



Greater Sacramento Region's
Food & Ag Cluster AgTech
Workforce Assessment:
*Skills for the 21st Century
Digitalization Era*

Prepared for:
The Los Rios Community College District
The California Rice Commission
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Executive Summary

This report is an assessment of the workforce needs in the Greater Sacramento Region’s Food and Ag Cluster related to the impact of technology – commonly referred to as “AgTech” – on various levels of skills across a range of occupations, especially related to middle skill jobs, defined as those requiring more than a high school degree and less than a four-year degree.

The assessment was conducted by Valley Vision for the Los Rios Community College District in partnership with the California Rice Commission, through the support of the Strong Workforce Program (SWP). The SWP, a key initiative of the California Community Colleges, is aimed at "lifting low-wage workers into living-wage jobs ... and building California's middle-skilled workforce." The program currently invests \$248 million annually throughout the state's community college system. It is intended to help meet the critical skills gaps across the California economy in key sectors.

The Commission identified the need for the assessment through input from its diverse membership along with other industry partners. Rice production and milling is a major agricultural industry in the Sacramento Valley and a \$5 billion dollar industry statewide. The project obtained information from employers across a range of industries in the cluster, building upon quantitative and qualitative research conducted by Valley Vision and the Centers of Excellence at Los Rios Community College District on career education opportunities and challenges, in-demand occupations and skills, and industry trends. A key focus was to identify potential employer interest in and support for a P-TECH program to increase training and skills building, address current workforce needs, and build a pipeline of skilled workers.

The P-TECH model is a partnership among K-12, community college and industry, each making long-term commitments and contributing their expertise to provide students with rigorous and hands-on academic, technical and workplace experiences. The unique culture of a P-TECH school is built upon high expectations for students and a belief that all students can earn their college degree. Students see themselves as “college students” and “on a career pathway” from the moment they begin 9th grade. The model integrates high school and college coursework, enabling students to begin college courses as soon as they are ready. Students also participate in a range of workplace opportunities that include mentoring, site visits and paid internships — all designed to support students’ academic and professional growth.

Through the SWP, our region's community colleges have aligned their funding to focus Career Education (CE) programs in nine priority industry clusters, including Food and Agriculture (Food and Ag). Goals are to increase the number of students in in-demand career pathways and

improve their job placement and earning potential. The Greater Sacramento Food and Ag industry cluster is a major economic driver, which contributed over \$12.5 billion of direct economic impact to the Sacramento Region.¹ This cluster is defined by the following subsectors: food processing (food and beverage manufacturing and packaging, which contributed \$4.6 billion; production (farming and ranching farmgate value, soil preparation, post-crop services, etc.) at \$3.1 billion; support industries (e.g., management services, farm machinery, equipment, supplies), at \$2.0 billion; and distribution (wholesalers, warehousing and storage, specialty food and beverage stores, etc.) at \$2.8 billion.

The Food and Ag cluster employed more than 35,600 people in the six-county Sacramento Region in 2018, showing steady growth even through the last recession, with projected annual openings of more than 5,000 jobs.² (This estimate does not include the Distribution subsector and other sub-industries referenced above, which bring industry employment to more than 55,000). Jobs represents a broad range of position types, ranging from entry level, general labor/field jobs to PhD level scientific positions. The breadth and scope of skills required for the Food and Ag sector to thrive is immense and contributes to the significant challenges



associated with meeting employer workforce demands.

There are several contributing factors to these challenges. They include an aging workforce; lack of adequate entry-level employees pursuing careers in the cluster, due to limited knowledge of career pathways and necessary skills; immigration laws; and rapidly changing skills needs, due to the increased levels of technology being deployed.

With the difficulty in attracting new potential employees into the Food and Ag cluster, many employers have turned to increasing the level of automation. As automation and technology become more integrated into the daily operations of operations and facilities, it will be

¹ California Community Colleges Centers of Excellence and University of California, Agriculture and Natural Resources, “California’s Working Landscape: A Key Contributor to the State’s Economic Vitality,” November 2019.

² Valley Vision and RW Ventures, “The Greater Sacramento Region’s Comprehensive Economic Development Strategy,” May 2020, p. 97; information from the Centers of Excellence at Los Rios Community College District.

imperative for regional workforce and education partners to proactively understand and work with employers to address current skills gaps and prepare the pipeline of future workers. The impacts of the COVID-19 pandemic have only accelerated these technology trends.

Technology is transforming agriculture, manufacturing and the overall food system. As one of the world’s leading agricultural research centers, the region has a specialized asset with UC Davis at its core, supporting development and deployment of ag technologies. Precision agriculture – the application of information technologies to farm-level operations and management decision-making – is projected to reach a global market scale of more than \$10 billion by 2025.³ Some of the types of emerging AgriFood technologies that will impact the development of workforce skills include:

Types of Emerging Agrifood Technology

Tech Category	Definition
Ag Biotechnology	On-farm inputs for crops & animal ag including genetics, microbiome, breeding, animal health
Agribusiness Marketplaces	Commodities trading platforms, online input procurement, equipment leasing
Farm Management Software, Sensing & IoT	Ag data capturing devices, decision support software, big data analytics
Farm Robotics, Mechanization and Equipment	On-farm machinery, automation, drone manufacturers, grow equipment
Midstream Technologies	Food safety and traceability tech, logistics & transport, processing tech
Innovative Food	Cultured meat, novel ingredients, plant-based proteins

Source: AgFunder, AgriFood Funding Report Year in Review, 2018.

³ Global Precision Market 2018-2025, Researchandmarkets.com, Sept. 21, 2018.

This study concludes that there is significant need for additional investment and collaboration between our K-12 system, community college districts, and our Food and Ag sector employers to foster strong pathways between K-12 and higher education, greatly increase career awareness, better prepare high school students for a range of careers and occupations in the Food and Ag cluster, and build a pipeline of future workers to address the projected 5,000 jobs that will be opening annually in the cluster. Workers must be prepared for the jobs and occupations of the future, with strong digital and technology skills, and the ability to keep pace with changing markets and technologies.



The P-TECH model offers a proven approach to building the infrastructure and capacity to meet the Food and Ag cluster current and future workforce needs. The employers who participated in this assessment expressed interest in working collectively to address the cluster's current and future skills gaps needs. Internship programs, industry focus groups, and better connectivity with educational partners at both the K-12 and the community college level ranked as the top three recommendations for addressing the cluster's workforce deficiencies. They were supportive of the P-TECH model and expressed interest in participating if such a program were established. When coupled with expanded broadband infrastructure, these investments could serve as the spring board for expanded and more cohesive workforce development for the Sacramento Valley Food & Ag industry cluster.

I. Study Background and Objectives

[Los Rios Community College District](#), in partnership with the [California Rice Commission](#), commissioned Valley Vision to conduct interviews with key Food and Ag Cluster employers located in the Sacramento Valley regarding their current workforce needs and to assess the trajectory of future skills-based workforce needs.

The objective of the study was to explore how these Food and Ag Cluster employers were functioning in the current economic landscape (pre-COVID-19) while also compiling data and information on what they foresee as emerging future workforce skills needs, largely as a result of a higher level of technological sophistication and automation transforming the industry. In addition to the survey findings, Valley Vision looked at overall industry trends in technology across the cluster (Agri-Food Tech) and leading Food & Ag programs both at the national and state levels to identify key program components that could be considered for possible adoption in the region.



Valley Vision interviewed 13 employers, ranging from small, family-run farming operations to international, fully vertically integrated research and development (R&D) employers in the Sacramento Valley. We focused on reaching employers in various geographical areas of the valley, ranging as far north as Butte County and as far south as San Joaquin County. Employers from Yolo, Yuba, Solano and Sacramento Counties were also participants in this survey, ensuring broad reach of employer-based research and assessment.

Valley Vision built upon a base of knowledge generated from previous employer engagement in Strong Workforce Program regional industry advisory meetings which are organized to gain input on high need occupations and skills and inform the community colleges on priorities for investment of SWP resources for demand-driven training and curricula. Interviews focused on current employment levels and position breakdown offered within the companies, projected skill needs and educational attainment requirements, as well as areas where vacant positions could be a potential impediment to the organization's ability to meet industry demands.

Survey results were aggregated. Interview findings and results of other research have been synthesized to provide insights on what the future of work (FOW) will look like in the Sacramento Region's Food and Ag Cluster, with recommendations on needed education and training priorities and consideration on the benefits of the P-TECH model to prepare the current and future workforce. The following section present the findings of the interviews.

II. Interview Findings

“Having been in this business for over four decades, I can honestly say our workforce needs have never been more complex or challenging. Finding employees with the right skill sets and technical aptitude has become increasingly difficult.”

The section of the report presents findings from the 1:1 interviews with 13 Food and Ag Cluster employers, who represented a range of employers across subsectors including production, processing and support industries (see Appendix for the Interview Protocol). The following is a list of the companies which participated in the project:

- American Commodity Company
- Andersen & Sons
- Bayer Crop Science
- Butte County Rice Growers Association
- Doherty Farms
- Farm Data Systems
- Farmers’ Rice Cooperative
- Lundberg Family Farms
- Mariani Packing Company
- Pacific Coast Producers
- Sunsweet Growers
- Valley Truck and Tractor
- Wilson Vineyards/Muddy Boot Winery

Macro Trends

As context, employers provided perspectives on the macro and micro trends that are affecting the industry and shaping their workforce challenges. Macro trends are defined here as state, national, and/or global trends that are impacting the Food and Ag cluster. They identified the following impacts:

- State minimum wage increases, leading to more payroll expense and less revenue in an industry with already slim margins.
- Lack of students interested in farming and agricultural related careers, resulting in more competition for the same employees.
- Lack of technical and vocational training in the K-12 school systems, impacting the workforce ecosystem for these students.

- Aging out of the low and middle skills level workforce (high average age of workers).
- Drought and access to water supply/threat of limited access to water supply.
- Commodity-based farming production model, requiring companies to be more strategic about the crops they plant and the amount of product they produce.
- Climate change which is impacting the seasonal cycles and causing farmers to have to make adjustments throughout the production cycle, thus trickling down to both the production and support subsectors.
- Immigration status, primarily due to uncertainty at the federal level.

Micro Trends

- Competition for the same pool of workers at all skills levels, but predominantly at the low and middle skills level segments.
- Introduction of large-scale distribution employers locating to the Sacramento Region, offering higher wages and more flexible schedules.
- Lack of career pathways for students in our local K-12 school systems.
- Need to market Food and Ag career opportunities to the emerging workforce in order to attract the next generation of workers.
- Lack of overall awareness for the types of positions associated with the more sophisticated farming industry.

Common Themes

The analysis of interview findings identified several common themes, regardless of size of the employer, product being produced and/or the area of the cluster subsector the employer represented. Production, processing and support employers all noted that they are struggling to find the necessary workforce needed to fully operate their businesses. While the production and processing employers are struggling with the low and middle skills levels, the support subsector is also struggling to attract the caliber and number of employees they need at the highest skills level, currently struggling at all three job skills levels.

For the survey, the low skills job segment was defined as those positions that require little to no training and do not require a degree, certificate or diploma. The middle skills job segment is defined as those jobs that require a higher level of technical training and/or vocational skills and aptitude. High skills job segment is defined as those positions requiring at least a Baccalaureate degree but, in many cases, will require a higher post-secondary educational attainment, such as a master's degree or PhD.

There was a high degree of frustration amongst employers regarding the lack of basic science, technology, engineering, and math (STEM) skills of those newly entering the workforce. In addition, many employers noted that this new generation of potential employees lacked basic decision-making skills and were not well-equipped to enter the labor market, even for entry-level positions.

Employers also noted the lack of workplace skills (sometimes referred to as soft skills) many entry-level potential employees exhibited. There was almost unanimous agreement across all employers in all three cluster employment subsectors that the newly emerging workforce had not received adequate preparation in the areas of interpersonal skills, such as communication, conflict resolution, and ability to be trained and mentored in the workplace.

Almost unilaterally, the employers stated that while potential employees lacked both basic STEM and workplace skills, they viewed both skill sets as critical to the overall success of their operations and they were not willing to compromise on the importance of these skills.

Employers ranked the importance of the following for each job skills level:

- A. Digital skills – for the low skills positions, digital literacy was not a prerequisite for initial hiring. Most employers ranked digital skills lower than any other category, due largely to these positions being more general labor or field services jobs. For the middle skills level positions, there was a substantial increase in the employers’ demand for digital literacy. For the high skills level, digital literacy was a must-have skill, with nearly all employers stating this is a prerequisite for hire.
- B. Critical thinking – this skill ranked high across all three skills levels. Most employers noted that they heavily screen for this during their interview process and view this as the most important hiring criteria.
- C. Basic math – this skill was viewed as desirable for the low skills level and critical for both the middle and high skills levels. Many employers stated they evaluate potential employees prior to hiring them. Employers deemed basic math skills as essential for low level skills employees to have the ability to promote into higher paying middle skills level jobs.
- D. Interpersonal skills – most employers viewed interpersonal skills as necessary across all levels of the organization. Employers stated that the emerging workforce tended to rate lower in this category than the more experienced candidates. Employers stated this is an area where they would like to see the K-12 school systems integrate additional coursework to better prepare the emerging generation of employees.
- E. Written and verbal skills – this skill ranked as desirable but not essential for many employers at the low skills level, but ranked as critical for both the middle and high skills level.

The following chart illustrates the average of employer responses for rating of each of the abovementioned hiring criteria:

FOOD & AG HIRING CRITERIA:
SKILLS NEEDS AT ALL LEVELS FOR CURRENT WORKFORCE

Desired Skills	Low Skills	Middle Skills	High Skills
Digital Literacy	4.67	8.11	9.55
Critical Thinking	7.22	8.55	9.33
Basic Math	6.56	8.67	9.56
Interpersonal Skills	5.67	9.11	9.78
Written/Verbal Skills	5.67	7.56	9.78

**Methodology: Employers were asked to use a 1-10 scale to rate the importance of each particular desired level at the three skill levels being assessed.*

Industry Subsector Analysis: Production

The production companies interviewed ranged from small, independently owned farms employing 20 full-time employees (FTE) to international, fully integrated producers, employing over 700 FTE.

In this subsector, low skills positions, predominantly made up of general labor and field services jobs, equated to nearly half of the FTE positions at these companies. All had extreme seasonal hiring needs, ranging from as low as 30 to as high as 1,400 during harvest time. Nearly every employer noted that it was becoming increasingly more difficult to fill these critical seasonal positions. Because of this factor, many of these production facilities have had to introduce additional technology into the production cycle in order to meet their demand. Many employers noted they used staffing agencies to fill the seasonal positions due to the challenges

associated with attracting and filling those positions. The introduction of more technology into the farming production process has created a growing number of middle skills level positions within the production cycle, thus increasing the types of technical/vocational skills needed at these facilities.

The middle skills level positions within the production segment ranged from as low as 25% at the least automated of the production facilities and as high as 60% in those facilities where they had implemented a more complex, technology-based production cycle. In this skills level, the most frequently mentioned types of positions include:

- Truck drivers
- Machine operators
- Mechanics
- Electrical technicians
- Welders
- Heavy equipment operators

Employers noted there was a significant gap between the number of skilled workers at this level vs. the number of skilled workers needed. (Note: Other Valley Vision research and input from other cluster employers such as manufacturing, and construction/energy/utilities identified similar shortages in these occupations, indicating cross-sector demand.)

Because of this circumstance, many employers had to do on-the-job training for entry level employees who exhibited technical aptitude and had proven their ability and willingness to learn. All employers expect technology to continue to play an important role in the production cycle and expect that their facilities will continue to add additional technology and automation in the coming years. While many noted the initial investment to implement additional automation and technology into their processes was expensive, most stated that the investment paid for itself in less than three years, due to increased output and less lost employee time.

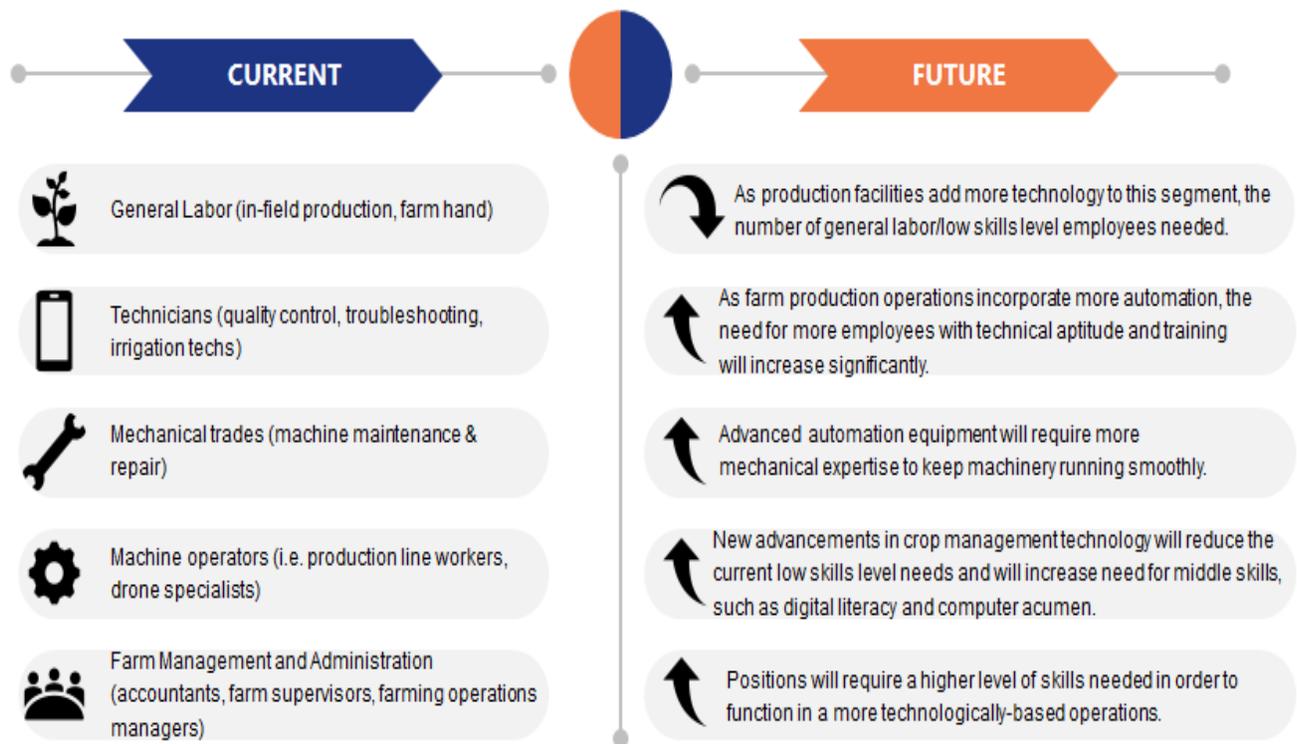
The high skills level, while constituting a smaller percentage of the overall workforce at these facilities, proved to be the most challenging to attract a small candidate pool. Many felt their most rural location was the biggest detriment to finding the needed high-skills level workforce. Challenging positions to fill included:

- Chief Financial Officer
- Financial Analysts with agricultural experience
- Farming Managers with previous large-scale farming operations experience

- IT positions also posed a challenge because the additional technology required the operations have a higher skills level than previously needed.

PRODUCTION WORKFORCE ANALYSIS

SKILLS NEEDS AND LEVEL OF COMPETENCY FOR KEY POSITIONS



Industry Subsector Analysis: Processing

The processing employers (food and beverage manufacturing), which ranged from 130 FTE to as high as 500 FTE, faced similar workforce challenges as the production segment.

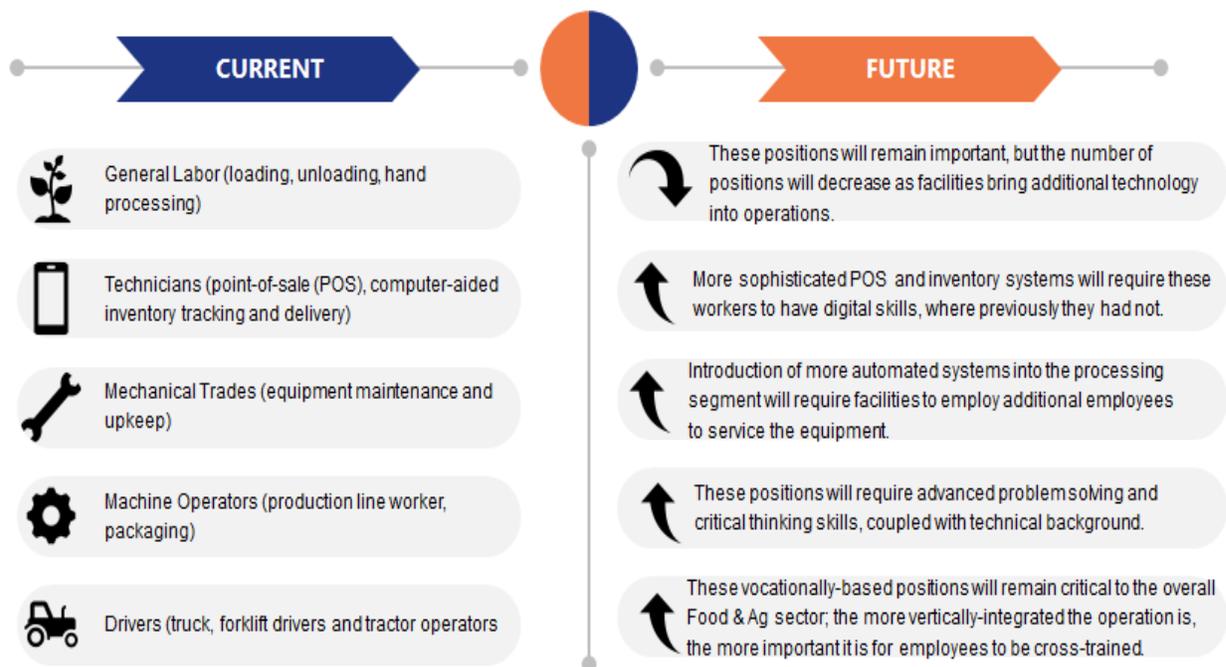
For the low-skills level positions, many used seasonal hires to supplement their year-round staff during the peak months (April – September). The employers noted that they were adding automation and technology wherever possible at this level due to the declining employee pool and need for more efficient, cost-effective processing operations. Although there was a high level of technology being used now, the employers noted that there were still many crops that required human capital in order to process them so they did not see that this segment would be eliminated in the foreseeable future.

The middle skills level positions provided the most significant change in workforce needs for the processing segment employers. The use of machinery and specialized equipment required a significantly higher level of technical expertise and training. At one facility, all machine operators had iPads to run the production lines and must be able to identify and troubleshoot issues using technology, so digital skills played a critical role in many of these positions. Mechanical positions in these facilities also require a computer programming background in order to fix processing issues and to keep the facility operating at peak performance. The largest employer cross-trained most of the middle skills level employees because they need the flexibility to address issues as they arise. They combined mechanics, welding and machine operators’ skills and created a controls technician position, where employees can be moved into different positions, as needed.

The high-skills level positions in the processing facilities also proved to be a challenge, once again where operations are in more rural locations. While the number of positions needed at this level was very small, the positions needed were critical to the overall success of the facility. Of the employers interviewed, only one had Food Sciences employees on staff. The others all used external consultants for these types of positions because they were very costly to have on staff full-time and it was difficult to find well-suited personnel.

PROCESSING WORKFORCE ANALYSIS

SKILLS NEEDS AND LEVEL OF COMPETENCY FOR KEY POSITIONS



Industry Subsector Analysis: Support Industries

The support subsector had some similar challenges to both the production and processing subsectors but also had unique workforce issues, primarily based on the need to support an expansive range of customers in a broad range of operations. The support subsector had a significantly lower need for the low-skills level employees and a higher percentage of employees in the middle skills and high skills levels.

For the middle skills level, the primary positions in these companies:

- Mechanics
- Welders
- Technicians

One employer, an agricultural commercial equipment sales and service organization, shared that there was a small pool of service technicians in the region who were trained to work on large-scale farming equipment, so these employees were often recruited between competitors and were able to demand higher wages due to the limited number of experts in the area. As both the production and processing segments become more mechanically and technically sophisticated, the support segment must follow, and it has been challenged to meet the workforce demands at this level.



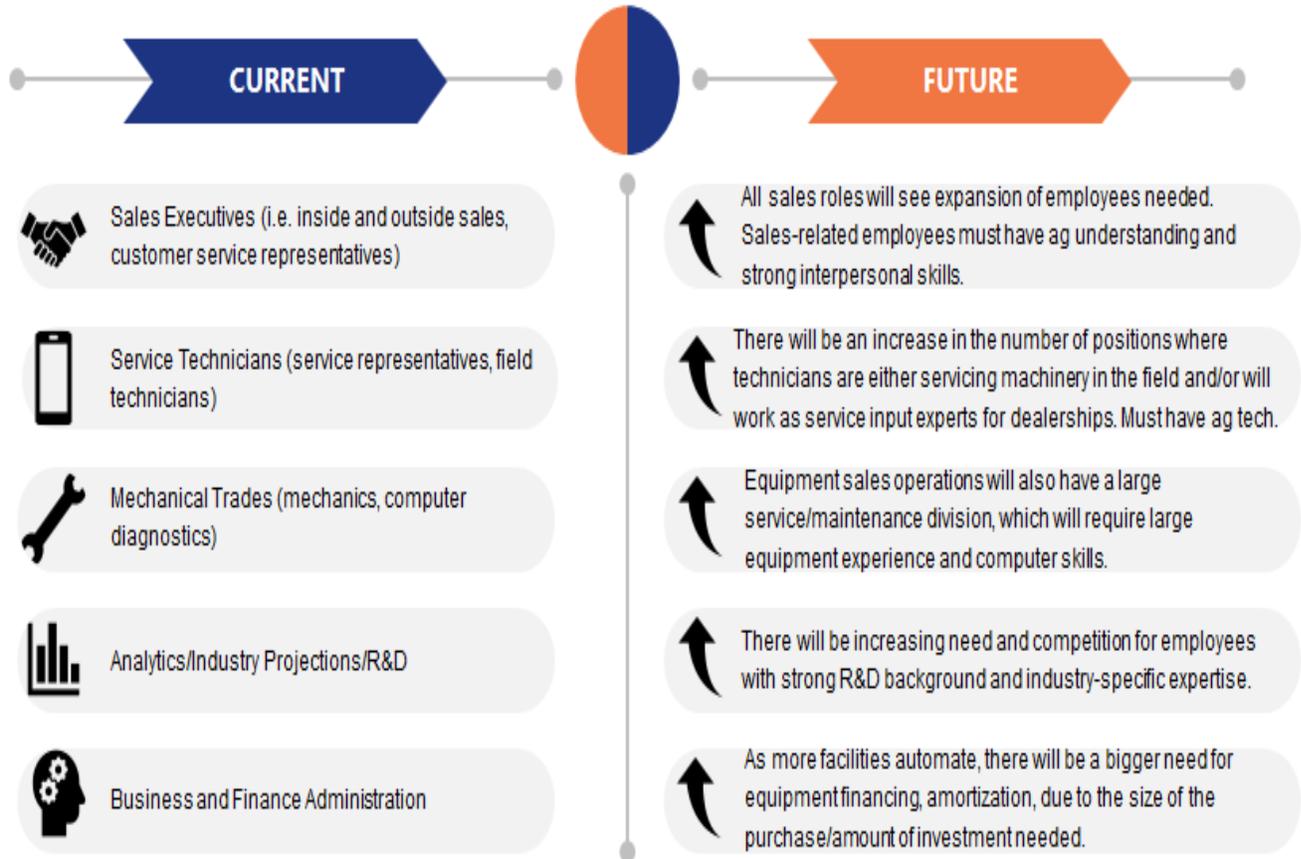
The high-skills level positions require both technical understanding and a high degree of specialization as well as knowledge of the industry. Examples of positions for these employers include:

- Accounting
- Executive sales managers
- IT managers

Because these positions require both vocational background as well as higher educational attainment and knowledge of the industry, the pool of qualified applicants does not meet the present demand and this should be a focus for developing agricultural business majors.

SUPPORT WORKFORCE ANALYSIS

SKILLS NEEDS AND LEVEL OF COMPETENCY FOR KEY POSITIONS



Workforce Partners

The companies all used various recruitment tools and partners for their workforce and hiring needs. Every company shared their struggle across the board for all three skills levels and felt they were addressing their hiring needs reactively, even though all had invested substantial time and effort into the employee attraction programs.

For hiring needs, online job websites, such as Indeed, and employee referral were the two primary recruitment methods for both the low and middle skills levels positions. CalAgJobs is a website specifically geared to the industry which is not currently highly utilized. This website holds promise as a future resource for the industry with increased outreach and exposure to companies and students/job seekers. Most companies were willing to contract with a recruiting firm for hard-to-fill, high skills level positions such as executive management and

food sciences. There were less direct partnerships with local one-stop job placement/training centers or with the community college districts, primarily due to the employers either not having a relationship with their respective one-stop centers or local community college districts or due to time restraints preventing them from establishing a pipeline with these workforce and hiring partners.

For training needs, many employers had a “promote from within” program in place, due to the challenging employee pool. Many noted they used their vendor relationships, such as their pesticide supplier or their equipment vendor, to conduct specialized training for employees operating machinery or working in the more technical positions.

Some employers used specific external training partners, such as:

- Universal Technical Institute, located in Sacramento, for mechanical and welding training
- Butte Community College, in Oroville, for continuous improvement courses
- University of California, in Davis, for high skills level training
- Walla Walla Community College, in Washington, for their on-the-job training program
- Perry Technical Institute, in Washington, for various technical trades

Many employers had designated “promote from within” programs in place, resulting in a significant number of low-skills level workers being able to move into the higher-paying middle skills level positions. Other employers have to recruit from outside the region, such as graduates from California Polytechnic State University, who are less apt to stay in rural communities.

Overall, the current state of the Sacramento Region’s Food and Ag sector workforce shows employers are struggling to attract the employees they need to operate their facilities. A primary cause appears to be the reduction of students pursuing technical and/or vocational certification career pathways following high school graduation, due to the push for students to attend a four-year university. In addition, employers perceive there are not enough linkages between K-12 and the community colleges in terms of specific programs facilitating the pathways, and work-based learning opportunities and partnerships with employers to foster the future workforce pipeline. When coupled with the lack of vocational programming in the K-12 school systems and the void of STEM-based learning opportunities, this has created a tremendous skills gap for the Food and Ag industry cluster. Increased outreach and connection with employers is critical to increase awareness and partnerships.

“Future of Work” Considerations

Valley Vision asked each employer about their future automation and technology plans. All predicted their facilities would continue to become more automated and technologically advanced. The rate of technology inclusion and implementation varied for each employer, but all were exploring ways they could further increase the sophistication of their processes.

The smallest of the employers interviewed stated that they typically wait for larger companies to purchase the newest equipment technology and they then purchase it from the larger employers once that larger employer is moving to the latest advancement in technology. The employer stated they are always “one technology step behind” the larger producers and processors but purchasing used equipment allowed them to join the “technology generation” of farming; they viewed this process as a critical part of their growth strategy.

Larger employers had the resources to update the processes through the purchase of additional technology and automation. Most currently already had sensor and/or laser technology, state-of-the-art robotics and computer programs, and fully interlinked production systems.

Employers were asked about their plans to introduce additional automation and/or technology in the next 12-24 months. Fifty percent stated they had plans to do so. When asked about the 3-5-year projection on technology integration, all employers expected the trend to continue and planned to add more advanced technology as they could afford to do so, and that the technology paid for itself through better production and processing outputs.

Key Challenges

When asked about their top three concerns for the future of the Food and Ag sector in the Sacramento Region and nationally, employers identified limited broadband connectivity, access to talent/competition for the same employees and need to stay ahead of current workforce trends.

TOP THREE THREATS TO REGION'S FOOD & AG CLUSTER



LACK OF BROADBAND INFRASTRUCTURE

Digitalization of the Food & AG sector, especially in the production and processing segments requires better internet connectivity and broadband networks.



ACCESS OF TALENT & COMPETITION FOR EMPLOYEES

There is currently steep competition for employees with the skills and experience needed. Rural location is less desirable for the emerging workforce.



LACK OF TECHNICAL TRAINING & JOB READINESS

In the decline in the number of students pursuing vocational and/or technical educational pathways at both the K-12 and the community college levels, employees lack the digital skills and technical aptitude in the more automated facilities.

Many employers also called attention to the lack of job readiness and technical skills for the emerging generation of employees. Many noted that they felt the higher level of automation and technology implementation in their operations and facilities would help to offset some of the gaps in workforce demand, but these advancements would not be significant enough to fill the void for the employees needed with the appropriate skill sets.

E-connectivity and broadband access will play a critical role in farmers' ability to automate and digitize their operations and facilities, both on and off farm. The gaps in rural broadband connectivity have been well documented in the region by Valley Vision and others and is a major regional policy priority. Broadband is the critical need for 21st century technology/infrastructure for rural and regional prosperity, enabling adoption of ag technologies (precision agriculture); food technologies in processing, packaging and distribution; R&D; rural business development; and access to vital services. COVID-19 has exposed even more deeply the region's Digital Divide and disparities between urban and rural areas.

The United States Department of Agriculture included e-connectivity as one of five key components as outlined in its 2017 Rural Prosperity Report⁴. Broadband touched the other key categories needed for the Food & Ag cluster to flourish and meet its full potential. The chart below outlines key factors in each of the key categories.

FIVE CORE TENETS FOR RURAL PROSPERITY

USDA RURAL PROSPERITY INDEX, 2017



⁴ [Report to the President of the United States from the Task Force on Agriculture and Rural Prosperity](#) (2017). United States Department of Agriculture.

III. AgTech Regional Assets

Valley Vision identified several Food and Ag-related workforce programs in the region that are a foundation to proactively address the Food and Ag sector skills gaps identified in this analysis. Below is a list of community college degrees and certificates available in the Greater Sacramento Region, followed by additional regional assets.

Discipline	Program	American River College	Cosumnes River College	Folsom Lake College	Sac. City College	Sierra College	Woodland Com. College	Yuba College
Agriculture	General Agriculture		AS, C				AS	
	Sustainable Agriculture					AS, C	C	
Agricultural Business	Agricultural Business		AS-T, AS, C				AS-T, C	
	Sustainable Agricultural Business					C		
Animal Science	Animal Science						AS-T	
	Equine Science		AS					
Environmental Studies	Environmental Studies & Sustainability					AS		
Manufacturing	Advanced Manufacturing					AS, C		
	Manufacturing Technology/Machining							AS, C
	Mechanical-Electrical Technology				AS, C			
	Welding	AS, C	AS, C			AA, AS, C		AS, C
Plant Science/ Horticulture	Field Ecology				C			
	Floristry	C						
	General Horticulture	AS, C	C				AS, C	
	Horticulture Skills	C						
	Landscape Design	C	C					
	Landscape Design Technology	AS, C						
	Plant-Based Nutrition and Sustainable Agriculture		C					
	Plant Production	C						
	Plant Protection						C	
	Plant Science						AS-T	

	Research Technician						C	
	Sustainable Landscaping	C	AS, C					
	Sustainable Irrigation & Water Management		C					
Veterinary Technology	Veterinary Technology		AS, C					
	Veterinary Assistant & Receptionist							
Viticulture	Small Vineyard & Winery Management			AS				

AA = Associate in Arts; AS-T = Associates Degree for Transfer; AS = Associates Degree; C = Certificate of Achievement/Completion, per Carrie Peterson, Regional Director for Employer Engagement, North/Far North Regions, California Community Colleges

Woodland Community College and Woodland High School were awarded a grant in 2019 to establish a Pathways in Technology Early College High School, better known as a P-TECH Program. The P-TECH model is a six-year program that utilizes dual enrollment, allowing high school students to gain college credits in a high-demand field, such as Food and Ag and Ag Tech. UC Davis also has some pathways and mentoring partnerships with local schools and Woodland College in Yolo County.

There are also several course offerings in urban agriculture through a variety of institutions and organizations including [Soil Born Farms](#), a community non-profit in Sacramento focused on providing both children and adults with opportunities to learn agricultural principles and attend a farm academy program, and [Sacramento Area Vocational Academy](#), which offers non-traditional students access to urban agriculture coursework.

The Center for Land-Based Learning in Woodland provides an apprenticeship in farm and farm management through a partnership with local farmers. The Beginning Farm and Ranch Management Apprenticeship Program trains individuals for farm management jobs by providing practical experience, valuable skills, connections to farmer mentors, and an industry-recognized credential. The Program is a formal apprenticeship registered with the California Division of Apprenticeship Standards that combines paid on-the-job training with job-related instruction. The FARMS (Farming, Agriculture, and Resource Management for Sustainability) Leadership program introduces, trains, and recruits high school students for college and career opportunities in agriculture and environmental sciences, including providing paid internships.

The Community Colleges have several programs across the region for manufacturing skills development, including new programs that are laying the foundation for skills building in electronics, sensors and other areas related to ag and food tech deployment. The region also has vocational educational providers such as [Universal Technical Institute](#) for general mechanical training, and regional CTE programs offering needed skills such as truck driving,

heavy equipment operation, digital skills, etc. Several high schools offer career academies related to agriculture, environmental technologies, engineering, robotics and ICT that are relevant for the industry.

However, as will be shown in the following section, these programs and courses are yet not organized at the scale of some other regions. This presents an opportunity for additional and more cohesive program development.

IV. Model AgTech Programs

Valley Vision researched national and state level educational programs and found the following six that have the most significant impact on their respective communities through a holistic approach to course offerings and a more integrated approach to incorporating technology.

- I. The [Kirkland Community College Department of Agricultural Sciences](#), located in Cedar Rapids, IA, offers eleven (11) Associate's Degree programs, including Agriculture Business, Agriculture Geospatial Technology, Agriculture Production Management, and Diesel Ag Technology. Kirkland also offers three (3) Food and Ag certification programs.



Kirkland Community College is home to a 600-acre working farm, which includes livestock complexes where students get hands-on training with beef and swine; a 1.5 acre vineyard and full wine production facility; a 32,000 square foot Horticulture building where students gain experience with greenhouse technologies and soil-related courses.

Recognized as the largest producer of Food & Ag students in the country, Kirkland Community College's curriculum also includes Associate's degrees in related fields such as Science, Technology, Engineering and Math (STEM) and Information Technology.

- II. The [Parkland College](#) Department of Agriculture/Engineering Science and Technology (Champaign, Illinois) offers five (5) Associate's degrees, including Advanced Applicator Technology, Precision Ag Technology, and Horticulture. In addition, Parkland College offers students six (6) certification programs including Geographic Information Systems (GIS), Agricultural Retail Operations, and Agriculture Business Management.



Parkland is home to the [Midwest Center for Precision Ag Technology \(MCPAg\)](#), which is recognized as an ag leader for its dual-enrollment offerings and for its emerging technologies coursework such as Unmanned Aircraft Systems (UAS), data analytics and remote sensor technology. MCPAg also provides high school teacher workshops, community education and industry consultations.

- III. [Ellsworth Community College](#), located in Iowa Falls, IA, has a broad range of Food & Ag curriculum offered through its Agriculture, Animals, Food and Natural Resources Department. Areas of study include Conservation Technology, Farm Management, Mobile Service Technician and Precision Agriculture. Most areas of study have both certificate and Associates degree options.



The college has a 133-acre working farm where students gain experience, in addition to having the opportunity to secure paid internships with local employers.

Ellsworth Community College also provides students with a chance to finish their Agriculture

Baccalaureate degree while studying abroad in Germany. Students spend their summers there to participate in internships with German Food & Ag employers.

- IV. [Hartnell College](#), located in the Salinas Valley of California, offers both certification programs and Associates degrees in Agriculture Business Technology and Agriculture Production. Additional certificate programs offered include Food Safety and Sustainable Crop Management. The College is closely connected with the Valley's the Food and Ag industry, with robust college-business partnerships.



One unique offering at Hartnell College is its [iAgriculture](#) program, located on its Alisal, CA campus. iAgriculture was started in August of 2014 and was initially funded through a grant from NIFA and administered by the Hartnell Agricultural Business & Technology Institute. This program allows students to explore potential careers in Food and Ag and provides experiential learning, which also reinforces classroom learning.

- V. [West Hills Community College](#), located in Central Valley California, offers both certification and Associates degree options and has a wide range of disciplines students can pursue. Their certification programs include Agriculture Business, Food Science and Safety, Irrigation Engineering Technology, Agriculture Science Technology, Integrated Pest Management for ag-specific coursework. In addition, they also provide several more general vocational certification programs such as Industrial Automation, Heavy Equipment Operation, Welding Technology and Diesel Technology: Professional Driver. Students can also pursue an associate degree in Agriculture Science Technology.

West Hills Community College's Coalinga campus is also home to a 213-acre "[Farm of the Future](#)". To date, the West Hills Community College District has invested more than \$26 million in onsite infrastructure. Investments include irrigation technology and management equipment and precision agriculture inventory including computers, software, and field data loggers. Key infrastructure includes a farm shop with equipment and computer laboratories.

Local donations and federal and state grants have also generated an additional \$4.7 million. This campus allows students to have real-life work experiences and develop applicable skills while taking classes. The college is a recognized leader in broadband connectivity and deployment as the equitable enabling technology for precision ag and agri-food tech.

- VI. Lastly, [The Pom Project](#), funded through The Wonderful Company Foundation, has two campuses located in the Central Valley. The original campus, located in Delano, CA, is a state-of-the-art \$100 million campus that serves over 2,000 kindergartners through 12th graders from Kern County. The newer campus in Lost Hills serves children from kindergarten through 8th grade currently. By 2023 the campus will serve students through 12th grade.

West Hills College and The Wonderful Company have been partnering together since 2013. Originally, the partnership focused on providing camps for middle school students to experience various skills such as welding and plant science. These middle school students could then apply to become part of The Pom Project educational system.

The partnership has now grown to provide students with a six-year apprenticeship based educational program, where students can fast-track their career pathway while pursuing an associate degree.

All these programs illustrate innovative learning systems that encourage students to pursue careers in the Food and Ag sector while allowing them to gain hands-on experience and recognize the importance of technical/vocational coursework and training.

The above-mentioned models all require expansive private sector investment while partnering with their respective K-12 and community college districts, however, they are excellent examples of the types of educational and career pathways that can be achieved when public sector educational institutions work hand-and-hand with private sector partners.



V. Conclusion/Recommendations

This report identifies a number of important gaps across the range of jobs and skills in the Food and Ag cluster, including an emerging and strong need to address gaps in technology-related and digital workforce skills in the cluster. These findings are very consistent with previous Food and Ag cluster workforce assessments conducted by Valley Vision, SACOG and the Centers of Excellence, and most recently, input and validation from employers through Strong Workforce Program regional advisory meetings for advanced manufacturing and agriculture (February and November 2019), and ag tech forums in 2019.

There is a good foundation of educational assets and training programs within the region's community colleges. And, nonprofits are beginning to provide more capacity for integrating digital literacy and technology-related skills building in the Food and Ag Cluster. However, as identified by the employers surveyed, the review of ag-related programs in other regions, and other Strong Workforce Program assessments and activities, more is needed.

There is significant need for additional investment and collaboration between our K-12, community college districts, and our Food and Ag private sector employers to foster strong pathways between K-12 and higher ed, greatly increase career awareness, better prepare high school students for a range of careers and occupations in the Food and Ag cluster, and build a pipeline of future workers to address the projected 5,000 jobs that will be opening annually in the cluster. Workers must be prepared for the jobs and occupations of the future, with strong digital and technology skills.

It will be critical to engage the K-12 school systems and the Community College Districts on these workforce needs in order to keep pace with changing markets and technologies. All the employers who participated in this project expressed interest in collectively working to address the current and future skills gaps needs. Internship programs, industry focus groups, and better connectivity with educational partners at both the K-12 and the community college level ranked as the top three recommendations for addressing the workforce deficiencies.

By working more closely together to address skills gaps needs and more actively engaging with one another, partnerships will support the growth and transition of the cluster, see strong economic impact and output, and secure a national and global leadership position for this important sector, to match the opportunities identified in the region's Prosperity Strategy for a 21st century Food and Ag industry.

The P-TECH model offers a proven approach to building the infrastructure and capacity to meet the cluster's current and future workforce needs, as related to a holistic educational program strongly grounded in food and ag technologies across the cluster. The employers who participated in the project were supportive of a P-TECH model and expressed interest in participating if such a program were established. When coupled with expanded broadband infrastructure, these investments could serve as the spring board for expanded and more cohesive workforce development for the Sacramento Valley Food & Ag industry cluster.



Appendix

Interview Protocol

- I. FT/PT/seasonal employees:
- II. Percentage of current workforce in the following categories:
 - Admin/Exec:
 - Technical/vocational:
 - Hands-on/field services:
 - Other:
- III. Percentage of skill levels within your company:
 - High skills (i.e. Master's/PhD/MBA):
 - Middle skills (technical/vocational expertise i.e. mechanical, communications, data analytics/cyber security):
 - Low skills:
- IV. Top three hardest positions to fill and why:
- V. Macro (global/national) trends impacting your company:
- VI. Micro (local) trends impacting your company:
- VII. How vertically integrated is your company currently?
- VIII. On a scale of 1 – 10, how important are soft/workplace skills in your hiring practice?
- IX. Which of the following do you rate as necessary when hiring for low/middle/high skills positions?

● Digital literacy:	Low 4/10	Middle 10/10	High 10/10
● Critical thinking:	Low 7/10	Middle 10/10	High 10/10
● Basic math:	Low 4/10	Middle 10/10	High 10/10
● Interpersonal skills:	Low 7/10	Middle 10/10	High 10/10
● Written/verbal skills:	Low 3/10	Middle 7/10	High 10/10
- X. On a scale of 1-10, how important is STEM curriculum for your low/middle/high skills level jobs?
- XI. On a scale of 1-10, how important is the role of technology (i.e. drones, specialized equipment, sensors, etc.) in your current day-to-day operations?
 - In 12- 24 months, how do you see that number changing?
 - In 3-5 years, how do you see that number changing?
- XII. On a scale of 1-10, how important is an employee's technical skills/aptitude for your current workforce needs?
 - In 12- 24 months, how do you see that number changing?
 - In 3-5 years, how do you see that number changing?
- XIII. What is your company's "promote from within" model or strategy? What additional training resources do you provide to assist employees with upward career pathways?
 - Name any training partners, either in the region or out of the region, who you use to help skill up your workforce.

- How easily transferable general mechanical/technical/vocational skill sets impact them?
- XIV. Do you expect to add to your staff in the next 12 months? If so, please estimate # of employees.
- XV. Where do you find new employees? Check all that apply.
- Recruiting firm:
 - Indeed/online portals:
 - One-stop job and training centers:
 - Employee referrals:
 - Other:
- XVI. Which of the following would you consider important to explore when discussing a potential ag-tech program?
- Equipment donation:
 - Shared space for trainings:
 - Hosting on-site training at your company:
 - Financial support for ag-tech program:
 - Industry expertise (train the trainer):
 - Participation in an industry focus group/employer-based partnerships:
 - Providing internships/externships for students:
 - Other:
- XVII. Which of the following do you consider a threat to the ag/ag tech industry in our region?
- Access to talent:
 - Competition for same employees/skills sets:
 - Lack of job readiness for entry level workers:
 - Lack of technical skills talent available:
 - Highly specialized training needs:
 - Higher level automation/sophistication of operations:
 - Lack of collaboration amongst industry partners:
 - Staying ahead of workforce market needs/trends:
- XVIII. Is there any other company you would recommend we speak with when compiling this data?

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