

Title: Driving Adoption: Smart Manufacturing Technologies

SOUTH KANSAS COALITION OVERARCHING NARRATIVE

VISION: The vision for the South Kansas Coalition initiative is to empower equitable adoption of productivity-enhancing emerging technologies for sustainable, precision manufacturing competitiveness and profitability.

1 SYNOPSIS

1.1 Regional Growth Cluster

WHO: The South Kansas region is a mixed advanced manufacturing ecosystem anchored in aerospace products. Due to the nature of aerospace's complex and regulated manufacturing environment, the region's manufacturers have highly complex design, automation, advanced materials, machinery, and fabrication supply chain capabilities. Wichita, the state's largest city, has a population of about 400,000, and is located in Sedgwick County, which has more than half a million people. The 27-county region has slightly more than one million people. Wichita is ranked among the nation's 50 largest cities and is known as the Air Capital of the World.

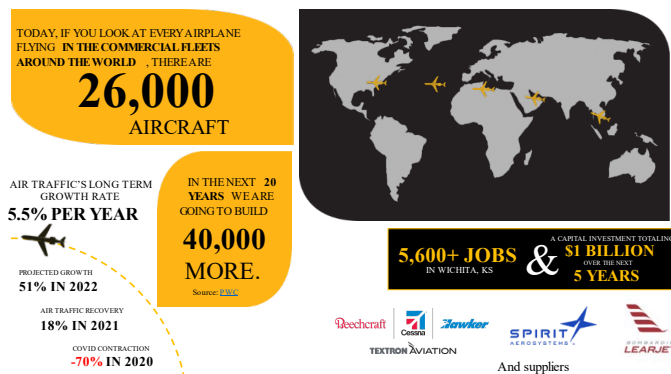


Figure 1. Air traffic's long-term growth rate of 5.5% per year

GROWTH CLUSTER: The Wichita metropolitan statistical area (MSA) employment location quotient (LQ) concentration rate for manufacturing (NAICS 31-33) is 2.18 and for Aerospace Products and Parts Manufacturing (NAICS 3364) is 32.83; employment concentration is more than 32 times the national average.

The long-term average compounded annual growth rate for commercial aircraft is 5.5 percent (60 percent above forecast gross domestic product growth). There are a total of 26,000 aircraft flying in commercial fleets around the world today. In the next 20 years, the world will build 40,000 more commercial aircraft to support increased demand from passengers and cargo (Figure 1).ⁱ **The world will need to build twice as many aircraft in half the amount of time. It is essential to U.S. economic and national security that the country continue to maintain and expand our competitive advantage and global market share in aerospace design, materials, manufacturing, and maintenance. Aircraft production velocity must increase. The *Driving Adoption* initiative will empower the equitable adoption of productivity-enhancing emerging technologies for sustainable, precision manufacturing competitiveness and profitability.**

The American aerospace and defense industry is a vital component of the U.S. economy, not solely for the role that industry plays in national security, transportation, and technological innovation, but also because its **influence spans many sectors and every state countrywide.**ⁱⁱ

CATYLLITIC OPPORTUNITY: The urgency for smart manufacturing initiatives is irrefutable, something that all members of the industry are feeling. Increased levels of smart manufacturing maturity significantly improve the competitive advantage along multiple performance indicators, such as time to market, cost efficiency, product quality, and customer satisfaction.ⁱⁱⁱ

In early 2020, the South Kansas region lost approximately 5,000 aerospace jobs because of the Boeing 737 MAX production suspension. In March 2020, the COVID-19 pandemic became the second unprecedented event to significantly affect the core industries that drive the regional and state economy. Roughly 20,000 (~60%) aerospace workers were laid off or furloughed.

In addition to the positive long-term growth trend for air travel and the need for more aircraft over the next 20 years, the COVID-19 pandemic has exposed an ongoing need for supply chain

resiliency and domestic crisis preparedness. Simultaneously, trade tensions and near-peer competitors continue to strengthen and emerge, while the value of labor arbitrage dwindles and global logistics costs increase. Without improving the resilience and competitiveness of U.S. manufacturers and supply chains, the future of this country’s economic and national security may be at risk.

The United States must maintain its competitive advantage in aerospace, as it will continue to remain a dominate economic driver and a national defense imperative (Figure 2). To remain the world leader in aerospace, the country must develop and execute a strategic plan to create an environment that allows U.S.-based companies to innovate and be first to market with these new technologies, while maintaining safety and security.^{iv} To do this, we must continue to embrace strong public-private partnerships to help establish the strategic framework and shape the regulatory environment. In addition, we must invest in research and development that enables new designs/products, materials, and manufacturing technologies that enable U.S. businesses to efficiently design, certify, and manufacture the most advanced air vehicles of the future.

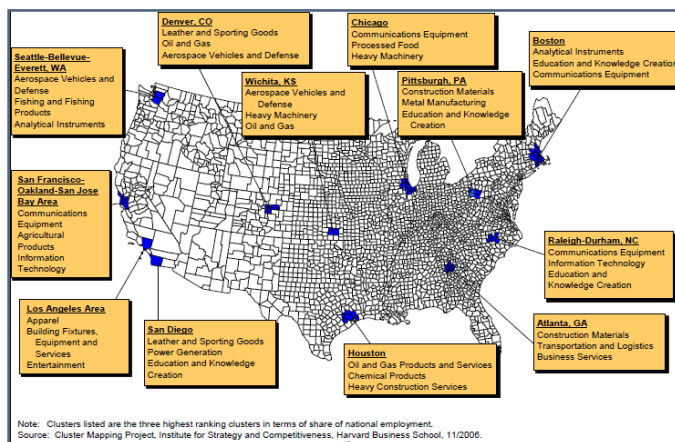


Figure 2. Highest ranking clusters in terms of share of national employment. Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

1.2 Coalition Members and Partners

Table 1 includes a list of South Kansas Coalition Members and additional partners.

Table 1. Coalition Members and Additional Partners

COALITION MEMBERS: Wichita State University, WSU Tech, Wichita Airport Authority, Greater Wichita Partnership, America Makes, State of Kansas

INDUSTRY LEADERSHIP: GE Additive, Integra Technologies, Inc., Airbus Americas, Inc., Spirit AeroSystems, Amazon Web Services, Bell, A Textron Company, Textron Aviation, Deloitte Consulting, LLP, Electroimact, Inc., Envision Workforce Innovation Center, High Touch Technologies, Impossible Objects, J R Custom Metal Projects, Inc., Markforged, Meld Manufacturing Corporation, Modig Machine Tool US Inc., Stratasys, Trilion Quality Systems, Yingling Aviation
PROFESSIONAL/ INDUSTRY ASSOCIATIONS: America Makes, CMH-17, Kansas Manufacturing Solutions (MEP), SAE International, Wichita Manufacturers Association and Wichita Regional Chamber of Commerce, Workforce Alliance of South Central Kansas



Figure 3. Wichita Manufacturing Association has 239 Members with 23 Board Members



LABOR: International Association of Machinists (IAM), International Brotherhood of Electrical Workers (IBEW)

EDUCATION AND TRAINING: Howard University, Kansas State University, Peaslee Technical Training Center, Wichita State University, Wichita State University Campus of Applied Sciences & Technology (WSU Tech)

ECONOMIC DEVELOPMENT ORGANIZATIONS: CML Collective, LLC, FirePoint Innovation Center, Groover Labs, Greater Wichita Partnership, Regional Economic Area Partnership (REAP), South Central Kansas Economic Development District (SCKEDD)

GOVERNMENT PARTNERS: State of Kansas, Sedgwick County, Small Business Association, Wichita District

Wichita State University (WSU)^v, the most diverse university in the state, will serve as the Coalition’s lead organization. The collective convening power of WSU and its long legacy of quality academic programs and industry-driven research (Figure 4) will enable the Coalition to

operationalize a unified, integrated, and wholistic strategy to help the South Kansas economy recover from the pandemic and build economic diversity and resiliency that will benefit the regional workforce and residents through the creation of high-quality jobs, increased wages, and revitalized communities.

1.3 Component Project Overview

South Kansas workers, industry, and government leaders are resolute and committed to building competitive strength in our high-precision commercial and defense manufacturing capacity, especially in productivity enhancing production methods, qualified factory development, and hybrid technical training. Projects blend human and technological capabilities to power innovation, growth, and resilience. *Driving Adoption* invests extensively in technology, data, and human capabilities thereby creating public sector assets that will equitably boost private production velocity, competitiveness, and profitability (Table 2).

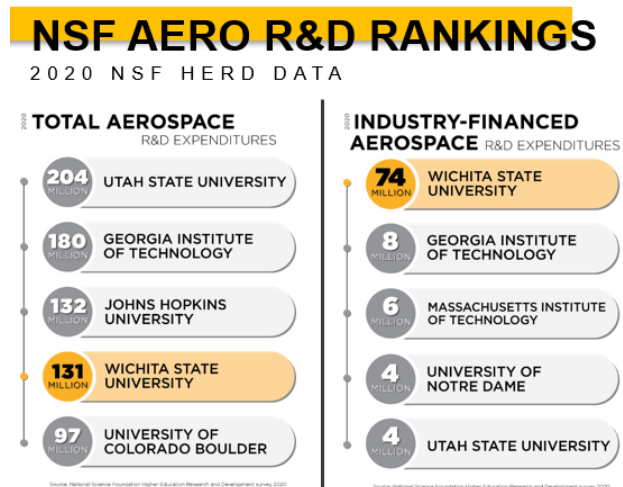


Figure 4. WSU’s industry-financed R&D ranking first among U.S. research institutions

Table 2. Component Projects that Support Economic Development Needs

Component Project	Contribution to Growth
1. Additive Manufacturing <ul style="list-style-type: none"> • Metal • Reinforced Polymer • Polymer • Robotic 	Focused on equipping South Kansas businesses with the tools needed to successfully implement additive manufacturing into their supply chains. Project develops a framework for businesses that will enable the manufacture of repeatable sustainable parts. WSU will team with national industry experts to train a wide range of employees from operators to designers and support individual businesses in creating “qualified factories” that deliver repeatable, robust parts.
2. Semiconductor Testing and Evaluation Laboratory	Alleviates supply chain bottlenecks in hermetic electronic component testing, increases resiliency and reliability of testing and evaluation, and provides applied learning for university and technical school students. Laboratory will double the amount of internal gas analysis (IGA) testing available to U.S. firms.
3. Smart Manufacturing <ul style="list-style-type: none"> • Smart Machining • Smart Factory • Crisis Manufacturing Network 	Expands and modernizes training and research capacity, develops, and deploys skills training need for high-velocity machining and smart factory technologies that are multi-faceted, flexible, and resilient. Subtractive and advanced machining technologies are part of the solution but can only be successful if introduced and implemented in a financially stable and reproducible way and if hands-on training is available to workers.
4. Smart Manufacturing Network and Talent Convening	Convenes a network of participants—small, medium, and large—to exchange ideas, explore new ways to translate results from research and ideas into industry practices, and provide underrepresented STEAM students with internships, networking, interviewing and professional conference experience.
5. Construction: Smart Manufacturing and Applied Research Training Facility	Expands training capacity to deliver high-precision, high-wage, high-demand career guidance for students and incumbent workers. Encourages educators, trainers, and researchers to partner with employers to equip the workforce with relevant skills and competencies for existing and emerging jobs, measuring success by the number of students who leave equipped to land a job.
6. Governance, Management, and Evaluation	Support Technical Advisory Panel, an interorganizational network of leaders, that will govern the Coalition data-driven vision with industry-defined and industry-prioritized, component projects backed by benchmark data and programmatic & ecosystem metrics.

1.4 Alignment with Regional CEDS

The *Driving Adoption* initiative is aligned with the 2021 SCKEDD Comprehensive Economic Development Strategy (CEDS) and the state of Kansas strategic plan, [Framework for Growth](#) (Figure 5). Strategic priorities include establishing a manufacturing 4.0 program for companies

and training for workers, and incentivizing businesses to upgrade the long-term manufacturing industrial base with cutting-edge factory floor technologies, such as **additive manufacturing, automation with in situ inspection, and semiconductor production, which will enhance productivity, aerospace and advanced manufacturing product performance, and quality-control while accelerating high-skilled job growth.**



Figure 5. Regional CEDS and Complementary initiatives

1.5 Complementary Initiatives

The *Driving Adoption* priorities and component projects build on and are complimented by the following: (a) Ewing Marion Kauffman Foundation Heartland funding to support business owners and founders, with intentional focus on those that are underrepresented; (b) the state of Kansas strategic plan, *Framework for Growth*, which includes business incentives to encourage digital engineering and manufacturing transformation; (c) Defense Manufacturing Community designation and associated high-temperature materials research and the National Defense Prototyping Center funded by the DoD; (d) American Manufacturing Communities Collaborative (AMCC); (e) Get to WERX earn and learn program among WSU Tech, WSU, and National Institute for Aviation Research (NIAR); (f) Department of Labor One Workforce award supporting advanced manufacturing and information technology training and education; and (g) Small Business Administration (SBA) Federal and State Technology programming.

1.6 Metrics

Table 3 provides the South Kansas Coalition metrics by component project.

Table 3. South Kansas Coalition Metrics by Component Project

South Kansas Coalition Project	Additive	Semiconductor	Resiliency	Convening	Facility
Job Creation	2,000-2,500	90–110	2,000-2,500		400–450
Wage Growth	3–10%	3–10%	3–10%		
Labor Force Participation Rate	3–7%		3–7%		3–7%
Workers Completing Training	1200–2K	50/year	600-700	9K–12K	3K/year
Population Demographic Breakdown	Yes	Yes	Yes	Yes	Yes

1.7 Timeline

The Driving Innovation work plan includes a 48-month period of performance (POP) that will commence with a successful award and executed contract. Staffing, equipment procurement, and curriculum development will be among the first-quarter tasks. The initiative includes one construction project—a state, public, non-profit educational, and research facility. The SMART facility’s groundbreaking and construction will commence within the second quarter of the award, with a construction period not to exceed 24 months. Occupancy of the facility will occur in Year 3 of the award (2025). Advanced manufacturing laboratories and training programs, which will be operational in the first program year; laboratories and training classrooms will relocate from their temporary locations into a new facility in the fourth program year.

2 SOUTH KANSAS REGION

2.1 Regional Location and Primary Service Area

The South Kansas primary service area includes the City of Wichita in Sedgwick County (20173), Kansas, associate Metropolitan Service Area and rural counties. The full list of 27-counties is attached. The South Kansas Coalition expects that the *Driving Additive Adoption* investment will impact all U.S. states and all advanced manufacturing industries.

Table 4 provides location quotients^{vi} for industries with regional specialization. The Aerospace Products and Parts Manufacturing is a traditional but evolving cluster that competes within a high-precision, highly regulated environment. The aerospace industry plays an essential role in economic and national security, transportation, and technological innovation, but its precision and technological **influence span many sectors and every state countrywide.**^{vii} This table highlights several convergent regional clusters, including heavy equipment manufacturing, Petroleum and Coal Product Manufacturing, and Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing. Also, noteworthy, and strategically postured for smart manufacturing adoption, is the emerging electric vertical take-off and landing (eVTOL) aircraft and associated lightweight materials and production processes.

Table 4. Employment and Establishment Location Quotients for Selected Manufacturing Industries

NAICS Code	Description	Employment		Establishments	
		Wichita MSA	27-County Region	Wichita MSA	27-County Region
3364	Aerospace Product and Parts Manufacturing	32.83	22.6	20.27	13.14
3331	Agriculture, Construction, and Mining Machinery Manufacturing	6.28	5.26	2.39	2.79
3241	Petroleum and Coal Products Manufacturing	5.25	3.45	2.78	1.38
3334	HVAC Equipment Manufacturing	4.71	2.98	1.59	0.58
3327	Machine Shops; Turned Products; and Screw, Nut, and Bolt Mfr.	3.59	2.91	2.35	1.83

Source: County Business Patterns (2019) - U.S. Census Bureau

2.2 Communities Served: Target Participants and Stakeholders Engaged

The South Kansas region has a diverse economic base, producing a wide variety of products and services. Approximately 21.5 percent of regional employment is in goods-producing industries. According to a Brookings manufacturing report, “Among the 100 largest metropolitan areas, **the most manufacturing-specialized metropolitan area is Wichita**, where manufacturing’s share of jobs was two times its nationwide share.”^{viii} Nearly 94 percent of the area’s business establishments employ fewer than 50 workers. Growth is stimulated by these small firms as well as local aircraft companies, which combine to produce a significant number of the world’s general aviation, commercial, and defense aircraft parts.

Figure 6 provide insights into the changing racial and ethnic population of the 27-county region. The x-axis measures each race’s (ethnicity’s) contribution to the population in 2019, while the y-axis measures the same thing for the 2000 population. The size of the bubble indicates how much each group grew in percentage terms. For example, Hispanics were 5.28 percent of the population in 2000 and 10.5 percent of the population in 2019. The Hispanic population grew 108 percent in that region over that time. You can

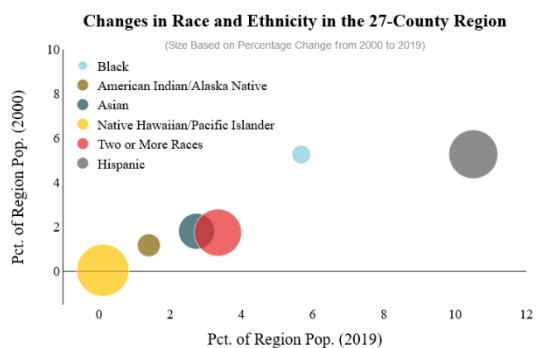


Figure 6. Changes in Regional Race and Ethnicity

also see from the figure that Native Hawaiians/Pacific Islanders grew by a lot over that time (122.7 percent), but they still only make up a small percentage of the population—less than one percent.

Strategic planning for the Economic Development Administration (EDA) Build Back Better (BBB) Driving Prosperity initiative included a Future of Work research study to further understand the talent and industrial ecosystem of the region. Targeted participants included students, job seekers, and young professionals; business leaders; and frontline/touch labor. Stakeholder input was analyzed based on demographics, gender, race/ethnicity, generation, field of work/study, and tenure in Wichita.

2.3 Regional Assets

The collective convening power of WSU, South Kansas Coalition partners, and industry leadership, including attractive and centrally located investments made at the WSU Innovation Campus, will make it easier to adopt advanced manufacturing initiatives by drawing manufacturing leaders into an existing ecosystem of technology, industry, and academia. The *Driving Adoption* initiative will help the regional manufacturing cluster recover from the pandemic and build economic diversity and resiliency to mitigate future impacts.

The South Kansas Coalition’s lead institution is WSU-NIAR, headed by senior vice president for industry and defense, John S. Tomblin, PhD, who also is the executive director of NIAR. NIAR’s mission is to conduct research, transfer technology, and enhance education for the purpose of advancing the nation’s aviation industry, and to assist non-aviation industries that may benefit from aviation-related technologies. NIAR’s centers promote the safety, research, manufacturing, and design elements of today’s aviation industry. This happens not only through NIAR’s own research, but through the exchange of knowledge with researchers in other centers. These centers include the following: Advanced Technologies Laboratory for Aerospace Systems, National Center for Advanced Materials Performance, Composite Materials Handbook-17 (CMH-17), Federal Aviation Administration (FAA) Center of Excellence for Composites and Advanced Materials, FAA Alliance for System Safety of Unmanned Aircraft Systems through Research Excellence (ASSURE), Center of Excellence for (UAS) Research, Kansas Aviation Research & Technology Growth Initiative, FirePoint Innovations Center who partners with the U.S. Army’s Aviation and Missile Center, and the National Institute for Research and Digital Transformation.



3 PRIVATE SECTOR AND PHILANTHROPIC ENGAGEMENT

Please see undated support letter from Key Partners in documentation that accompanies the Overarching Narrative. Each partner articulated a unique commitment to diversity, equity, inclusion, and accessibility (DEIA). GE Additive, Integra Technologies, Meld Manufacturing Corp., Modig Machine Tool, Stratasys, and Deloitte laid out that they will provide matching share that includes equipment discounts, subject matter expert’s time, material specifications, material property data, raw materials, technical training, and tailored advanced manufacturing consulting to enable the *Driving Adoption* objectives.

4 SUSTAINABILITY

The South Kansas Coalition intends to leverage the Build Back Better outcomes to continue to build the regional ecosystem and to continue to expand equitable adoption of productivity-enhancing smart manufacturing technologies to improve the safety and quality of life for all Americans. Sustainability efforts will continue beyond the four-year term of the grant across a continuum ranging from sustainability of the overarching vision to sustainability of specific activities. Four key points along the sustainably continuum are described below. These types of sustainably are not necessarily mutually exclusive.

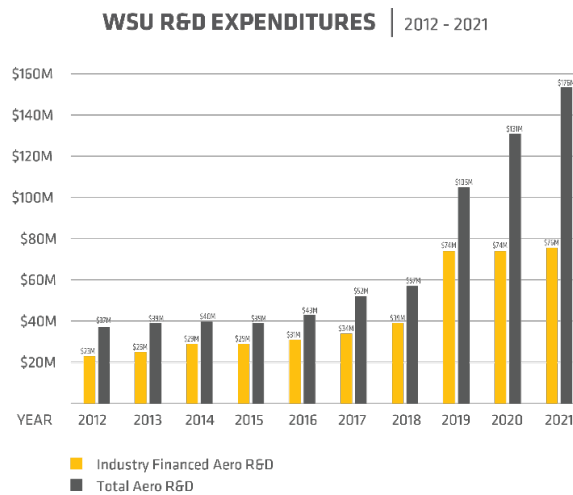


Figure 7. WSU R&D expenditures

A. Philosophical Sustainability: The *Driving Adoption* initiative is an enhanced way of thinking about economic competitiveness that considers equitable human capital as a key element of smart manufacturing and the regional economy as its focus. Philosophical sustainability occurs when the region absorbs the BBB vision and becomes part of the regional mode of technology adoption and manufacturing productivity resulting in economic resiliency. Empowering equitable adoption of productivity-enhancing emerging smart manufacturing technologies will require engagement of all workers trained to their highest competency levels. Equitable development of all human capital is at the core of the BBB proposal and essential for the U.S. to continue to be a leader in advanced manufacturing and aerospace. **B. Relational Sustainability:** Collaboration is the heart of the *Driving Adoption* initiative and operating the various component projects across geographical and jurisdictional boundaries will create strong cross-functionality across multiple organizational, professional, and systemic boundaries. From previous collaborative initiatives, the region has benefited from relational sustainability. Having trusted partners with a shared experience engenders trust when additional opportunities and/or challenges arise. Relational sustainability is important for resiliency and recovery. The durability of the regional network of stakeholders from different sectors and the extent to which we work with unity of purpose are indicators of relational sustainability. Aerospace is notoriously cyclical, and industry and households have developed coping strategies to address these fluctuations. Many of these coping strategies are based on relational sustainability. *Driving Adoption* was born from the experience of the double impacts of the Boeing 737 MAX production suspension and pandemic and address resiliency, sustainability, and next-generation competitiveness. **C. Institutional Sustainability:** This project is designed to be primarily self-supporting with industry-financed program income and tuition. Over the years, NIAR has successfully invested in industry-demanded facilities, equipment, staff, and capabilities. Figure 8 shows WSU-NIAR's growth of total aerospace research and development (R&D) revenue from 2012 to 2020, which will provide institutional sustainability. **D. Programmatic Sustainability:** The *Driving Adoption* activities are constructed to empower small- and medium-sized manufacturers and their workers to build additional competencies and master utilization of digital tools and platforms. Programmatic sustainability is the primary outcome of the grant's projects.

5 COMMUNITY-BASED ORGANIZATION AND LABOR UNIONS

The BBB proposal includes a construction project and smart manufacturing equipment that will be competitively bid per state of Kansas procurement standards. The Coalition will advocate the state contracts office who will publish the construction and equipment bids to do the following: (1) **include additional "points" to those that qualify as a small and underutilized businesses** (minority-, women-, veteran-owned businesses), and (2) send the solicitation to **platforms that will promote and communicate the bids** to these same groups.

The Coalition utilizes the SBA Dynamic Small Business Search Database ([DSBS](#)), **which was created and maintained to help firms that are owned and controlled by socially and economically disadvantaged individuals.** The database includes contacts for Sections 7(j)(10) and 8(a) of the Small Business Act (15 U.S.C. §§ 636(j)(10) as well as self-identified veteran owned, women owned, minority owned, etc. The Coalition uses the database as an outreach resource to enhance the procurement listserv for disseminating bids and program information.

Two regional **labor unions** are partnering on *Driving Adoption*, and both have committed to participating in governance and or task forces. Labor will have a seat on the Technical Advisory Panel. The Coalition will offer wages at or above the **prevailing wage rate** and include local hire provisions that reference county prevailing wage guidelines. In Sedgwick County, where the city of Wichita is located, a few trades' market-based pay exceeds the prevailing wage rate in positions such as tile setters, electricians, power equipment operators, iron workers, painters, etc.

The South Kansas Coalition includes multiple community-based organizations including, but not limited to the following: • **Wichita Manufacturer’s Association (WMA)**. Founded in 1917, **WMA has more than 239 members** with 23 board members. Seventy percent of its membership has a direct manufacturing role, and the remaining members are in support functions to manufacturers. • **Greater Wichita Partnership (GWP)**. Promotes recruitment, retention, and expansion of targeted economic driver industries. GWP facilitates diverse, quality jobs and capital investment that generates an overall positive return on public investment. • **SCKEDD**. Serves as financing funding agent in the way of loans/grants to local manufacturing entities via its internal loan programs, and government-backed loans and grants. • **Wichita Metro Chamber of Commerce**. Supports the Leadership Council and GWP on initiatives to improve Wichita’s competitiveness for primary jobs.

6 EQUITABLE ACCESS

Equal opportunity is the bedrock of American democracy, and our diversity is one of our country’s greatest strengths.^{ix} The South Kansas Coalition recognizes that leading with an integrated equity strategy is an essential source of a competitive advantage. Equitable practices and policies are a core driver of value creation for the region—a future-proofing strategy in a bull or bear market, as well as a way for thriving companies to return some of the value they create to society. While the advancement of technological tools, manufacturing processes, products, and services has provided society with numerous benefits, not every community has had the same positive experiences during the development, adoption, and implementation of these capabilities. Businesses who fail to see the impact of certain design choices and hidden bias in data sets likely play a significant role in the discriminatory functionality of cognitive products and tools. Coalition is committed to serving 40 percent underrepresented participants.

The Coalition programming will focus on underserved populations that include, but are not limited to, the following: historically underrepresented racial-ethnic populations, women, and members of religious minorities; lesbian, gay bisexual, transgender, and queer persons; individuals with disabilities; and rural communities. Figure 9 includes key observations to elevate diversity, equity, inclusion, and accessibility (DEIA) enablers from The Future of Work research.

ACCELERATING THE FUTURE OF WORK: KEY OBSERVATIONS

INCORPORATING DEIA INTO STRATEGIC AND BUSINESS IMPERATIVES

While some organizations have begun taking steps, the opportunity to ensure that DEIA is not just seen as the right thing to do but a strategic imperative remains. Many interview participants noted the need to increase focus on DEIA to help understand the needs of the community and aid in the retention and attraction of talent.

DIVERSIFYING REPRESENTATION AMONG DECISION-MAKERS

Representation at the leadership level in organizations as well as on decision-making bodies and committees was a key point of concern for many interview participants. There is shared sentiment that the perspectives and needs of marginalized groups are not always taken into consideration when strategies and decisions are made for Wichita, leaving many from these groups lacking a sense of belonging with Wichita.

Figure 8. Elevation of diversity, equity, inclusion, and accessibility (DEIA) imperatives in community decisions

The Kansas under-age 18 population has shrunk by 2.5 percent in the most recent decade. Programs for technical education and the future of work will need to tailor educational and workforce programs to empower all workers to aspire to and have equal access to well-paying, quality jobs and life-long learning/professional development opportunities, which are necessary to advance along a career path. Equity means recognizing the wants, needs, and circumstances particular to a community and providing members with tailored resources that are reflective of their experience.

The South Kansas Coalition is committed to ensuring that personnel are equipped to elevate equity. The Coalition will consult with external organizations who specialize in diversity, equity, and

inclusion, and seek input from external civil society organizations specializing in racial justice, civil rights, human rights, and/or other equity-based work. The following tactics are gleaned from an April 2021 report from New America titled “Equity by Design: Incorporating Equity into the Tech Development Process”^x: • Commit to seeking out representatives of those voices missing from the project. • Select diverse and inclusive populations for interviews, journey mapping, and research. • Critically evaluate data to offset systemic bias. • Refine product road mapping to identify equity concerns. • Create networking opportunities between business unit leadership and diverse or underserved suppliers to develop strategic relationships and encourage future sourcing opportunities.

“Prioritizing equity throughout the product lifecycle management process means being deliberate about incorporating perspectives from people of diverse backgrounds and considering equity as an essential component of the technological production process.”

7 DATA-BASED GOALS: OUTPUTS AND OUTCOMES

The key to progress on effectuating the South Kansas vision and a thriving advanced manufacturing ecosystem is benchmarking key progress indicators and evaluating the best evidence to inform integrated decision-making to advance competitiveness and sustainable development. Decision-makers need both **programmatic metrics** and broader **ecosystem metrics**. Sustainable development includes economic innovation and growth, inclusive dignity, and environmental sustainability.

Each of the *Driving Adoption* component project narratives includes a set of **programmatic metrics** that are focused on the project outputs and outcomes that are directly caused by BBB funding and activity. These metrics are measurable, clear, and credible and may include, but are not limited to, the quantification of the number of meetings convened; curricula developed and number of times delivered; students, workers, inventors, and stakeholders engaged; credential earned; jobs or career advancement; capital investment; new products or markets; etc.

To ascertain the joint impact of the BBB component projects and the Coalition’s complementary work, the leadership will evaluate existing indices that provide indicators for regional economic health, such as the [US Cluster Mapping Project](#), [Economic Innovation Group’s Distressed Communities Index](#), and the [ITIF’s New State Economy Index](#), and develop a regionalized data set of **ecosystem metrics** that measure and evaluate both distress and vitality indicators. Evaluation of the above-mentioned indices will inform tailored improvements to Kansas’s county-level measure of economic distress and establish a complementary set of vitality measures.

The current Kansas county-level [Economic Distress Index](#) combines seven indicators into a single, comparative measure of economic well-being.^{xi} The counties are ranked on seven indicators. The index is calculated by taking the average of the seven rankings and normalizing the average to be equivalent to a percentile.

The map colors are based on the Distress Score (Figure 9). Complementary vitality measures and associated indices will be developed and mapped. Vitality data measures are likely to include, but not be limited to, labor force participation rate, job creation, real wage growth, investment, new business starts, etc.

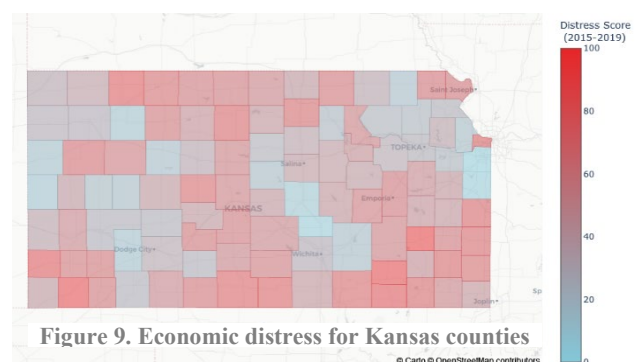


Figure 9. Economic distress for Kansas counties

The *Driving Adoption* ecosystems goals are to improve the overall growth index by 3-7 percent and reduce the distress indicators by 3-7 percent in each urban and rural county, with detailed review of data by race, ethnicity, gender, age, educational attainment, and industry, as available. Data indicators include but are not limited to the following: ● U.S. Bureau of Labor Statics: Quarterly Census of Employment and Wages ([QCEW](#)), Civilian labor force participation rate, Unemployment rate ([U-1](#), [U-3](#), [U-6](#)) ● U.S. Census Bureau: County Business Patterns ([CBP](#)), Annual Capital Expenditures Survey ([ACES](#)), Business Formation Statistics ([BFS](#))

To inform the best program and policy making, leadership and staff need reliable, longitudinal **ecosystem metrics** that drive multiple stakeholders to produce improved societal outcomes.

8 OVERVIEW: Cluster Program Development and Program Evolution

The Coalition commissioned and participated in two studies during the BBB planning phase.

1. **Future of Work and Workforce Strategy**: Over the last three years, the region experienced several events or disruptors that have had a significant impact in workforce and highlighted the need to understand and prepare for the Future of Work. As such, a study was commissioned.

Accelerating the Future of Work and Workforce Strategy effort had broad regional participation; 30 + regional organizations participated, 430+ unique individuals and over 1,500 total man hours were dedicated to the process. The following are some key findings:

Deloitte's research indicates that core responsibilities for existing roles will not change dramatically in the future; how the work gets done (e.g., process, technology) and skills required to do the work will change.

There are very few organizations globally who have scaled smart operations across the enterprise. The companies identified as "Industry 4.0 Leaders" are those who have successfully adapted to industry 4.0 in pockets of their organization.

2. In February 2022, WSU surveyed manufacturing companies to gauge what factors are associated with the adoption and implementation of smart manufacturing technologies and to identify ways to increase levels of smart manufacturing maturity and strengthen the domestic supply chain. Over 150 organizations provided input on their attitudes toward (and experience with) smart manufacturing technologies such as additive manufacturing, artificial intelligence, automation, big data, industrial internet of things, and predictive analytics. This information will impact how the Coalition develops the both the classroom and laboratory structure and content delivery modality.

Some of the results of the [Smart Manufacturing Technologies Survey](#) were anticipated; some were instructive and provided insights into how manufacturer's learn and these insights pivoted the component project strategies.

This region is dominated by small and medium-sized firms. Over one-third of respondents (33.6 percent) reported belonging to an organization with fewer than 100 employees.

Respondents from firms with fewer than 100 employees consistently accounted for the largest share of respondents reporting little or no organizational awareness of the six smart manufacturing technologies (62.5 percent to 77.8 percent of respondents). Conversely, respondents from larger firms (i.e., firms with more than 250 employees) accounted for the largest share of respondents reporting their organizations were actively using the various smart manufacturing technologies (42.3 percent to 83.3 percent of respondents).

Interestingly, peer/competitor experiences and vendor services appear to be important resources for organizations when it comes to learning about, deciding on, or implementing smart manufacturing technologies. Respondents consistently ranked these two resources in their top three—over 70 percent of respondents

This highlights the need for an industry and entrepreneurial ecosystem to convene a community of participants—small, medium, and large—to exchange ideas to enable adoption of smart manufacturing technologies. As a result of these findings, *Driving Adoption* has expanded the networking component project and incorporated novel curriculum design and engagement tasks.

ⁱ PwC’s Global Aerospace and Defense: Annual Industry Performance and Outlook, 2021 Edition, <https://www.pwc.com/us/en/industries/industrial-products/library/aerospace-defense-review-and-forecast.html>

ⁱⁱ AIA: Aerospace and Defense Economic Impacts Analysis, April 21, 2016, <https://www.aia-aerospace.org/news/aia-report-highlights-positive-economic-impact-of-aerospace-and-defense-industry/>

ⁱⁱⁱ Michael Grebe, et al., *Digital Maturity is Paying Off*, The Boston Consulting Group, June 7, 2018, <https://www.bcg.com/publications/2018/digital-maturity-is-paying-off>

^{iv} Source: Robin Lineberger, Aijaz Hussain and David Silver. Deloitte Insights. “Advanced air mobility: Can the United States afford to lose the race?” <https://www2.deloitte.com/us/en/insights/industry/aerospace-defense/advanced-air-mobility.html>.

^v Wichita State University is located in a HUBZone and Opportunity Zone (Census Tract: 20173000900).

^{vi} Location quotients are a common measure of the concentration of a particular industry in a region relative to the nation (reference area). The LQ consists of the ratio of the share of total regional employment that is in the particular industry and the share of total employment in the nation (reference area) that is in the particular industry. An LQ greater than 1.0 for a particular industry indicates that the region is relatively concentrated, whereas an LQ less than 1.0 signifies a relative under-representation. An LQ above 1.2 denotes an employment concentration well above the national average.

^{vii} AIA: Aerospace and Defense Economic Impacts Analysis, April 21, 2016, <https://www.aia-aerospace.org/news/aia-report-highlights-positive-economic-impact-of-aerospace-and-defense-industry/>

^{viii} Susan Helper et al., *Locating American Manufacturing: Trends in the Geography of Production*, Brookings Institution, May 2012, <http://www.brookings.edu/search?start=1&q=locating+manufacturing>

^{ix} Executive Order on Advancing Racial Equity and Support for Underserved Communities through the Federal Government, January 20, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>

^x Koustubh Bagchi and Brittany Thomas, *Equity by Design: Incorporating Equity into the Tech Development Process*, New America, April 19, 2021, accessed on December 26, 2021, <https://www.newamerica.org/oti/reports/equity-by-design/>

^{xi} Vitality indicators may include, but not limited to the following: Average Wage for Ten-County Area by Industry, <http://www.bls.gov/cew/>; K-12 Attendance Rate, https://datacentral.ksde.org/GIS_reports.aspx; New Business Startups or Expansions, Job Churning in Kansas, [Information Technology, and Innovation Foundation](#); Homeownership rate by race, [U.S. Census Bureau](#); etc.