

# UNMANNED AERIAL SYSTEMS (UAS)

## EXECUTIVE SUMMARY

The unmanned aerial systems (UAS) industry is a growing sector within agricultural technology, and Kansas joins the rest of the nation in seeing great opportunity in this growing field. UAS technology is becoming increasingly important on farms and ranches as farmers and ranchers work to implement precision technologies into their management practices. Kansas is home to multiple manufacturers of agricultural equipment and technology companies, as well as a large aviation industry, and the combination of these industries creates an atmosphere that supports development of UAS technology. Educational support has already begun, with UAS-related degrees now available within the state.

Although the potential of this sector is vast, it is a relatively new field and carries with it several unique challenges which can serve as barriers to growth. The technology is new, so there are few people with a background in UAS, making it difficult to find the expertise needed for a steady workforce. The effectiveness of UAS technology is dependent on capturing and applying data in a way that can maximize the potential of the system, and there remains a lack of sufficient information and algorithms to fully utilize the UAS technology.

The UAS industry offers significant opportunity for growth, and to realize that potential will require input and discussion among key stakeholders across not only the UAS industry but in other agricultural sectors as well. New research in data collection and economic benefits of UAS will increase usefulness and demand in the agricultural industry. Additional steps to encourage and support entrepreneurs within this developing industry, including marketing and training, could expand new business opportunities. Collaboration between public and private entities to develop a strategic growth plan is an important first step.



## STATUS

Nearly 90 percent of Kansas' land mass is devoted to farming and ranching, providing ample customers for agricultural technology applications. Pairing the prevalence of the agricultural industry with Kansas' pro-business climate and Midwest values makes Kansas a prime location for entrepreneurs to create or expand their businesses.

A growing sector within agricultural technology is the unmanned aircraft systems (UAS) industry. The Association for Unmanned Vehicle Systems International estimates the economic impact of UAS integration to reach \$2,941 million by 2025 and to create 3,716 additional jobs nationwide. Agriculture is anticipated to be the largest benefactor from UAS use. UAS technology is becoming increasingly important on farms and ranches as farmers and ranchers work to implement precision technologies into their management practices. When combined with the fact that agriculture and aviation are the largest contributors to the Kansas economy, the impact of UAS technology on the state is significant and has great potential for additional growth.

## OPPORTUNITIES

In order to develop a strategic growth plan for unmanned aerial systems, it is important to understand the areas where Kansas has a comparative advantage and the best opportunities for growth or expansion.

Factor	Implications for Growth and Development Opportunities
<b>Existing Customer Base</b>	<p>Over 46 million acres are devoted to farming and ranching in Kansas, nearly 90 percent of the state's total land mass. Kansas has an abundance of potential customers for agricultural technology companies that produce products for unmanned systems.</p> <p>Kansas is also home to multiple agricultural equipment manufacturers, which serve as potential customers for agricultural technology companies to develop strategic partnerships to enhance equipment with the latest precision technologies.</p>
<b>Human Capital</b>	<p>Kansas State Polytechnic boasts a strong aviation component and now offers one of the nation's first bachelor's degree programs in unmanned aircraft systems. Kansas State Polytechnic is nationally recognized for its expertise in the UAS field. Specific areas of study include UAS design and integration, and UAS flight and operations.</p>

# OPPORTUNITIES

Factor	Implications for Growth and Development Opportunities
<p><b>Policy Environment</b></p>	<p>The High Performance Incentive Program (HPIP) provides sales tax exemption on the construction, reconstruction and remodeling of facilities for projects greater than \$50,000. Sales tax exemptions are also present for farm machinery and equipment and various ag-based inputs. These state tax code provisions make Kansas a more attractive state for growth or expansion.</p> <p>Also at the state level, the state of Kansas works closely with the agricultural industry to ensure its protection from overreaching federal regulation.</p> <p>At the federal level, Kansas is fortunate to have elected members of Congress who strongly support the agricultural industry. The Kansas congressional delegation will play an important role in influencing positive changes related to federal regulations or legislation, international trade, federal taxes, transportation rules, natural resources and more.</p>
<p><b>Supporting Infrastructure</b></p>	<p>Kansas is home to a large aviation industry. Several major aircraft manufacturers are located in Wichita, and together with their allied industries they create an atmosphere that promotes and supports future aviation technology, such as UAS.</p>
<p><b>Weather and Natural Resources</b></p>	<p>Kansas is taking significant proactive steps to preserve and extend the usable life of water supplies in Kansas. In recent years, voluntary, flexible and producer-driven water conservation tools have been implemented to help farmers and ranchers manage their water rights while continuing to raise crops or livestock. Additionally, Kansas has developed a <i>Vision for the Future of Water Supply in Kansas</i> with goals and specific action items to help ensure a reliable water supply while continuing to grow the economy.</p> <p>Agricultural technologies such as UAS can assist in addressing key challenges in other agriculture sectors, such as reducing usage of water, chemicals and fertilizers.</p>

## SUCCESS STORIES

The UAS industry is rapidly moving towards greater influence in the agricultural industry. Although it is a budding industry, there are a few areas of notable success:

- In 2012, a technology company formed a partnership with Kansas State University to merge small radio controlled airplanes and near infrared photo image technology to determine crop health. Since that time, the company has become a leader in UAS manufacturing and has dealers across the U.S.
- Kansas State Polytechnic became the first entity in the nation to achieve statewide access during flight operations.
- K-State, the University of Kansas and Wichita State University are three of the twelve members of the FAA Center of Excellence for Unmanned Aircraft Systems.
- The Kansas UAS Summit, held in October 2015, has prompted greater cooperation and organization of the UAS industry within the state.
- In June 2016, the FAA released final regulations on small unmanned aircraft use commercially, creating certainty about future ability to use this technology effectively.

## CHALLENGES

While Kansas is poised for expansion of production and development of new technology related to UAS, the following factors represent challenges serving as barriers to achieving the objective of the UAS growth plan.

Challenge	Details of Challenge
<b>Critical Infrastructure</b>	A lack of adequate housing in rural areas compounds the issue of a shortage of agricultural workers.
<b>Industry Perception</b>	Unmanned aerial vehicles are commonly referred to as “drones.” The term drone originated in the military and drones were commonly utilized as a stealth weapon. Now, many citizens view “drones” in a negative viewpoint related to a threat to their ability to maintain privacy and safety.
<b>International Trade</b>	Access to international markets for technology products is a great potential revenue stream. Resistance to free trade agreements at the federal level can hinder this access.
<b>Policy</b>	Federal laws and regulations impacting the agricultural community as a whole include Waters of the U.S., the Endangered Species Act and more. These policies, while potentially not impacting UAS directly, affect the profitability of agriculture which creates downward pressure on farmers’ ability to purchase and incorporate UAS into their management plans.
<b>Research and Information</b>	While there are a lot of useful methods for capturing data related to crop production, there is a dearth of information and algorithms to actually interpret the data in a way that is helpful for a farmer looking to make management decisions.

# CHALLENGES

Challenge	Details of Challenge
<b>Small Entrepreneurs</b>	<p>It is difficult for small entrepreneurs to get their products in stores to make them accessible to consumers.</p> <p>Marketing assistance is also difficult. It is difficult to find sufficient scale to make an economic impact on marketing efforts outside of Facebook and social media.</p>
<b>Workforce Development</b>	<p>Currently, there are very few people with a background in UAS technology. This makes the job market incredibly competitive. At the university level, it is hard to keep PhD level faculty because they can be offered such lucrative salaries in the industry. Graduates with technical knowledge in engineering, agriculture, computers and technology will be necessary to fill the workforce needs of the technology industry.</p>

## NEXT STEPS IN STRATEGIC DEVELOPMENT

Leaders from throughout the Kansas unmanned aerial systems industry will continue to collaborate in the development and implementation of a long-term strategic growth strategy with input and discussion among key partners. Industry-identified desired growth outcomes, initially developed in 2016, will be implemented by industry and key partners and updated annually at the Kansas Governor's Summit on Agricultural Growth.

# UNMANNED AERIAL SYSTEMS INDUSTRY OUTCOMES



## **Growth Objective:**

*Develop Kansas as a leader in UAS technology, activity and expertise while also working to attract manufacturing and assembly operations.*

**The following outcomes will be the result of industry collaboration and effort to grow the Kansas unmanned aerial systems industry:**

### **Phase 1 (Begin within two years)**

- Information showing a demonstrated return on investment from incorporating UAS technology into farm management decisions. Evidence of return on investment would promote farmer adoption of UAS, assist farmers in becoming more comfortable in utilizing the technology, and result in greater farm profitability.
- Algorithms in use with UAS systems that provide useful recommendations to farmers. With current UAS technology farmers and ranchers are not able to understand the data generated by UAS, nor create solutions and management decisions, such as fertilizer application plans.
- Regulations based on sound science and supportive of business success, particularly in regard to regulations on unmanned aerial vehicles. Restrictive regulations on either the state or local level that are based on fear would limit growth in this industry.
- Partnerships between Kansas' existing military bases and the aviation industry to enhance the research, development and expertise of the UAS industry in Kansas.
- Increased UAS study and degree options at secondary and postsecondary educational institutions in Kansas
- Partnerships among agricultural equipment enterprises that may find mutually beneficial results from incorporating UAS technology into the menu of features provided by their products.

### **Phase 2 (Begin within 2-4 years)**

- Faster download and upload speeds from mobile networks in rural Kansas. This is critical to adoption and implementation of UAS technology on the farm.
- Business-friendly environment that attracts further expertise and innovation to the state.
- Research on applications in animal agriculture through collaborations between Kansas State University and industry, an area that remains largely untapped.
- Kansas presence at national UAS events in an effort to attract unmanned aerial vehicle manufacturing to Kansas.