fallen by less than one percentage point, U.S. market shares over the same period have declined roughly 3.9 percentage points to its 2014 value of 6.3 percent.

While U.S. industry tends to be fragmented and made up of many SMEs, a greater degree of industry consolidation and conglomeration has taken place in the Asia-Pacific region that has direct implications for U.S. competitiveness in the region.

For example, of the twenty largest machine tool producers in the world, 10 are incorporated in the Asia-Pacific region.[xxiii] Of this number, Japan accounts for seven, China for two, and South Korea one. But, although the two largest U.S.-owned machine tool manufacturers Haas and Gleason are primarily focused on machine-tool production, they are more likely to compete in the Asia-Pacific market with subsidiaries of industrial conglomerates that are highly diversified across a broad array of sectors. For example, Japan's Komatsu (TYO: 6301) is widely known for producing construction and mining equipment to compete with the likes of Caterpillar (NYSE: CAT) or John Deere (NYSE: DE). While the bulk of Komatsu's $16.6 billion in 2014 annual revenue came from construction and mining equipment, it was also the fifth largest manufacturer of machine tools in the world.[xxiv] Another example is Japan's Jtekt (TYO: 6473). Jtekt, which drew the majority of its $11.3 billion in 2014 annual revenue from producing automotive and aerospace components, was also the 9th largest machine tool manufacturer through its Toyoda brand. South Korea's Doosan (KRX: 000150) is another example of a major construction and heavy industry conglomerate active in the machine-tool industry. Doosan Infracore, the company's equipment subsidiary, had annual revenues of $7 billion in 2014, and was the 14th largest machine tool manufacturer.[xxv] The list of Asian conglomerates goes on.

There are several implications for U.S. competiveness. Conglomerates have capacity. They benefit from economy of scale, and act as internal customers for their manufacturing operations. They have better access to capital, and are thus more able to set up or acquire existing plants and distribution networks in their target markets.

Europe

Over the last decade, five of the top ten global supplier countries for manufacturing technology products were Western European (Germany, Italy, Switzerland, Austria, and France). Germany leads the world in output, and it is not surprising that the country ranks highest out of all of the industrialized nations in the United Nations Industrial Development Organization (UNIDO) competitive industrial performance index.

European manufacturing technology producers also tend to be SMEs, with some notable exceptions. But, as a result of limited domestic markets and tighter industry and government integration through compulsory membership in the national Chambers of Commerce, European producers have long relied on exporting goods to build competitiveness. With support from national export promotion agencies, as well as the EU common market and currency, European manufacturers have been more likely to develop export strategies at an earlier stage, gaining internal knowledge and capacity to conduct international business in the process. For example, according to the European Association of Machine Tool Industries (CECIMO), three quarters of member production is exported, and more than half of member production is exported outside of Europe.[xxvi]

Challenges and Barriers

The International Trade Administration regularly engages with foreign governments to improve opportunities for U.S. exporters.

Market Access

Tariffs affect many manufacturing technology products in a number of countries. Manufacturing technology is critical to industrialization, and many governments view the ability to produce items like machine tools as essential to developing their own industrial base. As a result, governments may levy tariffs on imports of foreign goods to support the development of local capacity. Opening market access through tariff reductions remains a critical strategy for the ITA in many countries, including Brazil, China, India, and more. By increasing the price of the product borne on the consumer, tariffs affect the cost-competitiveness of imported items and have a distortionary effect on the market. The United States continues to push for open access to markets by negotiating free trade agreements (FTA), including the Trans-Pacific Partnership (TPP) and Transatlantic Trade & Investment Partnership (T-TIP). The United States also engages partners through established multi-lateral fora like the World Trade Organization (WTO), as well as with other trading partners like China and India through the U.S.-China Strategic & Economic Dialogue and the U.S.-India Strategic & Commercial Dialogue.

Content Localization

The ITA also seeks to engage foreign governments on issues of content localization. Content localization requirements are typically set forth by governments as a means of ensuring a certain percentage of inputs into a product are sourced from domestic manufacturers. In return, companies may receive preferential treatment in taxation and subsidies, among other incentives. While calls by foreign governments to increase local content production are not in themselves barriers to trade, they can raise concerns if they lead to actual requirements. Because of this, the United States carefully monitors calls for content localization that may run counter to the World Trade Organization (WTO) rules. For example, Russia has called for increasing the share of machinery and tool equipment produced locally from the current 10 percent to 60 percent in 2020.[xxvii] As a result, in 2015, the United States and EU officially raised concerns with Russia over the possible extension of local content requirements in procurement of machinery and other sectors by state-owned enterprises.[xxviii] Similarly, in 2015, the Chinese Ministry of Industry and Information Technology unveiled "Made in China 2025," an industrial policy intended to upgrade Chinese manufacturing through technology and skilled labor. The plan also calls for Chinese companies in targeted sectors to raise domestic content to 70 percent. Among others, one priority sector included is automated machine tools.[xxix] Again, while these calls are not necessarily detrimental to trade, the ITA monitors them closely for their potential to affect U.S. exports. Through multilateral fora like the WTO and bilateral venues like the U.S.-China Joint Commission on Commerce and Trade, as well as with our Free Trade Agreement Partners, the ITA continues to advocate for the same preferential treatment to be given to U.S. exports in these sectors.

Technical Barriers to Trade

The ITA closely monitors the development of standards, which include voluntary product specifications set forth by hundreds of regional- and industry-specific standards-developing organizations (SDOs), as well as technical regulations issued by governments to specify product requirements for their markets. Oftentimes, governments will incorporate voluntary standards set by SDOs into their regulatory regimes, making them mandatory for their respective market. When regulations become overly burdensome or have the effect of

limiting imports from otherwise qualified vendors, they can become trade irritants, and in some cases, can be classified as technical barriers to trade (or TBT).

Since 1995, the EU has mandated that all machinery used within the 28 EU member states be built to comply with the "Machinery Directive" on safety; European Economic Area countries (EEA, which includes Iceland, Liechtenstein, and Norway) also follow this directive. Machinery manufacturers indicate their compliance with this directive by placing a "CE" marking (short for the French *Conformité Européene*) on their products. The easiest means for demonstrating compliance with the EU Directive is to show conformity with the recognized European Standard associated with it. Thus, by using the "CE" marking, many manufacturers demonstrate conformity to the appropriate standard or standards. However, for U.S. producers that manufacture to standards developed by U.S.-domiciled SDOs, this can require expensive changes to the product. Apart from the direct costs of retooling and reconfiguring models for the European market, there is opportunity cost from lost sales of U.S. products that are not modified for export. As a result, companies interested in doing business in Europe should be well versed in the "Machinery Directive" and its requirements.[xxx]

While CE marking has become an understood cost of doing business in Europe, an area long of concern to the U.S. Government and ITA has been the EU practice of spreading its standards regime to other countries through the EU Neighborhood Policy (ENP) and through European Free Trade Agreements (FTA). The ENP consists of 16 markets in Eastern Europe, Africa, and the Middle East,[xxxi] and is designed to promote closer economic and political integration with markets where the EU has strong trade ties but that are unlikely to become EU members. As part of the ENP or a signatory to an FTA, countries are often provided with aid and technical assistance to develop their markets, and in exchange, are often conditioned to adopt EU standards and directives. The effect is market access barriers in many instances for U.S. companies, and policymakers should be aware of EU agreements with other markets that obligate countries to withdraw from conflicting standards.

Export Controls

The United States Government restricts the sale of certain products and technologies to foreign countries or persons through a broad, interagency Export Control policy. The purpose of this policy is to safeguard U.S. national security interests and foreign policy objectives by limiting the sale of sensitive equipment, software, and technology. While most U.S. products shipped to foreign markets are innocuous and used strictly for commercial purposes, other products may possess a "dual-use" capability; that is, they can be used for legitimate commercial applications but can also be used for military or proliferation activities. As a result, the United States Government maintains regulations in tandem with international agreements such as the Wassenaar Arrangement and Missile Technology Control Regime, which lay out rules and restrictions for exporting or releasing products to foreign countries or persons.[xxxii]

For manufacturing technology equipment, many of the applicable licensing requirements are located in the Commerce Control List (CCL) of the Export Administration Regulations (EAR), which enumerates specific items regulated by the U.S. Department of Commerce, Bureau of Industry and Security (BIS).[xxxiii]

While the CCL enumerates specific items that require export licenses, the EAR also contains additional requirements applicable to most other items, which may require licensing based on the receiving entity (end-user) and/or the end-use of the product. For example, further regulatory requirements will likely apply to equipment sold for use in creating weapons or munitions, even if the equipment is not covered by an entry in the CCL. Also, some exports to certain countries may require further licensing, including both embargoed destinations and other countries such as China, India, and Russia. BIS also maintains a *List of Parties of Concern*, which enumerates individuals and entities that may be subject to licensing requirements or whose export privileges are denied outright. Finally, some items are not controlled by BIS, but are instead subject to regulation by another agency which may maintain separate licensing requirements.

While not all manufacturing technology products will require licensing, exporters will save valuable lead-time by familiarizing themselves in advance with the relevant Export Control regulations and availing themselves of the numerous compliance trainings

that are regularly scheduled by the Bureau of Industry and Security.[xxxiv] More importantly, export control violations may carry significant repercussions, including substantial criminal, civil, and administrative penalties. Exporters may also find local assistance through the Department of Commerce's network of 108 local U.S. Export Assistance Centers.[xxxv]

Opportunities

Despite experiencing difficult head-winds, the global market for manufacturing technology products will continue to be driven by demand for high-quality, innovative, and reliable machinery. By 2025, the world's population is expected to reach 8 billion, with hundreds of millions moving upward into the middle class. While short-term factors will likely limit growth opportunities through 2017, the long-term prospect for manufactured goods remains unchanged. This is not only the case in highly-industrialized economies, but also in developing nations as many companies simply bypass old technologies and leap-frog straight into the trends of today.

Concurrently, as traditional IT principles begin merging with manufacturing, companies that are able to harness concepts of "digital factory" and machine-to-machine communication will be at a distinct competitive advantage in their respective industries.

Many U.S. manufacturing technology companies are keenly sensitive to these facts. Around the globe and across all industries, from aerospace and automotive to industrial goods and utilities, the paradigm of production is shifting towards emerging markets and towards greater digitization. U.S. companies are well-positioned to play a leading role in driving technical change in the global value chain. The ITA is dedicated to partnering with U.S. companies that are looking to sell overseas. With a robust network in over 100 U.S. cities and 80 countries worldwide, the ITA is a ready and able partner in unlocking the potential of exporting.

[i] Gardner Research "2015 World Machine-Tool Output & Consumption Survey" *Gardner Media* http://www.gardnerweb.com/cdn/cms/GR-2015-WMTS.pdf

[ii] *ibid*.

[iii] Note: Both Switzerland and Venezuela are "Partner Post" countries, meaning export promotion and commercial responsibilities are delegated to the State Department in the Economic Section of the U.S. Embassy in Bern and Caracas, respectively.

[iv] http://www.metalworkinginsider.info/scoreboard.htm

[v] "Gleason Corporation, Rochester NY" *Company Overview, Hoovers, Inc.,* accessed 10/21/2015.

[vi] Alan K. Binder, ed. "Ward's Automotive Yearbook 2014" *Ward's Automotive Group* (Southfield, MI)

[vii] "Automobile Manufacturing", *Industry Profile*, *Gale Business Insights Online Collection*, 2015.

[viii] "Global Car & Automobile Manufacturing Market Research Report", *IBISWorld*, February 2015.

[ix] Jeffrey Williams "2015 Auto Parts Top Markets Report" *U.S. International Trade Administration*, 2015.Pg. 3.

[x] Binder, *Ward's*

[xi] Binder, *Ward's*

[xii] Business Monitor International "China Autos Report Q4 2015"

[xiii] Business Monitor International "Japan Autos Report Q4 2015"

[xiv] "Aircraft Engine and Engine Parts Manufacturing *"Industry Profile*, *Gale Business Insights Online Collection*, 2015.

[xv] "Other Aircraft Part and Auxiliary Equipment Manufacturing *"Industry Profile*, *Gale Business Insights Online Collection*, 2015.

[xvi] Fred Elliot "2015 Aircraft Parts Top Markets Report" *U.S. International Trade Administration,* 2015.Pg. 6.

[xvii] http://www.finmeccanica.com/en/nostro-impegno-our-commitment/conduzione-business-conduct/business-fornitori-suppliers

[xviii] http://www.airbus.com/tools/airbusfor/suppliers/

[xix] UNComtrade Data

[xx] UNComtrade Data

[xxi] http://www.wsj.com/articles/oil-prices-rise-but-supply-glut-caps-gains-1451560147

[xxii] Julius Svoboda "2015 Upstream Oil and Gas Equipment Top Markets Report" *U.S. International Trade Administration,* 2015.Pg. 4.

[xxiii] http://www.metalworkinginsider.info/scoreboard.htm

[xxiv] *Ibid*.

[xxv] *Ibid.*

[xxvi] http://www.cecimo.eu/site/

[xxvii] United States Trade Representative *"*2015 National Trade Estimate Report on Foreign Trade Barriers*"* p. 340. https://ustr.gov/sites/default/files/2015%20NTE%20Combined.pdf

[xxviii] https://www.wto.org/english/news_e/news15_e/monit_16apr15_e.htm

[xxix] Scott Kennedy "Overview: Made in China 2025" *Center for Strategic & International Studies,* June 1, 2015. http://csis.org/publication/made-china-2025

[xxx] http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/machinery/index_en.htm

[xxxi] http://eeas.europa.eu/enp/index_en.htm

[xxxii] http://www.wassenaar.org/

[xxxiii] https://www.bis.doc.gov/index.php/regulations/commerce-control-list-ccl

[xxxiv] http://www.bis.doc.gov/index.php/compliance-a-training/current-seminar-schedule

[xxxv] http://export.gov/eac/index.asp