

# Public Universities as Agents of Economic Prosperity

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All of higher education is facing challenges, most pervasively declining student enrollment due to demographics and changes in societal attitudes regarding the value of post-secondary education (Drozdowski, 2022; Milton, 2022). Public universities may feel these challenges more acutely; a study by the National Student Clearinghouse Research Center (2022) showed that public institutions had higher enrollment declines than private institutions. Meanwhile, costs of tuition and fees at public institutions continue to outpace inflation (Drozdowski, 2022).

Meanwhile, the pandemic continues to create its own challenges and exacerbate others, including faculty and staff burnout, student mental health issues, political polarization, and an evolving conception of the workplace (Higher Learning Commission, 2022).

## Where do we go from here?

As the nation continues to move in halting steps away from the COVID-19 pandemic, researchers and research administrators are looking to the future. Many of the recently released (summer 2022) and forthcoming opportunities authorized under the American Recovery Plan and the Chips and Science Act seek to rebuild and strengthen the economy. This is coupled with an increasing trend of state and local governments looking to universities, particularly research universities, as engines of economic development.

K-State will continue to build on our traditional strength areas, particularly in the natural sciences, engineering, and agriculture; foster interdisciplinary work; and adhere to our land-grant mission to support communities and the state with innovations promoting economic prosperity.

## KBOR Pillar 3: Advancing Kansas Economic Prosperity

Universities have historically worked

to provide trained workers needed to fill jobs dictated by the economic conditions at the time, such as following the Civil War with the passage of the Morrill Act (Thelin et al.), which dictated the establishment of institutions that would provide practical education to larger portions of the citizenry than traditionally served by elite institutions.

K-State has designed a blueprint for the future developed in response to the 2020 strategic plan from the Kansas Board of Regents (KBOR), *Building a Future* (KBOR, 2020). This document defines three so-called pillars:

1. Helping Kansas Families
2. Supporting Kansas Businesses
3. Advancing Kansas Economic Prosperity

KBOR, with its articulation of Pillar 3, seeks to advance the *creation of jobs* and *direct investments* beyond state borders into Kansas. Creating the jobs of the future will require:

- Alignment of education and local, state, and federal government;
- Partnerships with private business, industry, and investors;
- Actively working, engaging, and leveraging the attraction of investment capital in Kansas' core strength areas; and

- Infrastructure investments, including in people, process, information, and technology (e.g., broadband).

KBOR made Pillar 3 a charge for the six Kansas Regents universities, with the responsibility for Pillar 3 initiatives residing with the university CEOs, and they went further to identify the leads for Pillar 3 working groups at each university. K-State's Pillar 3 planning team was the then-Vice President for Research Peter Dorhout, K-State Foundation CEO Greg Willems, and K-State Innovation Partners CEO Kent Glasscock. The charge from KBOR stressed that proposed programming and strategies must be focused on the two key metrics of jobs and investments.

K-State chose four focus areas for our Pillar 3 plan, reflecting our land-grant mission and the disciplinary areas in which we have primarily benefited from partnerships with the private sector. Small working groups of faculty and administrators developed the initial articulations of the goals for each focus area:

- Food and Agriculture Systems Innovation
  - Will build on our historic strengths in advanced breeding techniques and integrated cropping systems
- Digital Agriculture and Advanced Analytics
  - Will exploit existing computing capacity, work with artificial intelligence systems and precision agriculture
  - Will take advantage of the geographic one of a range of climatic zones across the state that mimic many of the significant agricultural regions globally
- Biosecurity and Biodefense
  - Will leverage BSL-1 through BSL-4 assets on and adjacent to campus and our partnership with

USDA facilities including the National Bio- and Agro-Defense Facility

- K-State 105
  - Will build on the statewide research and extension network and its presence in all 105 Kansas counties to create a statewide economic development network

The final plan was submitted to KBOR in spring 2021 and subsequently approved. The Pillar 3 leadership team then turned its attention to rolling out and socializing the plan, which was redubbed as the Economic Prosperity Plan (EPP) (<https://www.k-state.edu/research/economic-prosperity/>).

#### **Progress on the EPP**

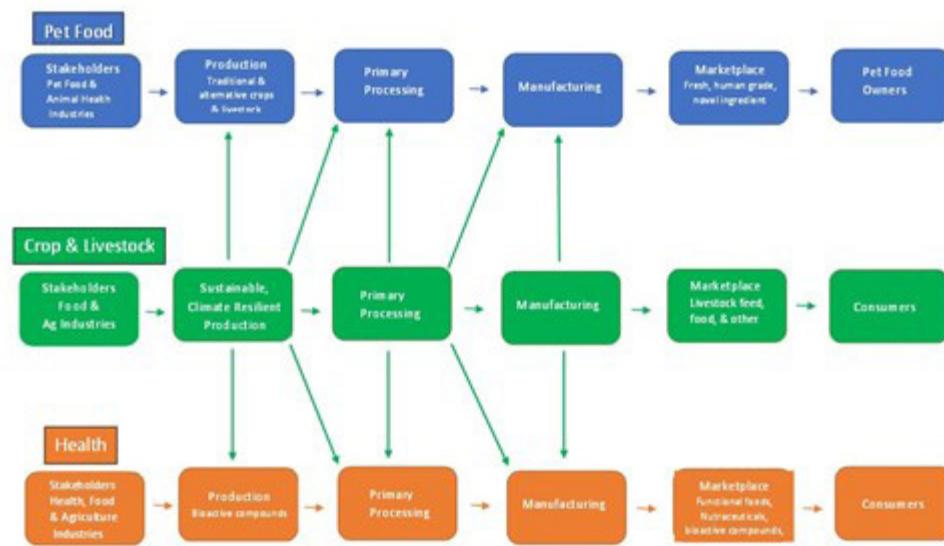
Four larger groups of faculty members were empaneled in spring 2022 to refine the vision for three of the focus areas and plan next steps. The charge was to identify the highest value sectors with the greatest potential to create jobs and/or attract investments, larger sponsored research opportunities that would be relevant, and companies with whom the university could partner to advance the efforts. The working groups were also asked about gaps in needed expertise or opportunities to build on selected areas of strength in order to help direct faculty recruiting. Finally, short-term implementation strategies were to be suggested.

The charge for the K-State 105 working group differed, appropriate to its distinctive vision. They were asked to identify a region of Kansas to conduct a two-year pilot in conjunction with a regional economic development partner working with appropriate K-State resources and other organizations.

#### **Food and Agriculture Systems Innovation**

This focus area in a nutshell:

- *New scalable multi-disciplinary links to enable sustainable systems-level food and ag research*



**Figure 1. The proposed systems in pet food and health innovation.**

- *Potential innovations in alternative crop development, value-added opportunities, and ag tech innovation and applications*

The Kansas Framework for Growth (KS Department of Commerce, 2021) focuses on five tradable industries. Kansas is twice as specialized as the national average in one of these industries: food and agriculture. The Framework for Growth specifically calls out leading higher education institutions specializing in food and agriculture to utilize extension systems and research facilities to make Kansas “a world-class home to research, development, and testing of new technologies in animal health, crop science, ag-tech and data analytics.” This proposal directly responds to all four Kansas Framework for Growth strategic pillars—talent, innovation, community assets and policy—and how the shared strategies are seeking value-added opportunities, ag tech innovation, sustainability initiatives, and the targeted support of producers.

The Food and Ag Systems focus area proposes a stakeholder-driven, systems-level strategy that includes a trans-disciplinary team of researchers, as well

as regular engagement with an advisory board to identify appropriate opportunities and venues. Partners across food and agriculture systems will include industries, producers, processors, regional foundations, commodity and trade organizations, as well as government. Consumers will be involved at both ends of the food production pathway.

The spring 2022 working group proposed building upon traditional crop and livestock agroecosystems to support two new transformative focused systems, pet food and health. The emphasis will be on developing sustainable systems in this area, developing alternative crops, a novel approach to the pet food industry, and new opportunities to improve foods to positively impact human health (Figure 1).

#### **Digital Agriculture and Advanced Analytics (DAAA)**

This focus area in a nutshell:

- *Artificial intelligence for production agriculture*
- *Scale-independent precision agriculture, current and emerging threats to crops & precision livestock production*

This focus area envisions the incorporation of existing K-State expertise in advanced breeding techniques and integrated cropping systems research to better attract opportunities and establish strategies that grow the capabilities and capacity needed to firmly establish K-State as a global leader in DAAA. It draws on expertise from multiple K-State colleges to firmly establish K-State as a true “cyber-land grant” institution.

Kansas is uniquely positioned to serve as a DAAA development hub. The extreme variability of climatic and production conditions found in Kansas positions the state as an analog for a significant portion of U.S. and global dryland and irrigated agricultural regions. K-State’s distribution of regional research and extension centers (Figures 2A and 2B) span this climatic gradient, making it an ideal laboratory for developing DAAA in the most variable and challenging environments.

The spring 2022 working group identified needs/goals that included a greater integration across disciplines, including artificial intelligence, specifically deep learning and machine learning; unmanned autonomous systems; sensor

technology and networks; cyber-physical systems and cybersecurity; and relationships with multiple kinds of companies—traditional ag as well as equipment, sensor, and data/AI firms.

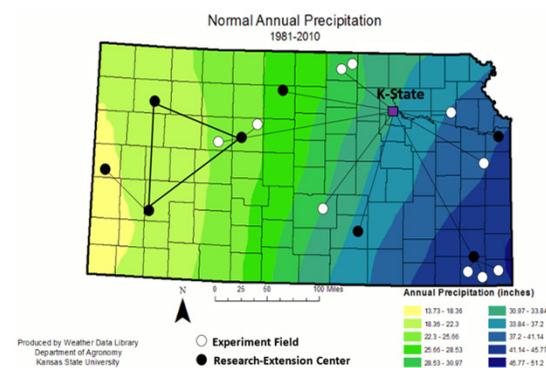
The group felt it important to establish an interdisciplinary center with dedicated physical space and eventually develop new academic programs that would emphasize the interdisciplinary nature of the field.

### Biosecurity and Biodefense

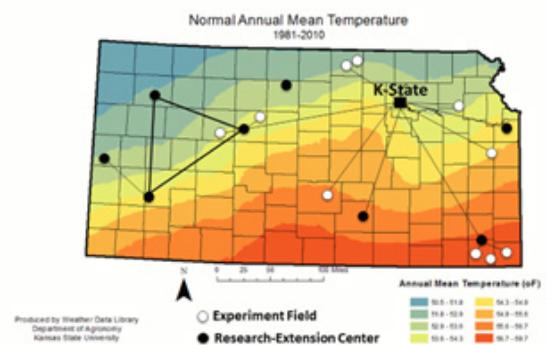
This focus area in a nutshell:

- *K-State will add a Biologics Development Module under BSL-3 containment to the BRI, enabling private sector vaccine/therapeutics manufacturers and their university researcher partners a pilot production facility.*

K-State has made significant investments in biosecurity and biodefense and is currently the only university in the world at which researchers have access to a full spectrum of BSL1-4 facilities located on or adjacent to campus. BSL1-3 spaces exist on the Manhattan campus, with most of the latter at the Biosecurity Research Institute (BRI). The BSL-4 USDA National Bio- and Agro-Defense



**Figure 2A.** Precipitation gradient across KS superimposed with locations of experiment fields and research-extension centers. Data from Weather Data Library, Department of Agronomy, Kansas State University.



**Figure 2B.** Temperature gradient across KS superimposed with locations of experiment fields and research-extension centers. Data from Weather Data Library, Department of Agronomy, Kansas State University.

Facility (NBAF) is located immediately adjacent to the BRI and has established a number of partnerships and cooperative agreements with K-State units and individual researchers.

While extensive, K-State's biocontainment capacity for intellectual discovery at these facilities is not sufficient to advance economic development. We proposed to address this by adding a Biologics Development Module to the BRI. This BSL-2 facility strategy would increase capacity for commercialization and manufacturing to ensure technological advancements are utilized in practical application. This structure would streamline the discovery to commercialization process for industry partners by reducing the regulatory burden associated with conducting containment/non-containment and live animal/benchtop research at multiple institutions. The extensive talent and infrastructure in Manhattan will attract companies, entrepreneurs, and venture capitalists to the region. New technology will be developed for economically important plant, animal, and zoonotic infectious diseases. No other university will have comparable assets.

During the COVID-19 pandemic K-State has been in a unique position to pivot research and contribute solutions for global human health using existing resources. The BRI was instrumental in securing for K-State \$12 million in funded grants, as well as several licensing agreements related to COVID-19. The notable limitation was the capacity for commercialization at this facility. The proposed strategies will allow K-State to become the foremost U.S. resource to facilitate private-public collaboration for research on pathogens of worldwide significance. These assets will strengthen relationships with industry and increase access to export markets for food and agricultural products. K-State's collective expertise in vaccine development, regulatory affairs, and flexible manufacturing capacity will

not exist anywhere else in the world. A global reputation for success in discovery and commercialization will enhance our opportunities to attract corporate pharmaceutical partners, licensing agreements, and workforce talent.

Progress made on this focus area includes the Biotechnology Development Module being completed at the BRI—pilot plant for vaccine/biologics production; active planning underway to expand the Large Animal Research Center to support K-State researchers, NBAF scientists, and others; and a collaboration with Manhattan Area Technical College and Scorpion Biological Services to develop biomanufacturing education capabilities to serve Scorpion, as well as other biomanufacturing firms in the region.

#### **K-State 105**

This project in a nutshell:

- *K-State will augment its presence in 105 counties in Kansas, creating an "Every Town to Gown" initiative designed to deploy cutting-edge research and development, workforce development initiatives, and new practices that solve relevant problems, support community and economic development, and encourage connectivity between urban and rural areas. K-State will establish streamlined mechanisms for businesses and communities across the state to access our innovation, talent, and training through local liaisons and coordinated resources. This initiative will further our status as a leader in community vitality and focus on creating sustainable growth across the state.*

With research centers, experiment fields, and extension services throughout the state, K-State's campus literally extends to every county in Kansas. While our statewide presence and network already attracts state, federal, and private funding, strategically leveraging this core capacity will attract additional investment and corporate partners seeking

to build their workforce and advance the development of new innovations. From local rural communities to state-of-the-art laboratories, our network connects resources to regional needs and opportunities. K-State 105 promotes local collaboration and investments in the human, social, and financial capital of our Kansas communities.

Our statewide research presence, combined with the climate and soil variability across the state, provides unique opportunities for agricultural research. K-State can be expected to achieve this aspirational goal because of our well-established network of highly respected Extension professionals throughout the state, as well as through partnerships with existing state and local economic development professionals.

Initial phases will utilize existing resources to convene stakeholders to better understand statewide needs and match relevant university resources to assist with targeted solutions. The goal of these efforts is to have our existing resources engage communities at a deeper level to identify challenges they are facing and bring them forward to determine if K-State resources can be used to assist in accomplishing their goals. Later phases will include adding dedicated liaisons and more effectively coordinated operational units to deploy needs-based solutions. As these phases are deployed, the university will examine existing engagement processes and alter them in ways that streamline the engagement pipeline.

In order for aggressive implementation to occur, the K-State 105 initiative will require external resources, particularly to fund the convening and coordination capacity needed to truly leverage K-State's existing presence in 105 counties and the centralized resources that can support statewide needs. In addition to investment from federal, state, local, private industry, and nonprofits, this initiative will require a commitment from

communities and regions, as well as university stakeholders and partners. Public and private partners who will help execute the strategies, include, but are not limited to:

- Small Business Development Center (SBDC) - Coordinate small business and entrepreneur research and technical assistance needs with university.
- Kansas Department of Agriculture (KDA) – Coordinate the implementation of the Kansas Agriculture Growth Strategy.
- Kansas Department of Commerce - As the state's lead economic development agency, administer programs and services to support businesses, grow the economy, and improve quality of life across the state.
- NetWork Kansas - Leverage statewide network of non-profit business building resources to assist small businesses and entrepreneurs.
- Kansas Board of Regents (KBOR) - Coordinate on the implementation of strategic initiatives across the Pillar 3 Economic Prosperity focus of the KBOR strategic plan.
- Business Resources for Innovation and Exporting (BRITE) Center – Assist in matching regional needs with resources including access to capital.
- Local Economic Development Partners - Partner with local county Extension to identify regional needs and opportunities related to business recruitment, retention, and growth, as well as workforce development and community vitality needs.

The spring 2022 working group established a programming plan that includes an innovation education series, innovation assistance services such as market research; workforce development assistance services; capacity building assistance services; and seed capital funding.

Two pilot projects are being planned

	Baseline 2019	2 years (2020-2021)	3 years (2020-2022)	5 years (2020-2024)	10 years (2020-2029)
Direct Jobs (FTE)	587	1,000	1,100	1,500	3,000
Annual Direct Wages	\$41.1M	\$70M	\$77M	\$105M	\$225M
Direct Investment	\$154M	\$400M	\$550M	\$1B	\$3B

**Figure 3. EP Plan Metrics**

with regional partners, one in rural northwest Kansas, working with the Northwest Kansas Economic Innovation Center, and one in Topeka, in conjunction with *Go Topeka*.

#### Summary

Our plan includes metrics and an ambitious 10-year goal (Figure 3).

To quote from our Pillar 3 strategic plan document submitted to KBOR: “K-State’s Pillar 3 plan creates an initiative that will become a part of the university’s long-term strategic plan and will be aligned with other related initiatives to increase efficiencies and impact and avoid duplication. The initiative will

be focused on issues of primary importance to state policymakers and citizens of the state, jobs, and prosperity. This initiative will connect university efforts directly to the national and international marketplace where jobs and prosperity are a match between our capabilities and market needs at a scope and scale that has never happened before. The institution will naturally evolve in ways to take full advantage of the initiative, the global marketplace, and the issues of importance to Kansans. As with any other innovative advancement, K-State of the 21st century will evolve at much greater velocity than ever before.”

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