

*Geographic assessment for aerospace
manufacturing investments*

September 2018

Aerospace manufacturing attractiveness rankings



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Introduction

In 2017, the Aerospace and Defense (A&D) sector reported record profits of \$77 billion, an 18 percent increase over the prior year, surpassing the previous record set in 2014. The top 100 A&D companies, by revenue, reported \$728 billion in revenue, an increase of 4 percent over 2016. Operating margin also set an industry record at 10.6 percent.¹

This year, the A&D industry is poised to achieve new record results. Commercial aviation revenue passenger miles increased by more than seven percent in 2017 and is on pace for the same performance in 2018; that's about double the rate of global GDP growth. Passenger growth is driving demand for new equipment and aftermarket, and manufacturers are expected to deliver a record number of aircraft in 2018. In addition, the outlook for defense contractors is strong, as a result of significant increases in US defense budgets and increasing global demand, and should result in accelerating growth in defense revenue and profit.²

With favorable short and long term projections, and additional cash generated by the tax reform bill, the industry is well-positioned to consider expansion opportunities. This report, our fifth edition ranking countries (or regions) and US states, can be a helpful tool in planning for future growth, optimizing manufacturing supply chains, and reexamining costs.

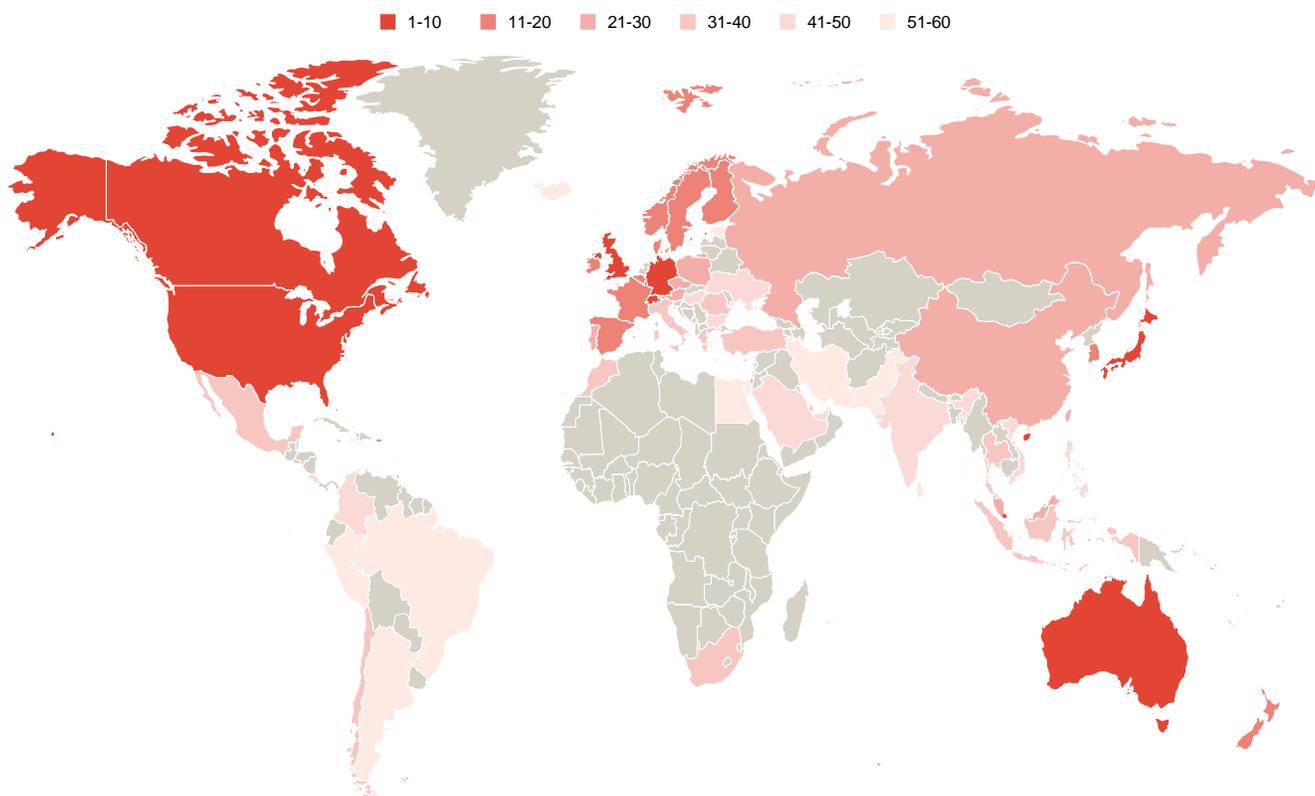
The 2018 index is based on a weighted score of category and subcategory rankings. Ranking categories include labor, infrastructure, industry, economy, cost, tax policy, and geopolitical risk. The latter category is excluded from the state ranking since their geopolitical risk is similar. The categories are comprised of many discrete metrics, which are then aggregated and weighted to arrive at the final rankings. While both state and country rankings use comparable metrics, there are slight differences in each measure's availability of quantitative information and relevance in the ranking. Further details on the methodology can be found in the Appendices. We emphasize that PwC's weighting system represents one way to evaluate the data and that individual users may tailor the weightings differently.

We hope you find this year's aerospace attractiveness rankings informative and useful. We welcome your feedback on this report and how it might impact your strategic plans.

¹ "Aerospace & Defense 2017 Year in Review and 2018 Forecast." PwC, June 2018.

² "A&D Year in Review and Forecast." PwC, June 2018.

Country Rankings



Top 10 country/region rankings for aerospace attractiveness

Country/ region	Overall Rank	Cost	Labor	Infra- structure	Industry	Geo- political Risk	Economy	Tax Policy
United States	1	7	1	5	1	4	10	36
Canada	2	9	3	9	3	3	23	16
Singapore	3	29	2	2	5	10	2	7
Switzerland	4	5	9	11	24	14	4	19
United Kingdom	5	15	14	4	12	8	20	23
Netherlands	6	19	7	3	37	9	7	20
Australia	7	2	10	20	17	6	22	26
Germany	8	28	6	10	8	2	11	41
Hong Kong	9	30	13	1	22	20	9	3
Japan	10	20	5	6	10	1	3	68

Below is a closer look at the top five countries in our ranking:

United States

The United States is once again the dominant global player. With \$240 billion in sales last year, the sheer size of the industry, coupled with a healthy GDP, strong transportation infrastructure, and educated workforce make it a hard country to beat. The US's A&D industry was the global leader in exports in 2017, generating \$143 billion,³ buoyed by continued passenger growth, low fuel costs, and strong ongoing momentum in world trade. The US's top ranking was also bolstered by the country's level of defense spending, which is the highest in the world. Congress recently gave final approval to a defense budget package of \$717 billion.⁴ The US ranked 36th in tax policy based on 2017 data. Given US tax reform, which took effect in 2018, we expect to see a significant improvement in the US's tax policy rank in next year's report.

Canada

Canada has a similar aerospace profile to the US, with an educated labor force, stable government, relatively low costs, and good infrastructure. In 2017, the industry contributed close to \$25 billion to the Canadian economy and employed almost 190,000 people.⁵ Over the last five years, the aerospace industry has become an increasingly important part of the economy, supported by global demand for Canadian exports. Canada is especially strong in the production of civilian flight simulators, business and regional aircraft, and turboprop and helicopter engines.

Singapore

Singapore has a stable government, which strongly supports the industry and provides a safe business environment, a healthy manufacturing base, and over 130 companies that provide a range of aerospace related services.⁶ Singapore has the fastest growing aviation industry in Asia-Pacific,⁷ which is a rapidly expanding marketplace with a burgeoning population, enabling it to both serve the market and draw needed talent from its neighbors. In 2017, greenfield investment in the city's aerospace sector resulted in an estimated 1,400 jobs.⁸ The government has also put into place programs to help develop new technologies as well as initiatives to develop skilled workers such as the Skills Framework for Aerospace and the SkillsFuture Enhanced Internship Initiatives.⁹

Switzerland

Switzerland's aerospace industry comprises almost six percent of the country's GDP. The industry includes more than 500 companies, mostly small and medium sized, and employs about 160,000 people, primarily in aircraft manufacturing.¹⁰ The industry is supported by a network, the Swiss Aerospace Cluster, formed in 2009, to promote the transfer of contacts, knowledge, and technology among suppliers, researchers, and downstream industry.¹¹

³ "Foreign Trade." *Aerospace Industries Association*, 2018.

⁴ Shane, Leo. "Congress finalizes \$717 billion defense budget authorization months ahead of schedule." *Military Times*. 1 Aug. 2018.

⁵ "State of Canada's Aerospace Industry 2018 Report." *Government of Canada*. 21 June 2018.

⁶ Pascoletti, Alice and Iannacone, Elisa. "Singapore Aerospace 2017." *Global Business Reports*, 15 Feb. 2017.

⁷ Pascoletti and Iannacone, Singapore Aerospace 2017.

⁸ Mullen, Cathy. "fDi's Aerospace Cities of the Future 2018/19 – the winners." *fDi Intelligence*, 14 June 2018.

⁹ "Clear skies ahead for Singapore's aerospace industry." *Singapore Economic Development Board*, 26 Mar. 2018.

¹⁰ "Switzerland Aerospace Industries." Sig Fiduciaire, 18 Oct. 2017.

¹¹ "About us." *Swiss Aerospace Cluster*, <https://swiss-aerospace-cluster.ch/about-us>.

United Kingdom

London, with its six local international airports and six ports, provides direct access to more than 300 global destinations. The city is also home to nearly 100 aerospace-related companies. In Scotland, Prestwick Airport received investment dollars from US-based Spirit Aerosystems for the third time since 2014.¹²

The UK aerospace industry has continued to excel despite the country's decision in 2016 to leave the European Union. In fact, the industry's growth rate is the highest among the G7 countries.¹³ However, an Oxford Economics report maintains that "long lead times for existing programs and the sterling's depreciation since the Brexit vote 'have helped sustain momentum' to date and forecasts slower growth in the years ahead."¹⁴

Considerations for your business

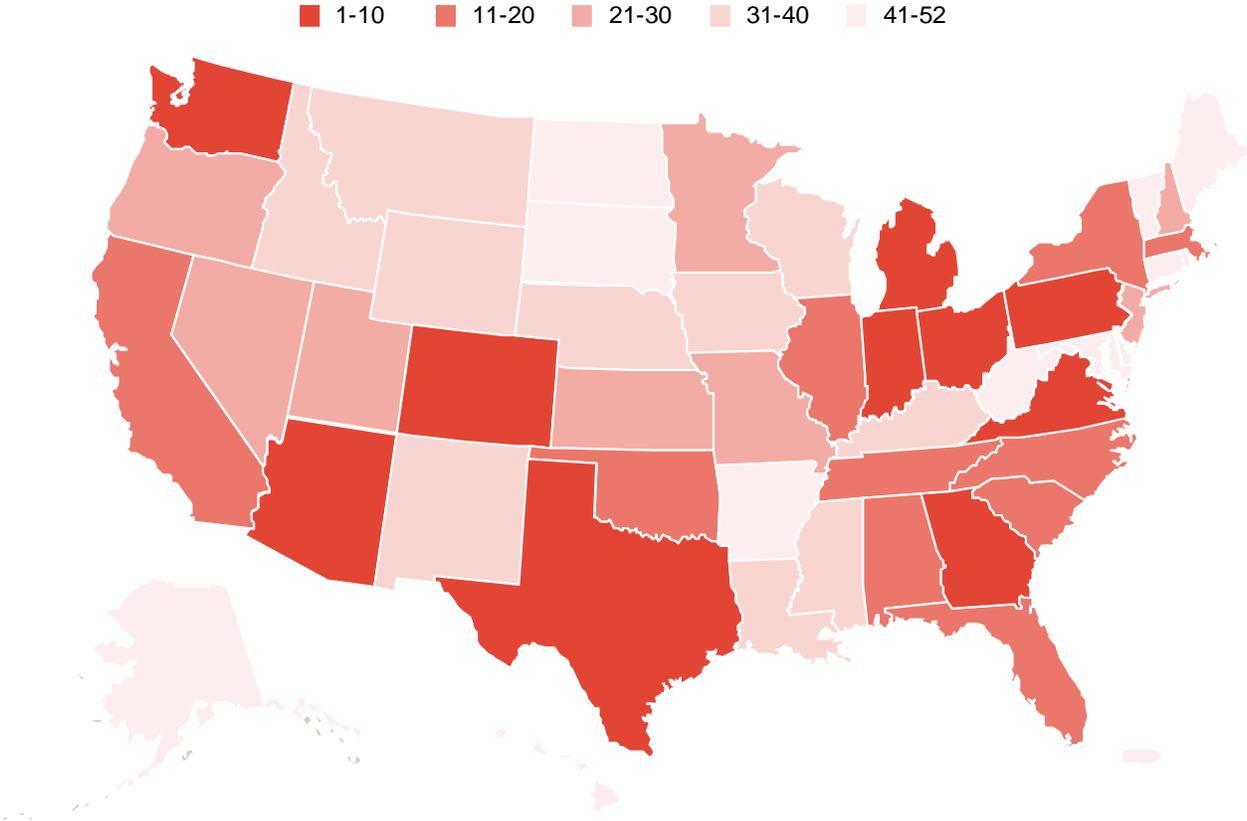
Demand for aircraft continues to be strong in most regions of the world, but especially in rapidly growing markets in Asia-Pacific. This region, with a burgeoning middle class and a large and growing population, offers significant opportunities for aircraft manufacturers and can drive both international and domestic expansion. Recent trade disputes have caused some uncertainty about future tariffs. So far, the aerospace industry has not been directly targeted, although the industry is indirectly impacted by certain tariffs on metals. The trade situation continues to evolve rapidly, and companies will need to monitor the impacts. Since some global markets pose significant risk, companies can mitigate this risk by considering each country's specific regulations, tax policies, and intellectual property protection laws. Also, companies need to address human resource issues, such as talent recruitment, training, and retention, which require knowledge of cultural norms and sensitivities. These risks have to be measured against the soundness of offshoring to extend supply chains overseas. In recent years, some companies have moved to re-shore all or part of their supply chain as domestic business conditions have become more competitive. To support this growth in American aerospace manufacturing, companies, educators, and policy makers should promote the skills and policies that will foster investment growth in the US.

¹² Mullen, Cathy. "fDi's Aerospace Cities of the Future 2018/19 – the winners." *fDi Intelligence*, 14 June 2018

¹³ Gubisch, Michael. "Aerospace sector set for 'steep' growth: UK forecast." *Flight Global*, 10 Jan. 2018.

¹⁴ Gubisch, Aerospace sector set for 'steep' growth.

State rankings



Top 10 state rankings for aerospace attractiveness

State	Overall Rank	Cost	Labor	Infra-structure	Industry	Economy	Tax Policy
Washington	1	33	9	4	1	4	17
Texas	2	39	32	24	3	1	4
Georgia	3	7	19	24	7	5	20
Arizona	4	10	23	17	5	21	14
Colorado	5	44	3	8	22	25	16
Virginia	6	29	6	12	19	20	23
Pennsylvania	7	36	20	2	11	11	32
Michigan	8	20	30	21	9	6	21
Ohio	9	32	34	10	4	3	26
Indiana	10	9	39	7	15	9	21

Below is a closer look at the top five states in our ranking:

Washington

Washington topped the state ranking this year, with high marks in the categories of industry, infrastructure, and economy. (Note: Last year, certain data relating to Washington's aerospace industry were unavailable/undisclosed, which negatively impacted its industry rank.) Washington's economy and industry size are heavily tied to Boeing's commercial aircraft business, which is headquartered in the state. And Boeing, as the industry leader, had a very good year. The company achieved record production numbers and earned \$10.3 billion in operating profit—an industry milestone.¹⁵ But Washington is also home to 1,400 aerospace-related businesses and has the highest concentration of aerospace jobs in the country.¹⁶

Texas

Texas hosts a large industry presence, including Lockheed Martin's Aeronautics business, where it produces the F-35. The state has a strong economy and favorable tax policy. Seventeen of the 20 largest aerospace manufacturers in the world have major operations in Texas. In addition to Lockheed Martin, companies manufacturing in Texas include Airbus, Boeing, Bell Helicopter, Textron, and Gulfstream. As a result, about nine percent of all aerospace manufacturing jobs are in Texas. And that number is increasing. Recently, Bell, part of Textron, signed a deal with Uber to develop and build a flying taxi prototype that would work in a similar way to Uber cars in metropolitan areas.¹⁷ Lockheed is ramping up production of its F-35 to fulfill growing orders and hiring additional workers to help it realize its plans to build up to 160 fighters a year by 2019.¹⁸ Boeing and Lockheed Martin are expected to receive additional funding for key missile defense and legacy aircraft platforms in the new defense budget.¹⁹

Georgia

Georgia is home to more than 800 aerospace companies, including some major players such as Gulfstream Aerospace and Lockheed Martin. Companies are attracted to Georgia in part because of its relatively low costs, business-friendly policies, and major international airport. In the last five years, Georgia has gained about 1,700 additional aerospace-related jobs because of companies expanding in the area. Pratt & Whitney alone added 500 jobs in 2017 and 100 jobs in 2016.²⁰ Aerospace products are Georgia's key international export, producing more than \$8 billion annually.

Arizona

Arizona continues to be attractive for aerospace manufacturing, with an ideal climate for aircraft testing and space observation, good transportation infrastructure, and business-friendly tax policy. An example of Arizona's appeal is the decision by AQST Space Systems to relocate its headquarters and operations hub to Mesa, Arizona, from Puerto Rico. AQST said it expects to hire up to 125 employees over the next three years to manufacture and assemble rockets for small satellites.²¹

¹⁵ "Aerospace & Defense 2017 Year in Review and 2018 Forecast." *PwC*, June 2018.

¹⁶ "Aerospace Competitive Economics Study." *Teal Group Corporation*, June 2018.

¹⁷ Hethcock, Bill, "Making flying taxis: Inside the Bell Helicopter-Uber collaboration." *Dallas Business Journal Online*, 8 Dec 2017.

¹⁸ Ahles, Andrea, "Lockheed to hire up to 1,000 people at another job fair this month." *The Fort Worth Star-Telegram*, 15 Aug 2017.

¹⁹ Kim, Tae, "Boeing, Lockheed Martin are the 'early winners' under Trump's budget proposal: JP Morgan *CNBC*, 13 Feb 2018.

²⁰ "Aerospace Manufacturing: A growth leader in aerospace." *Georgia Power*.

²¹ "AQST Space Systems Relocates Headquarters-Operations Hub to Mesa, Arizona." *Area Development*, 8 June 2018.

Colorado

Colorado's aerospace industry is supported by its educated labor force and modern infrastructure, attracting several major aerospace contractors, including Ball, Boeing, Lockheed Martin, Northrop Grumman, and Raytheon as well as Department of Defense military installations and command centers. In 2017, construction began on Lockheed Martin Space System's new \$350 million Gateway Center facility that will produce next-generation satellites. Also, Lockheed Martin Autonomous Systems (LMSS) expanded its facility in the state in order to better test autonomous drones. LMSS said it will move 650 jobs from California to Colorado and Florida to deliver on a major contract for the Trident II D5 nuclear missile.²²

Notable events in other states

Alabama

The first Airbus A320 assembled in Alabama was delivered to Spirit Airlines in August. Airbus said it intends to use the plant in Mobile to build three variants of the jet, including A321s, A320s, and A319s, reaching a production rate of four jets per month by the end of the year.²³ Alabama came in 19th in the overall ranking.

Indiana

Indiana, along with Rolls-Royce and Purdue University, announced a new \$24 million jointly-funded program to establish research capabilities that will focus on advanced turbine aerodynamic and heat-transfer technologies. Rolls-Royce will apply these technologies to airfoil components in jet engines produced at the company's Indiana facilities.²⁴ Indiana came in 10th in the overall ranking, with excellent scores in the cost, infrastructure, and economy metrics.

South Carolina

The South Carolina aerospace industry is growing rapidly, thanks to an increase in export demand. Export numbers have increased almost 50 percent over the prior year. The \$19 billion industry, employing about 100,000 people, has exported more than \$5.7 billion in aerospace-related products.²⁵ To help support industry growth, the state is launching a high school aerospace curriculum this fall at six schools across the state.²⁶ South Carolina came in 17th in the overall ranking and 6th in the cost category.

Considerations for your business

The category of education is critical not only for companies trying to meet today's demands, but in ensuring tomorrow's workforce can help build the next generation of more efficient, sustainable aircraft. An educated, technology-savvy, and diversified workforce is essential for maintaining US competitiveness in commercial aviation manufacturing. Some companies are actively participating in the process of preparing the future workforce. Indiana's partnership with Purdue and Rolls-Royce is a case in point. It's an arrangement that benefits all concerned and has boosted Indiana in our ranking. The same is true of South Carolina, which is working at the high school level to interest teenagers in the aerospace industry. These are laudable efforts because they benefit society. They help build a future workforce and, at the same time, provide companies with an opportunity to recruit the best and the brightest.

²² "Aerospace: Colorado Industry Cluster Profile." *Metro Denver Economic Development Corporation*, 22 Feb. 2018.

²³ Specker, Lawrence, "Airbus delivers 'beautiful yellow bird': first A320 made in Mobile." 25 Aug. 2017.

²⁴ Press release, "Rolls-Royce, Purdue, state of Indiana announce new initiative to develop next-generation jet engine components." 19 June 2017.

²⁵ Schechter, Maayan, "Economic impact of aerospace industry in South Carolina only going up." *The Greenville News*, 1 Sept. 2017.

²⁶ Press release, "South Carolina to Launch High School Aerospace Curriculum." South Carolina Department of Education, 3 May 2017.

Appendices

Ranking methodology

Ranking calculations

The 2018 country/region and state rankings were carefully determined through the combination of seven category ranks. The category ranks were all weighted equally, although the measures used to determine category ranks were weighted to account for relevance

and the availability of quantitative information. Measure weights were determined through a collaboration between client service professionals and the industry analyst at PwC and can be found in the “Measure Weights for Country and State Rankings” section. Measures with null values were given the lowest possible rank. The formulas below were used to compute the rankings:

Provided:

Measure Value
Measure Weight

Calculations:

$$\begin{aligned} \text{Rank}_{\text{Measure } i} &= \text{Rank} [\text{Measure Value}] \\ \text{Score}_{\text{Measure } i} &= \text{Weight}_{\text{Measure } i} \times \text{Rank}_{\text{Measure } i} \\ \text{Rank}_{\text{Category } n} &= \text{Rank} [\text{Score}_{\text{Measure } 1} + \text{Score}_{\text{Measure } 2} + \dots + \text{Score}_{\text{Measure } i}] \\ \text{Final Country Rank} &= \text{Rank} [\text{Final Country Score}] \end{aligned}$$

Data resources

Seven public and private independent data sources were used in calculating the 2018 country/region rankings. Paid-for subscriptions included IHS and S&P, and public domain information was obtained from global associations, such as Germanwatch and the World Economic Forum. PwC’s “Paying Taxes 2018” report provided comprehensive data for the Tax Policy category.

Methodology changes

The country rankings combined a total of 33 metrics and the state rankings were based on a total of 30 metrics this year. The use of such a diverse dataset helps increase ranking validity.

Measure selection

The measures used in the 2018 Aerospace Manufacturing Attractiveness Rankings came from “Facility Location Selection for Global Manufacturing.”²⁷ In cases where we were unable to obtain detailed data for certain metrics, we used proxy data. The following illustrations show the detailed breakouts of country and state rankings used in the 2018 edition:

Measures used in country/region rankings

Labor	Infrastructure	Industry	Geopolitical Risk	Economy	Cost	Tax policy
Labor Force Total country labor force	Quality of Roads Quality of roads	Market Size Total aircraft and spacecraft sales	Population Average annual population	GDP Real gross domestic product (GDP)	Operating Expense Aerospace operating expenditures as a percent of sales	Tax Ranking Based on the overall ranking in PwC’s “Paying Taxes” publication
Basic Education Quantity of education	Quality of Railroads Quality of railroad infrastructure	Market Profit Margin Aircraft and spacecraft net profits over sales	Population Growth Annual population growth	GDP Growth Real GDP growth	Trend in Capex Annual change in aerospace capital expenditures	
Skilled Education Quality of math and science education	Quality of Port Infrastructure Quality of port infrastructure	Market Maturity Total aircraft and spacecraft consumption	Strategic Risk Overall strategic risk rating	FDI Net Foreign Direct Investment (FDI), net capital inflow	Labor Cost Unit labor costs index	
Advanced Education Availability of scientists and engineers	Quality of Air Infrastructure Available airline seat kilometers per week	Market Growth Percent change in aircraft and spacecraft sales	Political Risk Overall political risk rating	Interest Rates Interest rate policy	Electricity Price Electricity price for industrial user	
Union Flexibility Cooperation in labor-employer relations	Internet Usage International internet bandwidth, kb/s per user		Sovereign Risk Credit risk rating	Debt Current account balance as a % of GDP	Labor Productivity GDP-to-employed labor force	
	Quality of Electric Supply Quality of electricity supply		Climate Risk Climate risk index	Unemployment Rate Annual average unemployment rate		

²⁷ Kalantari, A.H. “Facility Location Selection for Global Manufacturing,” UWM Digital Commons at the University of Wisconsin Milwaukee, August 2013.

Measures used in state rankings

Labor	Infrastructure	Industry	Economy	Cost	Tax policy
Labor Force Production workers annual hours for aerospace mfg.	Quality of Roads Road condition by average roughness	Industry Size Total value of aerospace shipments and receipts	GSP Real gross state product (GSP)	Energy Cost Average Price of electricity to ultimate customers	State-Local Tax Burdens State-local tax burdens as a share of state income
Basic Education % of people over 25 who have completed high school	Quality of Railroads Number of freight railroads by class	Industry Profit Margin Total value added in aerospace products and parts mfg.	GSP Growth Real GSP growth	Transportation Cost Transportation expenditures by State & Local Gov'ts	Individual Income Tax State Individual Income Tax Rate @ \$75K
Skilled Education % of people over 25 who have completed a bachelor's degree	Quality of Air Infrastructure Public and private airports, heliports and seaplane bases	Industry Maturity Manufacturing share of total gross state product	CPI Consumer Price Index	Labor Cost Average hourly wage payroll for aerospace manufacturing	
Advanced Education % of people over 25 who have completed an advanced degree	Internet Usage % of households with a broadband internet subscription	Industry Growth Growth in manufactured goods exports	Exports Manufactured goods exports	Labor Productivity Industrial production index for total manufacturing	
Union Flexibility Union membership rates by state	Quality of Electric Supply Number of major disturbances and unusual occurrences	Number of Companies Total number of companies in the industry	Manufacturing Output Total manufacturing output	Construction Cost Total cost over created value of construction	
		Number of Suppliers Total number of manufacturing firms.	Government Subsidies Subsidies for durable goods manufacturing		
		Labor Cost Total annual payroll in aerospace manufacturing			

Category weights and reference metrics

Country metrics

Category	Sub-Category	Reference Metric	Source	Weight	Category Sum
Cost	Opex/Sales	(Aircraft & Spacecraft - Operating Expenditures)/(Aircraft & Spacecraft - Sales)	IHS Aircraft & Spacecraft Industry Outlook February 2018	12%	100%
	Trend in Capex	Aircraft & Spacecraft - Capital Expenditures Percent Change	IHS Aircraft & Spacecraft Industry Outlook February 2018	6%	
	Labor Cost	Index: Unit Labor Costs, US\$ basis	IHS Global Economics February 15, 2018	12%	
	Electricity Prices	Electricity Price, Industrial Users, USD/KWh	BMI 2018	30%	
	Labor Productivity	Labor Productivity: GDP-to-Employed Labor Force, US\$	IHS Global Economics February 15, 2018	40%	
Labor	Labor Force	Labor Force	IHS Global Economics February 15, 2018	18%	100%
	Basic Education	Sum of Quantity of education	WEF Global Competitiveness Index 2018	25%	
	Skilled Education	Sum of Quality of math and science education, 1-7 (best)	WEF Global Competitiveness Index 2018	18%	
	Advanced Education	Sum of Availability of scientists and engineers, 1-7 (best)	WEF Global Competitiveness Index 2018	25%	
	Union Flexibility	Sum of Cooperation in labor-employer relations, 1-7 (best)	WEF Global Competitiveness Index 2018	14%	
Infrastructure	Quality of Roads	Sum of Quality of roads, 1-7 (best)	WEF Global Competitiveness Index 2018	15%	100%
	Quality of Railroads	Sum of Quality of railroad infrastructure, 1-7 (best)	WEF Global Competitiveness Index 2018	10%	
	Quality of Port Infrastructure	Sum of Quality of port infrastructure, 1-7 (best)	WEF Global Competitiveness Index 2018	15%	
	Quality of Air Infrastructure	Sum of Available airline seat km/week, millions*	WEF Global Competitiveness Index 2018	30%	
	Internet Usage	Sum of Int'l Internet bandwidth, kb/s per user*	WEF Global Competitiveness Index 2018	15%	
	Quality of Electricity Supply	Sum of Quality of electricity supply, 1-7 (best)	WEF Global Competitiveness Index 2018	15%	
Industry	Industry Size	Aircraft & Spacecraft - Sales	IHS Aircraft & Spacecraft Industry Outlook February 2018	35%	100%
	Industry Growth	Aircraft & Spacecraft - Sales Percent Change	IHS Aircraft & Spacecraft Industry Outlook February 2018	5%	
	Industry Profit Margin	(Aircraft & Spacecraft - Net Profits)/(Aircraft & Spacecraft - Sales)	IHS Aircraft & Spacecraft Industry Outlook February 2018	25%	

Category	Sub-Category	Reference Metric	Source	Weight	Category Sum
	Industry Maturity	Aircraft & Spacecraft - Consumption	IHS Aircraft & Spacecraft Industry Outlook February 2018	35%	
Geo Political Risk	Population	Population: Total	IHS Global Economics February 15, 2018	40%	100%
	Population Growth	Population: Growth Rate	IHS Global Economics February 15, 2018	5%	
	Strategic Risk	Overall Strategic Risk	IHS Country Risk Ratings February 15, 2018	20%	
	Political Risk	Overall Political Risk	IHS Country Risk Ratings February 15, 2018	20%	
	Sovereign Risk	Credit Risk Rating	S&P Capital IQ February 15, 2018	10%	
	Climate Risk	Climate Risk Index	Germanwatch Climate Risk Index 2018	5%	
Economy	Outside Investment	BOP Direct Investment Balance or Net FDI (Net Capital Inflow), % of GDP	IHS Global Economics February 15, 2018	5%	100%
	Interest Rates	Interest Rate: Policy	IHS Global Economics February 15, 2018	6%	
	Debt/GDP	Current Account Balance as a % of GDP	IHS Global Economics February 15, 2018	5%	
	Unemployment Rate	% of Labor Force	IHS Aircraft & Spacecraft Industry Outlook February 2018	35%	
	GDP	Real GDP (Gross Domestic Product), US\$	IHS Global Economics February 15, 2018	40%	
	GDP Growth	Real GDP, Growth Rate, Year-on-Year	IHS Global Economics February 15, 2018	9%	
Tax Policy	Overall Tax Ranking	Overall Tax Ranking	PwC Paying Taxes 2018	100%	100%

State metrics

Category	Sub-Category	Reference Metric	Source	Weight	Category Sum
Cost	Energy Cost	Average Price of Electricity to Ultimate Customers by End-Use Sector, Industrial	EIA Electric Power Monthly (January 2018 and 2017 Data)	25%	100%
	Transportation Cost	Transportation Expenditures by State and Local Governments, Total	DOT BTS State Transportation Statistics	15%	
	Labor Cost	Average hourly wage in manufacturing	US Census Bureau - American Fact Finder	20%	
	Labor Productivity	Industrial Production Index, Total Manufacturing	IHS US Regional Economics 2018	25%	
	Construction Cost	NAICS 023 Construction - Total Costs/Total Value Created	US Census Bureau - American Fact Finder	15%	
Labor	Labor Force	Aerospace product and parts manufacturing - Production Workers Annual Hours	US Census Bureau - American Fact Finder	10%	100%
	Basic Education	Percent of people 25 years and over who have completed high school (includes equivalency)	US Census Bureau - American Fact Finder	5%	
	Skilled Education	Percent of people 25 years and over who have completed a bachelor's degree	US Census Bureau - American Fact Finder	40%	
	Advanced Education	Percent of people 25 years and over who have completed an advanced degree	US Census Bureau - American Fact Finder	40%	
	Union Flexibility	Union Membership Rates by State	Bureau of Labor Statistics - Data Finder 9.0	5%	
Infrastructure	Quality of Roads	Table 1-4: Road Condition	DOT BTS State Transportation Statistics	20%	100%
	Quality of Railroads	Table 1-13: Number of Freight Railroads by Class	DOT BTS State Transportation Statistics	20%	
	Quality of Air Infrastructure	Table 1-10: Public and Private Airports, Heliports and Seaplane Bases	DOT BTS State Transportation Statistics	20%	
	Internet Usage	Percent of Households with a Broadband Internet Subscription	US Census Bureau - American Fact Finder	20%	
	Quality of Electricity Supply	Major Disturbances and Unusual Occurrences	DOE Office of Electricity Delivery & Energy Reliability	20%	
Industry	Industry Size	Aerospace product and parts manufacturing - Total value of shipments and receipts for services	US Census Bureau - American Fact Finder	20%	100%
	Industry Profit Margin	Aerospace product and parts manufacturing - Value added	US Census Bureau - American Fact Finder	5%	
	Industry Maturity	Mfg share of total GSP	NAM Manufacturing Data Table (2016)	5%	

Category	Sub-Category	Reference Metric	Source	Weight	Category Sum
	Industry Growth	Growth in Manufactured Goods Exports	NAM Manufacturing Data Table (2016)	20%	
	Number of Companies	Aerospace and Defense Firms	Capital IQ Company Screening Report	20%	
	Labor Cost	Aerospace product and parts manufacturing - Annual Payroll	US Census Bureau - American Fact Finder	10%	
	Number of Suppliers	Manufacturing Firms	NAM Manufacturing Data Table (2016)	20%	
Economy	GDP	Real Gross State Product (GSP)	IHS US Regional Economics 2018	10%	100%
	GDP Growth	Real GSP Growth	IHS US Regional Economics 2018	20%	
	Consumer Price Index	Consumer Price Index (CPI)	IHS US Regional Economics 2018	5%	
	Manufacturing Output	Total Manufacturing Output	IHS US Regional Economics 2018	30%	
	Exports	Manufactured Goods Exports	NAM Manufacturing Data Table (2016)	30%	
	Subsidies	Subsidies, Durable Goods Manufacturing	BEA - Regional Data 2018	5%	
Tax Policy	State-Local Tax Burdens	State-Local Tax Burdens per Capita	Tax Foundation "Facts & Figures 2018"	75%	100%
	Individual Income Tax	State Individual Income Tax Rate @ \$75K	Tax Foundation "Facts & Figures 2018"	25%	

Complete country/region rankings

Country	Overall Rank	Cost	Labor	Infra-structure	Industry	Geo-political Risk	Economy	Tax Policy
United States	1	7	1	5	1	4	10	36
Canada	2	9	3	9	3	3	23	16
Singapore	3	29	2	2	5	10	2	7
Switzerland	4	5	9	11	24	14	4	19
United Kingdom	5	15	14	4	12	8	20	23
Netherlands	6	19	7	3	37	9	7	20
Australia	7	2	10	20	17	6	22	26
Germany	8	28	6	10	8	2	11	41
Hong Kong	9	30	13	1	22	20	9	3
Japan	10	20	5	6	10	1	3	68
Ireland	11	6	15	24	27	35	16	4
Finland	12	14	4	15	39	17	44	12
Denmark	13	1	16	14	60	22	34	8
France	14	11	30	7	7	5	30	54
Sweden	15	21	21	12	26	11	27	27
Norway	16	4	12	19	53	21	25	28
Spain	17	10	27	8	14	17	43	34
New Zealand	18	38	11	22	42	25	37	9
Belgium	19	3	19	18	30	32	40	59
South Korea	20	34	26	16	4	106	5	24
Austria	21	12	19	27	49	26	35	39
Poland	22	16	39	43	34	15	14	51
Czech Republic	23	17	43	46	31	29	12	44
Portugal	24	22	28	17	55	34	46	38
Malaysia	25	53	24	23	15	12	8	73
Qatar	26	36	35	32	38	67	32	1
Taiwan	27	64	8	13	25	30	13	56
Israel	28	8	17	25	28	47	18	99
Russia	29	24	31	45	19	58	29	52
China	30	47	29	30	6	13	1	130
Chile	31	31	32	26	56	26	50	72
Romania	32	25	52	66	43	45	21	42
Thailand	33	55	45	39	33	24	6	67
Italy	34	23	36	29	21	19	39	112
Morocco	35	46	77	38	23	33	62	25
Turkey	36	32	44	35	11	43	36	88
Greece	37	13	25	37	47	70	70	65
Mexico	38	33	60	44	2	23	18	115
Indonesia	39	42	37	48	32	16	15	114
South Africa	40	18	104	31	35	46	74	46
Vietnam	41	54	65	55	51	7	17	86
India	42	50	40	36	16	38	26	119
Hungary	43	27	70	57	46	28	28	93
United Arab Emirates	44	44	22	21	73	37	42	1
Ukraine	45	49	18	77	18	94	72	43
Saudi Arabia	46	45	34	28	66	57	41	76
Philippines	47	62	51	75	29	36	24	105
Bulgaria	48	41	69	64	61	63	55	90
Colombia	49	37	57	59	44	41	55	142
Costa Rica	50	48	41	95	62	86	77	60
Iran	51	40	38	61	36	74	53	150

Country	Overall Rank	Cost	Labor	Infra-structure	Industry	Geo - political Risk	Economy	Tax Policy
Peru	52	39	93	69	53	39	49	121
Argentina	53	26	58	70	45	31	52	169
Brazil	54	35	75	60	9	41	48	184
Iceland	55	58	23	39	74	55	66	33
Sri Lanka	56	57	53	65	50	78	51	158
Pakistan	57	61	85	71	20	56	33	172
Bahrain	58	85	72	56	57	98	119	5
Estonia	59	74	33	47	74	48	60	14
Egypt	60	60	71	49	59	64	59	167
Panama	61	51	84	33	65	66	67	180
Slovakia	62	43	81	80	74	40	54	49
Luxembourg	63	67	62	34	74	76	57	21
Lithuania	64	75	47	42	74	51	63	18
Oman	65	116	66	52	48	90	128	11
Bangladesh	66	80	79	85	13	82	31	152
Uruguay	67	59	99	63	70	52	80	106
Kazakhstan	68	68	54	72	74	44	38	50
Slovenia	69	71	42	53	74	53	47	58
Nigeria	70	56	91	106	40	59	69	171
Latvia	71	77	68	51	74	61	68	13
Ecuador	72	76	88	76	41	101	64	145
Tunisia	73	78	63	81	64	75	87	140
Ghana	74	81	78	96	52	65	96	116
Azerbaijan	75	99	46	50	74	96	65	35
Mauritius	76	91	61	78	74	73	82	10
Malta	77	72	50	73	74	99	58	71
Kenya	78	117	105	58	63	72	108	92
Cyprus	79	69	49	54	74	104	78	95
Serbia	80	65	56	92	74	69	84	82
Venezuela	81	52	86	108	67	110	81	189
Georgia	82	106	100	68	74	117	85	22
Jordan	83	118	74	67	68	91	120	97
Croatia	84	73	73	41	74	61	71	175
Algeria	85	63	76	79	74	114	75	157
Moldova	86	109	94	98	74	183	83	32
Kuwait	87	114	108	74	74	138	102	6
Botswana	88	96	109	111	74	60	89	47
Honduras	89	79	113	110	58	154	115	164
Montenegro	90	94	80	82	74	145	97	70
Zambia	91	103	117	115	74	80	112	15
Armenia	92	102	48	91	74	162	117	87
Cape Verde	93	108	102	107	74	127	92	75
Albania	94	100	67	89	74	132	86	125
El Salvador	95	70	129	97	74	102	130	61
Guatemala	96	86	83	105	74	97	104	100
Cameroon	97	92	89	116	72	95	107	183
Senegal	98	118	87	90	71	71	116	178
Tajikistan	99	111	64	102	74	177	73	132
Jamaica	100	101	90	83	74	151	90	122
Namibia	101	89	115	62	74	118	133	79
Uganda	102	103	112	113	74	83	114	84
Mongolia	103	121	55	99	74	110	141	62
Rwanda	104	121	106	112	74	54	162	31
Bosnia and Herzegovina	105	87	103	103	74	161	93	137

Country	Overall Rank	Cost	Labor	Infra-structure	Industry	Geo - political Risk	Economy	Tax Policy
Ethiopia	106	88	124	93	74	93	98	133
Bhutan	107	121	107	120	74	108	177	17
Dominican Republic	108	121	95	86	74	50	100	149
Kyrgyz Republic	109	113	98	104	74	184	88	151
Seychelles	110	121	114	88	74	145	191	29
Cambodia	111	115	123	94	74	49	137	136
Brunei Darussalam	112	121	96	84	74	77	171	104
Tanzania	113	107	126	100	74	88	103	154
Nicaragua	114	66	119	114	74	157	123	159
Lebanon	115	121	82	109	74	156	121	113
Mozambique	116	103	136	117	74	121	127	117
Trinidad and Tobago	117	121	59	87	74	144	132	162
Uzbekistan	118	110	139	138	74	87	61	78
Madagascar	119	121	92	118	74	105	136	131
Swaziland	120	121	110	101	74	192	188	63
Belarus	121	98	141	138	74	126	45	96
Lao People's Democratic Republic	122	121	97	123	74	92	142	156
Paraguay	123	121	127	127	74	120	113	127
Macedonia	124	97	144	138	74	173	95	29
Nepal	125	121	116	126	74	115	122	146
Kosovo	126	93	145	138	74	163	101	45
Yemen	127	121	131	137	74	154	144	80
Sierra Leone	128	121	132	131	74	141	173	85
Benin	129	121	101	124	74	88	153	174
Congo Democratic Republic	130	121	120	125	74	109	109	181
Malawi	131	121	128	129	74	100	154	134
Liberia	132	121	135	130	74	188	193	69
Mali	133	121	121	122	74	125	126	166
Puerto Rico	134	82	143	138	74	116	79	161
Zimbabwe	135	121	122	121	74	181	168	143
Angola	136	89	152	138	74	81	111	103
Cote d'Ivoire	137	121	152	138	74	83	99	53
Lesotho	138	121	134	134	74	182	186	111
Mauritania	139	121	111	128	74	170	176	179
Gambia	140	121	118	119	74	189	194	169
Burundi	141	121	125	132	74	189	199	138
Haiti	142	121	133	135	74	194	161	147
Guinea	143	121	130	133	74	131	150	182
Chad	144	121	137	136	74	140	159	188
Turkmenistan	145	95	142	138	74	165	76	190
Andorra	146	83	151	138	74	130	91	190
Bolivia	147	118	152	138	69	168	124	186
Bahamas	148	121	152	138	74	133	163	55
Sao Tome and Principe	149	112	149	138	74	201	110	135
Iraq	150	121	152	138	74	79	105	129
Barbados	151	121	148	138	74	103	167	89
Myanmar (Burma)	152	121	152	138	74	68	118	125
Belize	153	121	146	138	74	207	164	48
Solomon Islands	154	121	152	138	74	169	197	37
South Sudan	155	121	152	138	74	176	152	66
San Marino	156	121	152	138	74	149	206	40
St. Lucia	157	121	152	138	74	152	172	74
Vanuatu	158	121	152	138	74	163	192	57
Papua New Guinea	159	121	152	138	74	147	145	91

Country	Overall Rank	Cost	Labor	Infra-structure	Industry	Geo - political Risk	Economy	Tax Policy
Syria	160	121	152	138	74	197	147	81
US Virgin Islands	161	84	150	138	74	153	125	190
Dominica	162	121	152	138	74	158	195	77
Samoa	163	121	152	138	74	175	204	64
Kiribati	164	121	152	138	74	118	201	94
Suriname	165	121	147	138	74	204	156	102
Sudan	166	121	152	138	74	134	106	163
Niger	167	121	140	138	74	113	160	160
Djibouti	168	121	152	138	74	174	158	108
Burkina Faso	169	121	152	138	74	121	135	153
Libya	170	121	152	138	74	198	129	128
Marshall Islands	171	121	152	138	74	160	206	83
Micronesia, Federated States of	172	121	152	138	74	123	202	110
St. Vincent and the Grenadines	173	121	152	138	74	179	190	101
Macau	174	121	152	138	74	85	94	190
Tonga	175	121	152	138	74	186	196	98
Fiji	176	121	152	138	74	166	182	120
Palestinian Authority	177	121	152	138	74	205	166	109
St. Kitts and Nevis	178	121	152	138	74	172	185	124
Grenada	179	121	152	138	74	167	151	141
Guyana	180	121	152	138	74	199	169	123
Maldives	181	121	152	138	74	200	180	118
Antigua and Barbuda	182	121	152	138	74	170	157	144
Togo	183	121	152	138	74	112	149	173
Palau	184	121	152	138	74	180	206	107
Gabon	185	121	152	138	74	186	140	165
East Timor	186	121	152	138	74	136	203	139
Afghanistan	187	121	152	138	74	143	143	176
Eritrea	188	121	152	138	74	196	165	148
Reunion	189	121	152	138	74	107	134	190
North Korea	190	121	138	138	74	193	138	190
Cuba	191	121	152	138	74	135	131	190
Liechtenstein	192	121	152	138	74	128	139	190
Congo	193	121	152	138	74	177	146	185
Guinea-Bissau	194	121	152	138	74	206	183	155
Comoros	195	121	152	138	74	202	174	168
Equatorial Guinea	196	121	152	138	74	208	148	177
Bermuda	197	121	152	138	74	150	155	190
French Guiana	198	121	152	138	74	124	181	190
Martinique	199	121	152	138	74	137	178	190
Cayman Islands	200	121	152	138	74	142	179	190
Curacao	201	121	152	138	74	139	184	190
Aruba	202	121	152	138	74	148	175	190
Central African Republic	203	121	152	138	74	203	170	187
Guam	204	121	152	138	74	159	189	190
American Samoa	205	121	152	138	74	129	205	190
Anguilla	206	121	152	138	74	185	187	190
Somalia	207	121	152	138	74	191	198	190
Tuvalu	208	121	152	138	74	195	200	190
Curacao (CUW)	209	121	152	138	74	209	206	190
Sint Maarten (SXM)	209	121	152	138	74	209	206	190

Complete state rankings

State	Overall Rank	Cost	Labor	Infra-structure	Industry	Economy	Tax Policy
Washington	1	33	9	4	1	4	17
Texas	2	39	32	24	3	1	4
Georgia	3	7	19	24	7	5	20
Arizona	4	10	23	17	5	21	14
Colorado	5	44	3	8	22	25	16
Virginia	6	29	6	12	19	20	23
Pennsylvania	7	36	20	2	11	11	32
Michigan	8	20	30	21	9	6	21
Ohio	9	32	34	10	4	3	26
Indiana	10	9	39	7	15	9	21
Illinois	11	34	12	3	13	7	43
Tennessee	12	8	37	42	21	10	5
California	13	48	13	5	2	2	50
North Carolina	14	16	24	28	6	8	33
Florida	15	40	31	32	10	13	9
New York	16	31	8	5	11	12	50
South Carolina	17	6	36	41	20	16	18
Massachusetts	18	51	1	15	24	14	35
Alabama	19	18	43	42	8	26	13
Oklahoma	20	11	45	14	17	36	10
New Hampshire	21	30	11	16	40	38	7
Utah	22	14	16	35	32	24	29
Oregon	23	23	17	18	18	17	44
Kansas	24	26	15	27	16	34	27
New Jersey	25	45	7	1	29	22	49
Nevada	26	2	47	49	31	28	6
Missouri	27	38	27	34	23	27	24
Maryland	28	49	4	11	30	30	40
Minnesota	29	42	14	13	28	18	46
Connecticut	30	47	2	20	14	32	48
Kentucky	31	4	46	48	25	19	30
Louisiana	32	24	48	29	36	23	8
Wisconsin	33	37	35	9	26	15	45
New Mexico	34	12	33	47	33	43	12
Nebraska	35	21	25	31	34	39	25
Montana	36	1	28	45	43	50	19
Iowa	37	17	39	19	37	29	27
Idaho	38	3	42	39	39	33	30
Wyoming	39	25	44	46	41	45	2
Mississippi	40	12	52	40	35	37	10
Rhode Island	41	19	18	38	38	41	38
Alaska	42	50	29	23	47	51	1
Arkansas	43	5	50	33	27	35	36
Delaware	44	15	21	37	44	40	36
South Dakota	45	22	39	51	46	49	2
District of Columbia	46	41	5	22	51	44	47
Hawaii	47	27	22	44	42	46	41
Vermont	48	46	10	29	50	47	42
West Virginia	49	28	49	36	45	31	34
North Dakota	50	35	38	50	48	47	15
Maine	51	43	26	24	49	42	39
Puerto Rico	52	52	51	52	52	52	52

Contacts

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