

Section 4 – AFB Human Capital

The knowledge and skills of a region's residents, also known as human capital, are primary drivers and determinants of economic growth. Human capital is also essential to successful industry clusters through the contributions of a region's labor force and entrepreneurs. Accordingly, Section 4 examines the AFB cluster's labor force in terms of its occupational structure, age distribution, employment churn and wages. Entrepreneurial culture and support is also considered.

Occupational Structure and Job Zones

All industries have an occupational structure, or a typical distribution of workers classified by their skills, tasks, credentials and common experiences. Understanding the occupational structure within food and beverage manufacturing provides important insights to occupational clusters and skills typically concentrated in these industries. Examining occupational wages and concentrations also provides perspectives on: 1) relative job quality in the industry and 2) the potential competitiveness of the region.

The 50 largest occupational categories found in the food and beverage manufacturing industries are listed in Table 4.1 and Table 4.2 respectively. Note that these figures are based on the national occupational distributions for food and beverage manufacturing as reported by the Bureau of Labor Statistics (BLS). Local occupational structures likely will vary in sub-categories of food and beverage manufacturing and within individual firms. Nonetheless, the overall national distributions provide a starting point for determining the occupations that are commonly important to these industries.

Information on regional specialization for each occupation is provided by an occupational location quotient calculated for the combined Madison and Janesville metropolitan statistical areas (MSAs).³⁰ Each occupation's annual average wage in the region is provided alongside the industry's national average wage to provide some perspective on pay rates. While these MSAs only cover five counties in the study area, detailed occupational figures are not available for other geographies in the Madison Region and Driftless Region.

Overall, the food and beverage manufacturing industries are a mix of diverse occupations. Many jobs are involved with the operation of specific machinery such as packaging and filling machines; cooking, roasting and baking machines; mixing and blending machines; and separating, filtering and clarifying machines. The industries also have occupational concentrations engaged in more general labor such as packaging, material moving and unclassified production work. Additionally, food and beverage manufacturing industries employ occupations that may not be directly involved with producing food or beverage products, but instead provide support as mechanics, truck drivers, food scientists or sales representatives. Specific information about the typical tasks and skills associated with each occupation is available through the Occupational Information Network (O*NET) website at: <http://www.onetonline.org/>.³¹

³⁰ Section 1 provides an overview of location quotients.

³¹ Occupations can be explored in O*NET using the SOC code provided with each occupation in Table 4.1.

Table 4.1 – Food Manufacturing Occupations by Share of Industry Employment – Top 50 Occupations (2012)

SOC Code	Occupation Title	Percent of Total Employment	Job Zone	MSAs LQ*	National Annual Avg. Wage	MSAs Annual Avg. Wage*
51-3022	Meat, Poultry, and Fish Cutters and Trimmers	8.6%	1	N/A	\$23,690	N/A
51-9111	Packaging and Filling Machine Operators and Tenders	8.1%	2	1.70	\$28,160	\$30,447
51-3092	Food Batchmakers	5.8%	2	1.81	\$28,340	\$33,809
51-3023	Slaughterers and Meat Packers	5.2%	1	N/A	\$24,930	N/A
53-7064	Packers and Packagers, Hand	4.8%	2	1.72	\$22,470	\$30,551
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	4.1%	2	1.07	\$26,410	\$26,939
51-9198	Helpers--Production Workers	3.6%	1	0.52	\$24,620	\$29,703
51-3011	Bakers	3.5%	2	1.18	\$25,060	\$22,839
51-1011	First-Line Supervisors of Production and Operating Workers	3.2%	2	1.00	\$57,420	\$56,664
53-7051	Industrial Truck and Tractor Operators	2.5%	2	1.03	\$32,090	\$31,211
49-9071	Maintenance and Repair Workers, General	2.3%	3	0.80	\$37,190	\$36,980
49-9041	Industrial Machinery Mechanics	2.0%	3	0.76	\$48,690	\$44,663
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.0%	2	0.93	\$37,240	\$34,079
51-2092	Team Assemblers	1.9%	2	1.02	\$29,910	\$30,340
51-9199	Production Workers, All Other	1.9%	2	0.97	\$30,380	\$32,470
51-3093	Food Cooking Machine Operators and Tenders	1.7%	2	N/A	\$28,090	N/A
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.6%	2	0.82	\$40,360	\$39,932
51-3099	Food Processing Workers, All Other	1.5%	2	0.44	\$24,880	\$25,420
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1.5%	1	1.04	\$24,850	\$25,861
53-7061	Cleaners of Vehicles and Equipment	1.3%	1	0.99	\$22,620	\$23,539
43-5071	Shipping, Receiving, and Traffic Clerks	1.3%	2	1.33	\$30,700	\$30,695
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	1.2%	2	0.79	\$35,200	\$39,680
41-2011	Cashiers	1.2%	1	0.89	\$20,370	\$19,929
41-4012	Sales Representatives, Wholesale and Mfg., Exc. Technical & Scientific Products	1.1%	3	1.10	\$64,300	\$65,190
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators & Tenders	1.1%	2	N/A	\$29,580	N/A
11-1021	General and Operations Managers	1.1%	3	0.86	\$114,850	\$104,977
41-2031	Retail Salespersons	1.1%	2	0.80	\$25,310	\$24,961
53-3031	Driver/Sales Workers	1.0%	1	0.57	\$27,730	\$21,510
53-7063	Machine Feeders and Offbearers	0.9%	2	1.50	\$28,680	\$27,960
43-9061	Office Clerks, General	0.8%	2	1.15	\$29,270	\$31,290
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, etc.	0.8%	2	N/A	\$40,340	N/A
42-0700	Industrial Production Managers	0.8%	3	1.19	\$97,490	\$99,600
53-3033	Light Truck or Delivery Services Drivers	0.7%	2	1.16	\$33,940	\$34,680
43-3031	Bookkeeping, Accounting, and Auditing Clerks	0.7%	3	1.06	\$36,640	\$36,399
43-5081	Stock Clerks and Order Fillers	0.7%	1	0.87	\$24,440	\$23,916
49-9043	Maintenance Workers, Machinery	0.7%	2	1.42	\$42,190	\$42,403
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.7%	2	1.34	\$32,340	\$35,721
45-2041	Graders and Sorters, Agricultural Products	0.6%	1	N/A	\$20,870	N/A
35-2021	Food Preparation Workers	0.6%	1	0.78	\$20,910	\$20,237
51-3021	Butchers and Meat Cutters	0.6%	2	0.27	\$30,000	\$39,310
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	0.6%	2	1.65	\$28,280	N/A
35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	0.6%	1	0.91	\$19,430	\$19,160
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	0.5%	3	0.89	\$62,540	\$65,140
43-4051	Customer Service Representatives	0.5%	2	1.34	\$33,110	\$33,713
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.5%	2	0.68	\$33,340	\$34,950
19-4011	Agricultural and Food Science Technicians	0.4%	3	1.99	\$36,390	\$35,550
19-1012	Food Scientists and Technologists	0.4%	4	1.45	\$64,140	\$55,140
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, etc.	0.4%	2	N/A	\$32,880	N/A
51-9193	Cooling and Freezing Equipment Operators and Tenders	0.4%	2	N/A	\$30,020	N/A
35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	0.4%	1	1.03	\$18,720	\$19,012

Sources: BLS, O*NET and Author's Calculations. *MSA Figures include the Madison MSA and the Janesville MSA

Table 4.2 – Beverage Manufacturing Occupations by Share of Industry Employment – Top 50 Occupations (2012)

SOC Code	Occupation Title	Percent of Total Employment	Job Zone	MSAs LQ*	National Annual Avg. Wage	MSAs Annual Avg. Wage*
51-9111	Packaging and Filling Machine Operators and Tenders	11.0%	2	1.70	\$33,610	\$30,447
51-9012	Separating, Filtering, Clarifying, Precipitating and Still Machine Operators, etc.	5.7%	2	N/A	\$40,650	N/A
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	5.7%	2	1.07	\$28,360	\$26,939
41-4012	Sales Representatives, Wholesale and Manufacturing,	5.4%	3	1.10	\$55,560	\$65,190
53-3031	Driver/Sales Workers	4.6%	1	0.57	\$33,120	\$21,510
41-2031	Retail Salespersons	3.8%	2	0.80	\$25,350	\$24,961
53-7051	Industrial Truck and Tractor Operators	3.5%	2	1.03	\$34,200	\$31,211
53-3032	Heavy and Tractor-Trailer Truck Drivers	3.3%	2	0.82	\$41,800	\$39,932
41-9011	Demonstrators and Product Promoters	3.0%	2	0.41	\$28,710	\$31,750
49-9041	Industrial Machinery Mechanics	2.8%	3	0.76	\$51,090	\$44,663
51-1011	First-Line Supervisors of Production and Operating Workers	2.8%	2	1.00	\$57,720	\$56,664
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	2.5%	1	0.10	\$23,660	\$25,200
43-5081	Stock Clerks and Order Fillers	2.5%	1	0.87	\$27,270	\$23,916
53-3033	Light Truck or Delivery Services Drivers	2.4%	2	1.16	\$33,100	\$34,680
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.8%	2	0.93	\$37,720	\$34,079
11-1021	General and Operations Managers	1.8%	3	0.86	\$104,820	\$104,977
35-3031	Waiters and Waitresses	1.7%	1	0.86	\$21,130	\$20,190
49-9071	Maintenance and Repair Workers, General	1.7%	3	0.80	\$42,660	\$36,980
51-9198	Helpers--Production Workers	1.6%	1	0.52	\$24,300	\$29,703
51-2092	Team Assemblers	1.5%	2	1.02	\$29,030	\$30,340
43-9061	Office Clerks, General	1.2%	2	1.15	\$30,820	\$31,290
49-9091	Coin, Vending, and Amusement Machine Servicers and Repairers	1.1%	2	0.92	\$34,440	\$30,910
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	1.1%	2	0.79	\$35,290	\$39,680
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1.0%	3	1.06	\$38,320	\$36,399
43-4051	Customer Service Representatives	0.9%	2	1.34	\$32,450	\$33,713
27-1026	Merchandise Displayers and Window Trimmers	0.9%	2	0.58	\$31,740	\$28,100
11-3051	Industrial Production Managers	0.9%	3	1.19	\$100,640	\$99,600
51-3092	Food Batchmakers	0.8%	2	1.81	\$36,150	\$33,809
53-1031	First-Line Supervisors of Transportation and Vehicle Operators	0.8%	3	0.72	\$56,250	\$57,565
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	0.7%	2	0.77	\$33,750	\$34,960
41-2011	Cashiers	0.7%	1	0.89	\$22,460	\$19,929
43-5071	Shipping, Receiving, and Traffic Clerks	0.7%	2	1.33	\$34,360	\$30,695
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	0.7%	3	0.89	\$68,060	\$65,140
11-2022	Sales Managers	0.7%	4	1.24	\$108,030	\$101,467
41-1012	First-Line Supervisors of Non-Retail Sales Workers	0.6%	4	0.91	\$69,830	\$73,354
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.6%	3	0.83	\$45,440	\$44,287
13-2011	Accountants and Auditors	0.6%	4	0.95	\$70,670	\$66,773
49-9043	Maintenance Workers, Machinery	0.6%	2	1.42	\$41,940	\$42,403
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	0.6%	1	1.04	\$28,840	\$25,861
51-9193	Cooling and Freezing Equipment Operators and Tenders	0.5%	2	N/A	\$27,090	N/A
35-3011	Bartenders	0.5%	2	1.95	\$22,850	\$20,276
41-1011	First-Line Supervisors of Retail Sales Workers	0.5%	2	0.78	\$42,250	\$40,879
43-1011	First-Line Supervisors of Office and Administrative Support Workers	0.5%	3	0.83	\$53,460	\$49,575
43-5061	Production, Planning, and Expediting Clerks	0.5%	2	0.94	\$44,800	\$45,833
13-1161	Market Research Analysts and Marketing Specialists	0.5%	4	1.18	\$63,460	\$58,966
51-9199	Production Workers, All Other	0.5%	0	0.97	\$31,900	\$32,470
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	0.5%	3	1.00	\$48,280	\$48,739
35-2014	Cooks, Restaurant	0.3%	2	0.77	\$23,440	\$22,900
53-7064	Packers and Packagers, Hand	0.3%	2	1.72	\$22,070	\$30,551
11-3071	Transportation, Storage and Distribution Managers	0.3%	4	1.11	\$83,140	\$85,590

Sources: BLS, O*NET and Author's Calculations. *MSA Figures include the Madison MSA and the Janesville MSA

A number of food and beverage manufacturing occupations show high location quotients in the combined Madison and Janesville metro areas, suggesting a local specialization of these workers.³² These location quotients are not surprising given the large concentration of food and beverage manufacturing establishments in the region. Nonetheless, they do show the breadth of specialized occupations present in the region. Specific categories with location quotients above 1.25 include:

- Packaging, and filling machine operators and tenders (LQ = 1.70)
- Food batchmakers (LQ = 1.81)
- Hand packers and packagers (LQ = 1.72)
- Machine feeders and offbearers (LQ = 1.50)
- Cutting and slicing machine setters, operators, and tenders (LQ = 1.34)
- Cleaning, washing, and metal pickling equipment operators and tenders (LQ 1.65)
- Agricultural and food science technicians (1.99)
- Food scientists and technologists (1.45)
- Machinery maintenance workers (LQ = 1.42)
- Customer service representatives (LQ = 1.34)

Note that local wage and location quotient data are excluded for several of the most common occupations in food and beverage manufacturing. Figures for 1) meat, poultry, and fish cutters and trimmers; 2) slaughterers and meat packers; 3) food cooking machine operators and tenders; and 4) separating, filtering, clarifying, precipitating and still machine operators are not included in the estimates. Their exclusions do not mean these occupations are not present in the area, but rather that the data have been suppressed by the Bureau of Labor Statistics.

Unfortunately, a similar occupational analysis for agricultural production cannot be conducted due to a lack of available data at the local level. However, a national analysis of agricultural employment from the BLS suggests that employment is heavily concentrated in two occupations: 1) farmworkers and laborers working in crop, nursery and greenhouse establishments; and 2) farmworkers working with farm, ranch and aquaculture animals. These two occupations alone account for 56 percent of employment nationwide in the industry. More information on the occupational structure of agriculture at the national level is available from the Bureau of Labor Statistics at: www.bls.gov/opub/mlr/2014/article/agriculture-occupational-employment-and-wages-1.htm. The University of Wisconsin-Extension's Farm and Risk Management (FARM) Team also provides statewide statistics on agricultural employee characteristics at: www.uwex.edu/ces/farmteam/

Each occupation in food and beverage manufacturing also can be associated with a so-called *Job Zone*. Job zones provide information on the usual types of preparation needed for given occupations within an industry. Job Zones also suggest the typical length of time workers need to acquire information, learn techniques, and develop the capacity needed for average performance in these occupations. Note that training may be acquired in a variety of environments (vocational education, apprenticeship training, on-the-job, etc.) and does not include the orientation time required to become a fully-qualified worker or accustomed to special conditions of a job. Occupations in Job Zone 1 have lower preparation requirements and occupations in Job Zone 5 require the largest amount of preparation (Figure 4.1).

³² Many of these occupations also are concentrated throughout the State of Wisconsin.

Figure 4.1 – Understanding Job Zones

Job Zone One: Little or No Preparation Needed

- *Education* - Some of these occupations may require a high school diploma or GED certificate.
- *Related Experience* - Little or no previous work-related skill, knowledge, or experience is needed for these occupations. For example, a person can become a waiter or waitress even if he/she has never worked before.
- *Job Training* - Employees in these occupations need anywhere from a few days to a few months of training. Usually, an experienced worker could show you how to do the job.
- *Specific Vocational Preparation Time* – Short demonstration, up to one month or one to 3 months.

Job Zone Two: Some Preparation Needed

- *Education* - These occupations usually require a high school diploma.
- *Related Experience* - Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.
- *Job Training* - Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.
- *Specific Vocational Preparation Time* – 3 to 6 months, 6 months to 1 year

Job Zone Three: Medium Preparation Needed

- *Education* - Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.
- *Related Experience* - Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.
- *Job Training* - Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.
- *Specific Vocational Preparation Time* – 1 to 2 years

Job Zone Four: Considerable Preparation Needed

- *Education* - Most of these occupations require a four-year bachelor's degree, but some do not.
- *Related Experience* - A considerable amount of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified.
- *Job Training* - Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or vocational training.
- *Specific Vocational Preparation Time* – 2 to 4 years

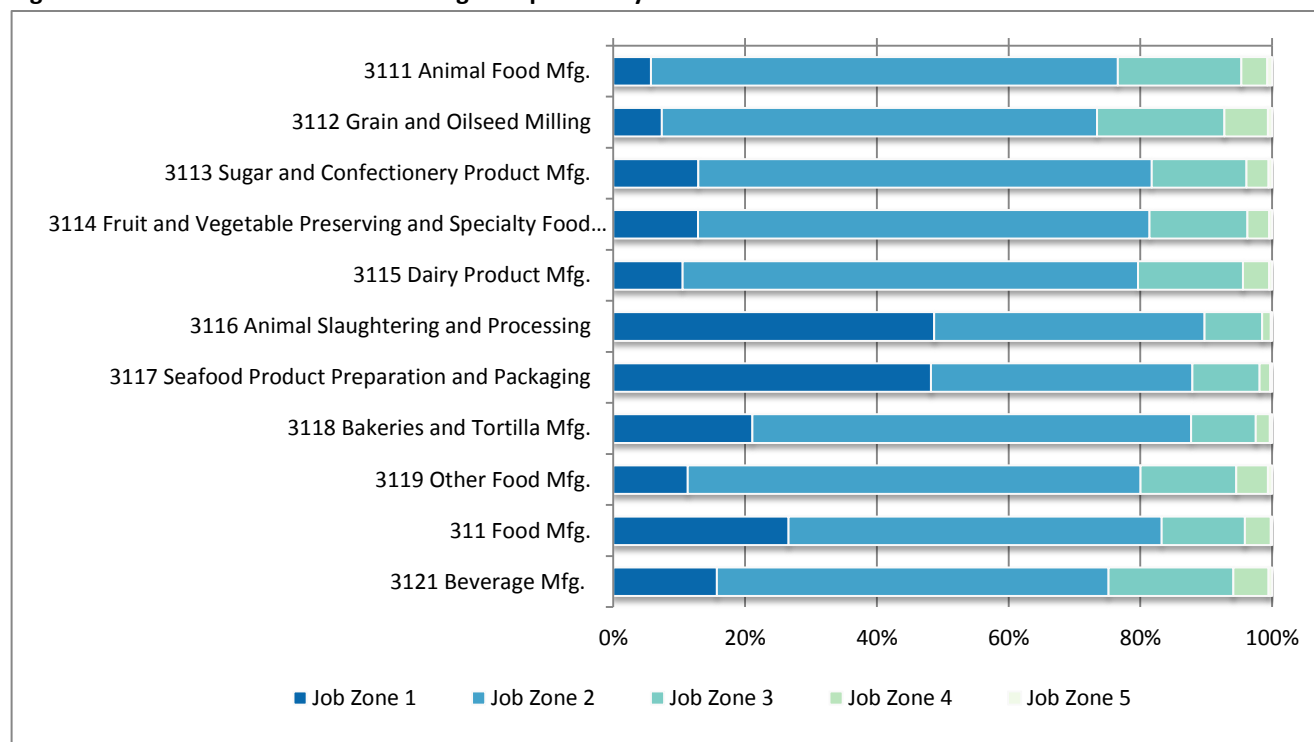
Job Zone Five: Extensive Preparation Needed

- *Education* - Most of these occupations require graduate school. For example, they may require a master's degree, and some require a Ph.D., M.D., or J.D. (law degree).
- *Related Experience* - Extensive skill, knowledge, and experience are needed for these occupations. Many require more than five years of experience. For example, surgeons must complete four years of college and an additional five to seven years of specialized medical training to be able to do their job.
- *Job Training* - Employees may need some on-the-job training, but most of these occupations assume that the person will already have the required skills, knowledge, work-related experience, and/or training.
- *Specific Vocational Preparation Time* – 4 to 10 years, or over 10 years

Source: O*NET

The broad distribution of food and beverage manufacturing industry employment by job zone is summarized in Figure 4.2. When compared to other manufacturing subsectors, food manufacturing has a notably high share of occupations found in Job Zone 1 and Job Zone 2. Every sub-category of food manufacturing has *at least* 75 percent of its occupations in Job Zone 1 and Job Zone 2. Furthermore, almost 75 percent of occupations in beverage manufacturing are found in Job Zone 1 or Job Zone 2. Dairy product manufacturing, animal food manufacturing, grain and oilseed manufacturing and other food manufacturing have the largest shares in Job Zone 2, while animal processing and seafood products have the largest shares in Job Zone 1. Again, the shares of occupations within the food manufacturing industry are based on national distributions reported by the Bureau of Labor Statistics and the local occupational structure likely varies in the region and within individual firm.

Figure 4.2 – Share of Food Manufacturing Occupations by Job Zone



Source: BLS and O*NET and Author's Calculations

The overall shares of occupations found in Job Zone 1 and Job Zone 2 suggest that preparation times and requirements are somewhat less than those found in industries with high shares of jobs in Job Zones 3, 4 or 5. However, the concentration of employment in Job Zone 1 and Job Zone 2 should not necessarily suggest that food and beverage manufacturing requires low skill levels. Many food and beverage manufacturing occupations in these job zones entail specific skills that require specialized training. Furthermore, the industries are becoming more automated and technologically intensive. Increased computerization and automation through the use of new collators, conveyor lines, production equipment and automated case packers and drops adds to the technical skills needed by workers.

While less prevalent, the industries also have important occupations found in Job Zone 3 and Job Zone 4. Many of these occupations are related to food science, nutrition, management, sales and engineering. Individuals in these occupations develop new food and beverage products; perform quality assurance/quality

control; design new packaging, transportation and storing technologies to extend shelf lives of fresh and packaged products; and engineer new manufacturing and processing equipment. Other occupations in Job Zone 3 and Job Zone 4 work in logistics, develop new markets, and manage day-to-day operations related to human resources and finances. While these are relatively small occupational categories in the industries, they remain important to a firm's competitiveness.

Occupations across all job zones are also facing new food safety regulations from the U.S. Food and Drug Administration (FDA). The Food Safety Modernization Act (FSMA) was signed into law in 2011. The FSMA focuses on proactive measures related to food safety and provides the FDA with new enforcement authorities. Several examples of these measures include: requiring food facilities to implement mandatory preventative controls plans; minimum safety standards for producing and harvesting fruits and vegetables; mandated inspection frequencies; greater authority to issue product recalls; enhanced production tracing abilities; and new oversights on imported goods. The gradual implementation of FSMA components likely will require additional training requirements for many occupations.

The distribution of food and beverage manufacturing occupations by job zones also has broader implications for the region's economy. In particular, they offer opportunities for workers without advanced levels of educational attainment. Despite the notable share of residents in Dane County with a college degree, the region's workforce is largely comprised of residents without a bachelor's degree or an associate's degree. In fact, half of all residents age 25 and over in the Madison Region have either a high school degree, or some college, but no degree. In the Driftless Region, 61.1 percent of residents are found in these two levels of educational attainment. Other industries also provide opportunities for residents without a post-secondary degree, but food manufacturing often offers higher annual and hourly wages than found in other industries relying on a high share of occupations in Job Zone 1 and Job Zone 2 (i.e. retail, hospitality, etc.)

Table 4.3 – Highest Level of Educational Attainment for the Population Age 25 and Over (2008-2012)

Highest Level of Educational Attainment	Madison Region	Driftless Region	State of Wisconsin	United States
Total population Age 25 and over	667,539	116,822	3,800,291	204,336,017
Less than 9th grade	2.7%	5.1%	3.5%	6.0%
9th to 12th grade, no diploma	5.5%	6.4%	6.4%	8.2%
High school graduate (includes GED)	29.4%	40.9%	33.1%	28.2%
Some college, no degree	20.7%	20.7%	21.3%	21.3%
Associate's degree	9.4%	9.5%	9.4%	7.7%
Bachelor's degree	20.0%	11.4%	17.5%	17.9%
Graduate or professional degree	12.3%	6.0%	8.9%	10.6%
High school graduate or greater	91.7%	88.5%	90.2%	85.7%
Bachelor's degree or greater	32.2%	17.4%	26.4%	28.5%

Source: U.S. Census Bureau American Community Survey 2008-2012 5-Year Estimates. Figures are subject to a margin of error.

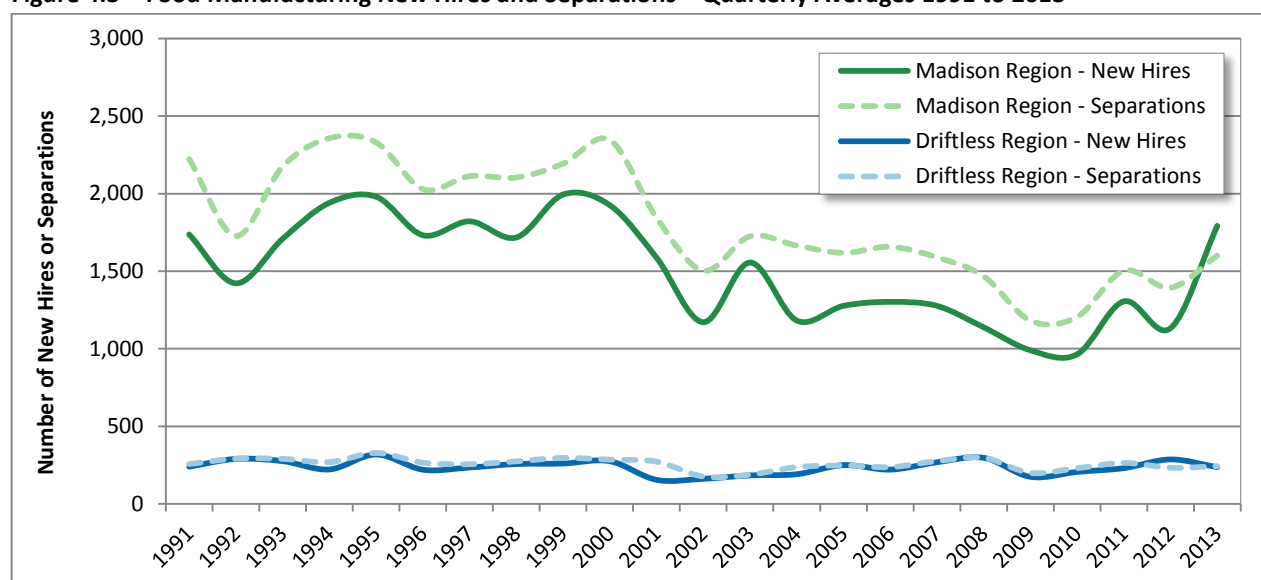
Employment Churn and Age Structure

The food manufacturing employment trends in Section 1 show a growing number of jobs in the Driftless Region and a declining number in the Madison Region. Certainly net job creation in the Driftless Region creates demand for new employees. However, declining employment in the Madison Region should not suggest that food manufacturing establishments do not need new workers. Job separations occur regularly as workers leave firms for other employment opportunities. Workers also may retire or exit the labor force for other reasons. Consequently, hires can occur in establishments that are expanding, contracting, or staying the same size simply for purposes of worker replacement. In fact, most hiring and separations reflect *churn* within an industry, rather than the overall expansion or contraction of the industry. More specifically, churn is defined as the simultaneous hiring and separation within an industry (Hyatt and Spletzer 2013).

New hires and separations in the Madison Region's food manufacturing industry have trended downward since the late 1990s (Figure 4.3).³³ While the overall trend reflects the region's declining employment, employers were still hiring an average of 1,000 new workers per quarter at the lowest point in 2010. More recently, the Madison Region averaged almost 1,800 new hires and 1,600 separations per quarter, marking the first time in over two decades that new hires exceeded separations. These figures show that employers in the region continue to hire a sizeable number of workers despite overall employment trends in the industry.

Lower levels of new hires and separations occur in the Driftless Region's food manufacturing industry. These lesser values are to be expected given that total food manufacturing employment in the Driftless Region is less than one-quarter the size of that in the Madison Region. Nonetheless, the region's food manufacturing employers still averaged between 150 and 300 new hires and separations per quarter over the past two decades.

Figure 4.3 – Food Manufacturing New Hires and Separations – Quarterly Averages 1991 to 2013



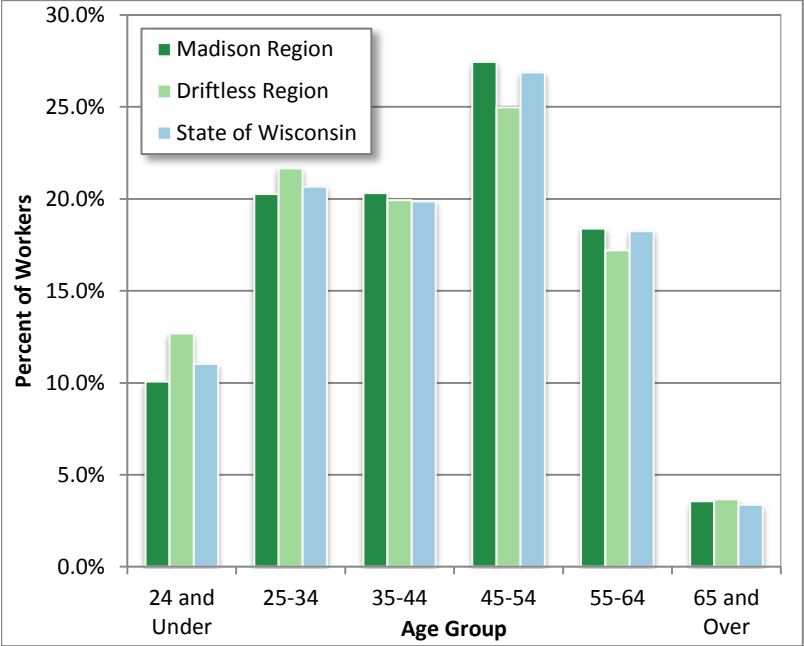
Source: U.S. Census Bureau LEHD and Author's Calculations

³³ New hires are workers who started a new job with an employer and were not employed by that employer in any of the previous four quarters. These figures do not include workers who returned to the same employer where they had worked within the previous year (such as those who may have been recalled from a layoff or work stoppage).

Employees leave their workplace for many reasons such as layoffs, new employment opportunities, schooling, child care, and other reasons. One looming issue facing employers in the Madison Region and Driftless Region is the share of the labor force approaching retirement age. Over 20 percent of food manufacturing employees in the Madison Region, Driftless Region and the State of Wisconsin were age 55 older in 2013 (Figure 4.4). Furthermore, the share of the workforce age 55 and over has almost doubled over the past two decades, increasing from approximately 10 percent in 1993 (Figure 4.5).

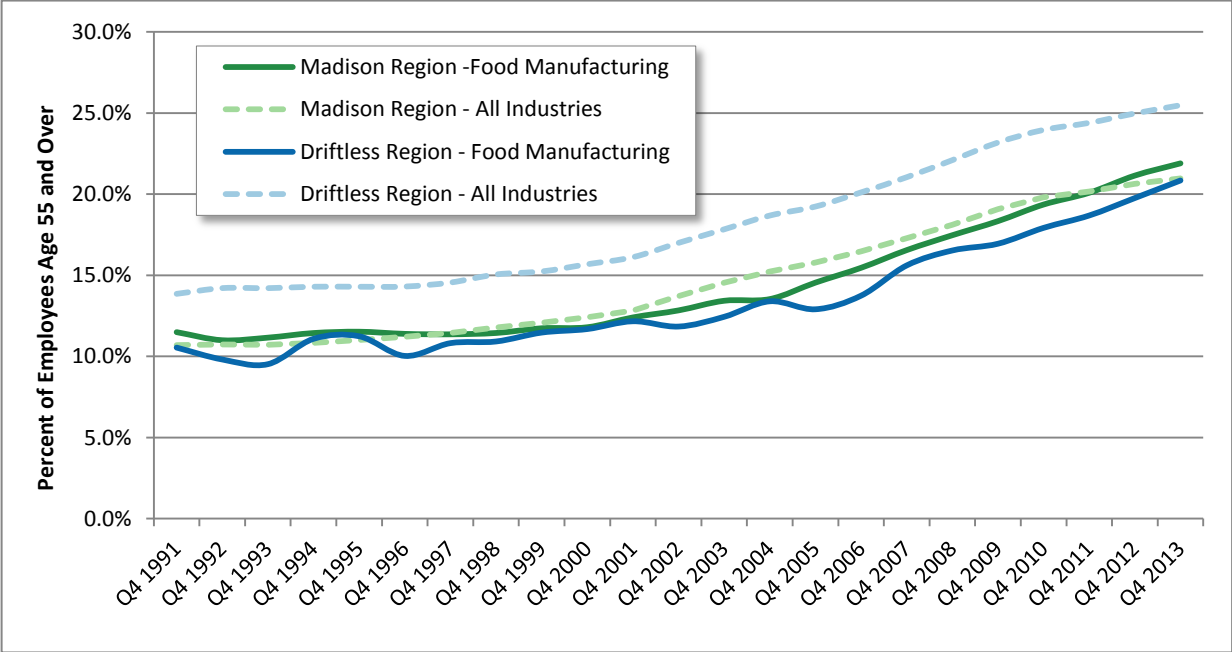
The growing share of food manufacturing workers age 55 and over reflects an overall aging of the labor force in the region. While food manufacturing tends to have a younger workforce than most manufacturing sub-sectors, and increased productivity may reduce labor needs in some areas, a large number of workers across many industries are approaching retirement in the next decade. Accordingly, food manufacturing firms are potentially in competition with many industries for new or replacement workers over the next ten-to-twenty years.

Figure 4.4 – Food Manufacturing Age Structure (2013 Annual Average)



Source: U.S. Census Bureau LEHD and Author's Calculations

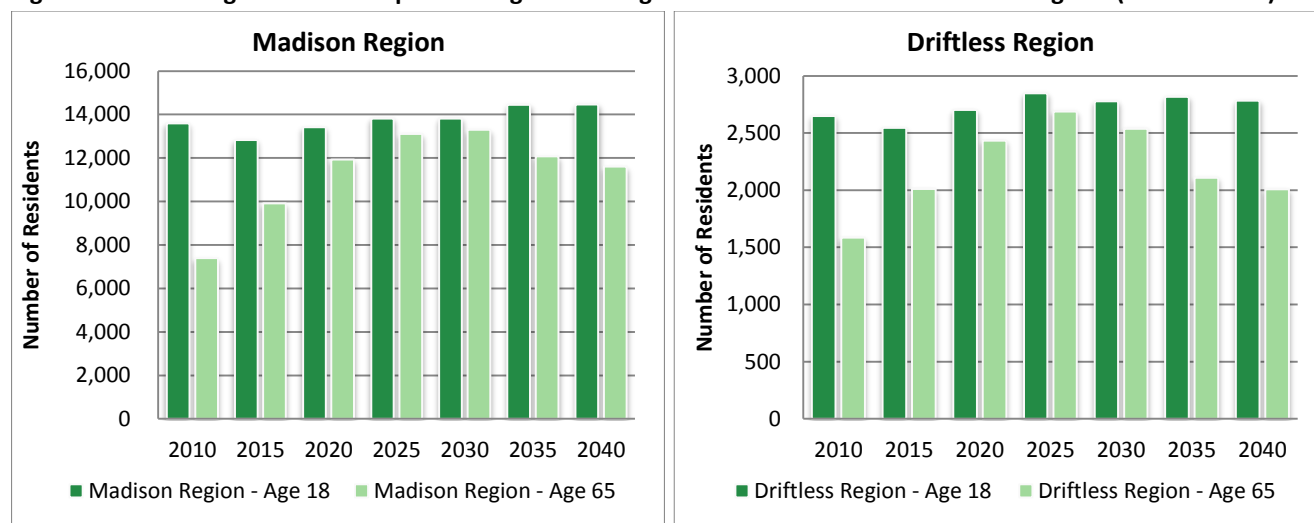
Figure 4.5 – Percent of Food Manufacturing Employees Age 55 and Over – 1991 to 2013



Source: U.S. Census Bureau LEHD and Author's Calculations

To illustrate potential changes in labor force age structure, Figure 4.6 provides estimates on the number of residents turning age 18 and age 65 in the Madison Region and Driftless Region over a 30-year period. Age 18 and age 65 provide proxies for when individuals may respectively enter and exit the labor force. Certainly workers may start a job before age 18 and continue to work past age 65, but these ages provide a beginning point for comparing worker availability. In 2010, there were almost twice as many residents turning age 18 as those turning age 65 in the Madison Region. By 2025, there are approximately as many people turning age 65 as those turning age 18. Somewhat similar ratios are present in the Driftless Region. Specific trends will vary by individual counties, but even Dane County faces an aging workforce, despite the large number of young residents contributed annually to the area by UW-Madison.

Figure 4.6 – Convergence of the Population Age 18 and Age 65 in the Madison and Driftless Regions (2010 to 2040)



Source: Wisconsin Department of Administration Demographic Services Center and Author's Calculations

While age data are not available for hired agricultural workers, the 2012 Census of Agriculture provides age information on principal farm operators. According to the USDA, a “farm operator is the person who runs the farm, making the day-to-day management decisions. The operator could be an owner, hired manager, cash tenant, share tenant, and/or a partner. If land is rented or worked on shares, the tenant or renter is the operator.”³⁴ In the case of multiple operators, the principal farm operator is the individual primarily responsible for the farm’s usual management.

Principal farm operators in the Driftless Region have a slightly younger age distribution than that of the Madison Region, State of Wisconsin and United States (Figure 4.7). Both the Driftless Region and Madison Region also have a lower share of operators over age 65 than the national average. Nonetheless, the overall age distribution of principal operators is skewed toward older age cohorts. Note that the Census data do not account for the ages of other operators who may be part of a farm. In the case of family-operated enterprises, there may be multiple generations working on the farm. Consequently, younger operators could be in place when the principal operator decides to retire or become less involved. Nonetheless, the age distributions could suggest needs for succession planning or new operators over the next decade. A number of programs in the region are providing potential pathways to new operators, such as those found at UW-Madison’s Center

³⁴ Source: USDA Census of Agriculture

for Integrated Agriculture Systems, Madison College, Blackhawk Technical College and Southwest Wisconsin Technical College. These programs are further detailed in the Investing in Manufacturing Communities Partnership application submitted to the Economic Development Administration by MadREP.

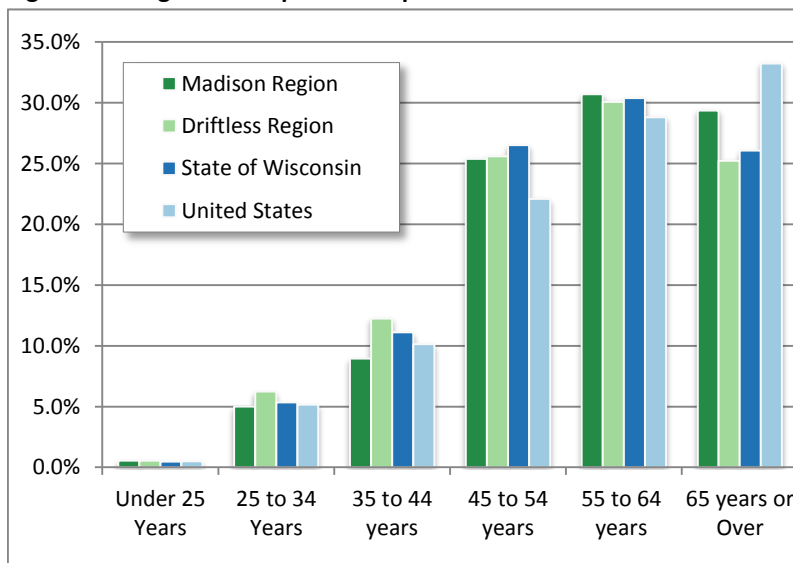
Rates of employment churn and an aging population will require creating a pipeline of workers to fill jobs both now and over the next decade. The challenge will be finding an appropriate balance of supply and demand. Certainly employers have worker requirements that can go unmet if proper training opportunities are not in place or do not adapt to changing needs. However, economic development practitioners and policy makers often push for workforce

development programs with the idea that simply having a large number of highly-skilled workers will make the region more competitive. Putting workforce development programs into place without knowing the true demand for specific skills can create workers without sufficient job opportunities.

Unfortunately, quantifying current and longer-term demand for skills and occupations is difficult for workforce development providers. Occupational forecasts are often inaccurate or outdated. In some areas, poor information on occupational supply and demand is also attributed to a lack of deep relationships among workforce development providers, intermediaries and local employers. For instance, strategies that connect employers to workforce development providers through employer representation on advisory boards do not guarantee the communications needed to influence program implementations and outcomes (Harper-Anderson 2008). In particular, advisory boards frequently are weighted with larger firms even though the labor market is often dominated by smaller firms, such as those noted in Section 1 (Grubb 2009). Unless there is an on-going conversation among workforce intermediaries and small-to-medium enterprises in the AFB cluster, workforce development efforts may not fully understand the true need for many occupations in the cluster.

Creating a pipeline of AFB employees will require a large number of potential partners and workforce development intermediaries. In fact, workforce development is one of the most common activities pursued by cluster initiatives. Businesses; economic and workforce development entities; educational institutions (colleges, universities, and K-12); community organizations and other groups will all need to be a part of this effort (Figure 4.7). Each partner will have unique roles, and many are already highly engaged this process. A number specific existing and proposed programs are detailed in the aforementioned IMCP application. Nonetheless, more partnerships and opportunities for engagement likely are needed, particularly among those organizations in Figure 4.7 that are not traditionally associated with workforce development.

Figure 4.6 – Age of Principal Farm Operator in 2012



Source: USDA 2012 Census of Agriculture

Figure 4.7 - Potential AFB Workforce Development Providers, Intermediaries and Partners

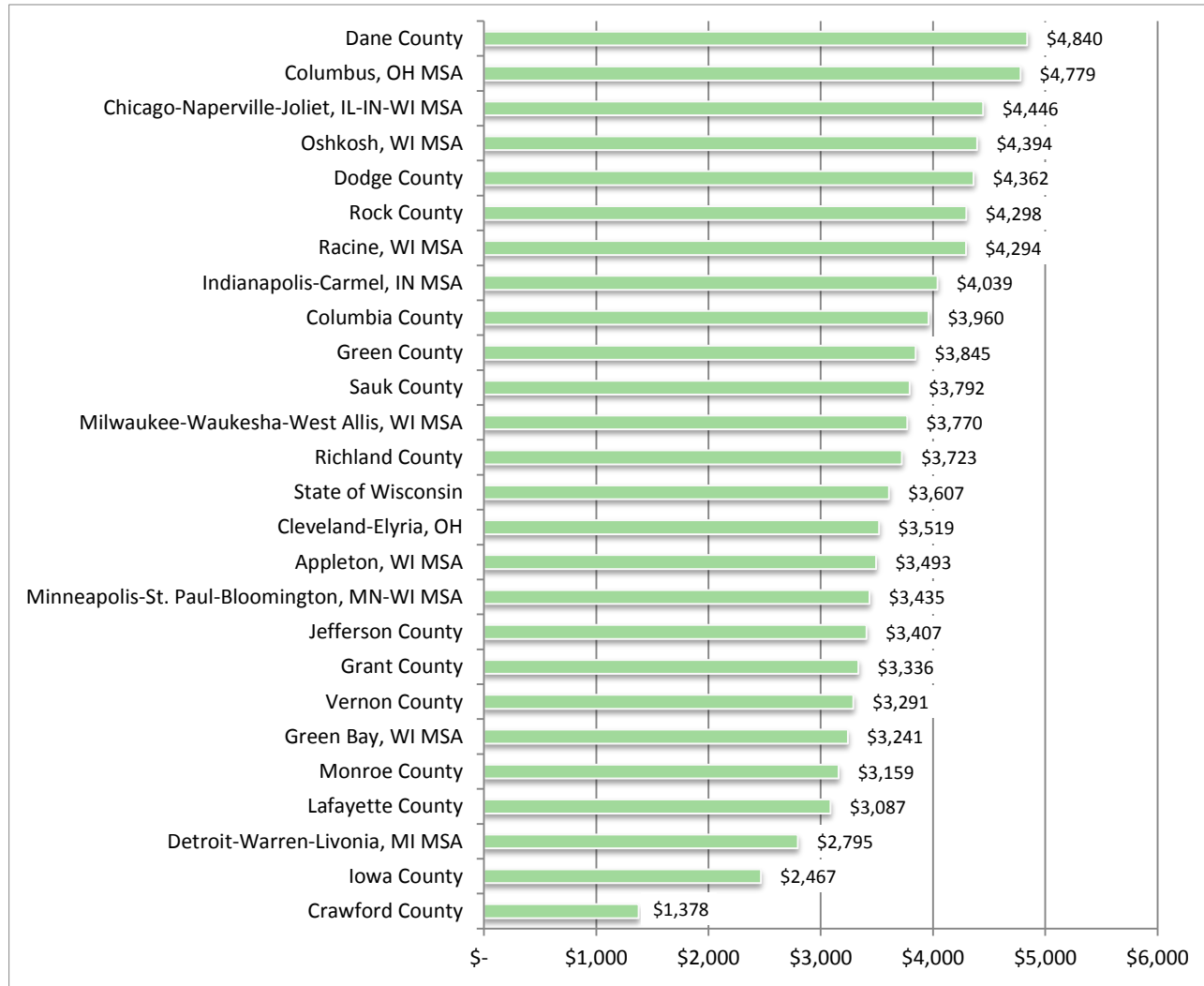
Type of Intermediary	Potential Roles
Community and Technical Colleges	<ul style="list-style-type: none"> • Offer certificate programs to develop entry-level or specific skills and associate degree programs for more comprehensive training; • Provide student career counseling and job placement assistance; • Provide short-term customized training to support learning and career development among incumbent workers; • Provide technical assistance to employers; • Collaborate with other partners in region to share resources and create centers of excellence in particular technical specialties;
High Schools	<ul style="list-style-type: none"> • Administer school-to-work or career-specific programs; • Provide instruction to develop technical foundations; • Encourage students to pursue careers in technical fields by providing exposure through career awareness, internships, etc. • Provide college and job placement assistance;
Community and Faith-Based Organizations	<ul style="list-style-type: none"> • Recruit community residents for employment programs; • Provide basic literacy for youth and adults tied to technical education and employment; • Provide education on soft-skills; • Offer career counseling; • Provide support services for community residents in community college or other training programs (day care, transportation assistance, etc.); • Provide job and college placement assistance; • Work with clients to develop job-keeping skills and promote job retention.
Social Service Agencies	<ul style="list-style-type: none"> • Provide transportation; • Recruit community residents; • Provide day care.
Economic Development and Workforce Development Organizations	<ul style="list-style-type: none"> • Align economic development programs with workforce development needs; • Identify emerging employment and training needs among local employers; • Identify key occupations to guide comprehensive economic and workforce development programs; • Recruit employers, community colleges, and organizations to participate in development of a curriculum (DACUM) efforts; • Assist colleges and high schools in identifying internship and employment opportunities for students;
Employers	<ul style="list-style-type: none"> • Participate in DACUM creation; • Encourage career interest through job shadowing and mentoring programs; • Provide internships for students and teachers; • Establish hiring agreements; • Report job openings;
Labor Organizations	<ul style="list-style-type: none"> • Participate in DACUM creation; • Establish new points of entry for apprenticeship programs;
Universities	<ul style="list-style-type: none"> • Offer baccalaureate programs in applied science and technology for graduates of associate degree programs; • Serve as intermediaries in developing integrated pathway or systems for workforce development; • Provide applied research for workforce development initiatives; • Develop program assessment tools; • Offer career counseling and job placement assistance.

Adapted from Fitzgerald, J. (1999). *Principles and Practices for Creating Systems Reform in Urban Workforce Development*. Great Cities Institute Working Paper.

Wage Comparisons

In Q2 2013, average monthly wages in food manufacturing varied across the Madison and Driftless regions, with the highest and lowest wages found in Dane County and Crawford County respectively (Figure 4.8).³⁵ While average wages in food manufacturing vary by sub-category and by occupation, the industry's overall average monthly wages in the region are mostly between \$3,000 and \$4,000.³⁶ Annual average wages in the region largely range from \$35,000 to \$45,000.³⁷ Food manufacturing wages in counties across the Madison Region and Driftless Region also fluctuate from those found in many metro areas in Wisconsin and throughout Great Lakes states. Consequently, wages in the study area may or may not provide a potential source of comparative advantage, depending on the areas being compared.

Figure 4.8 – Average Monthly Wage in Food Manufacturing for Selected Areas (Q2 2013)



Source: U.S. Census Bureau LEHD and Author's Calculations

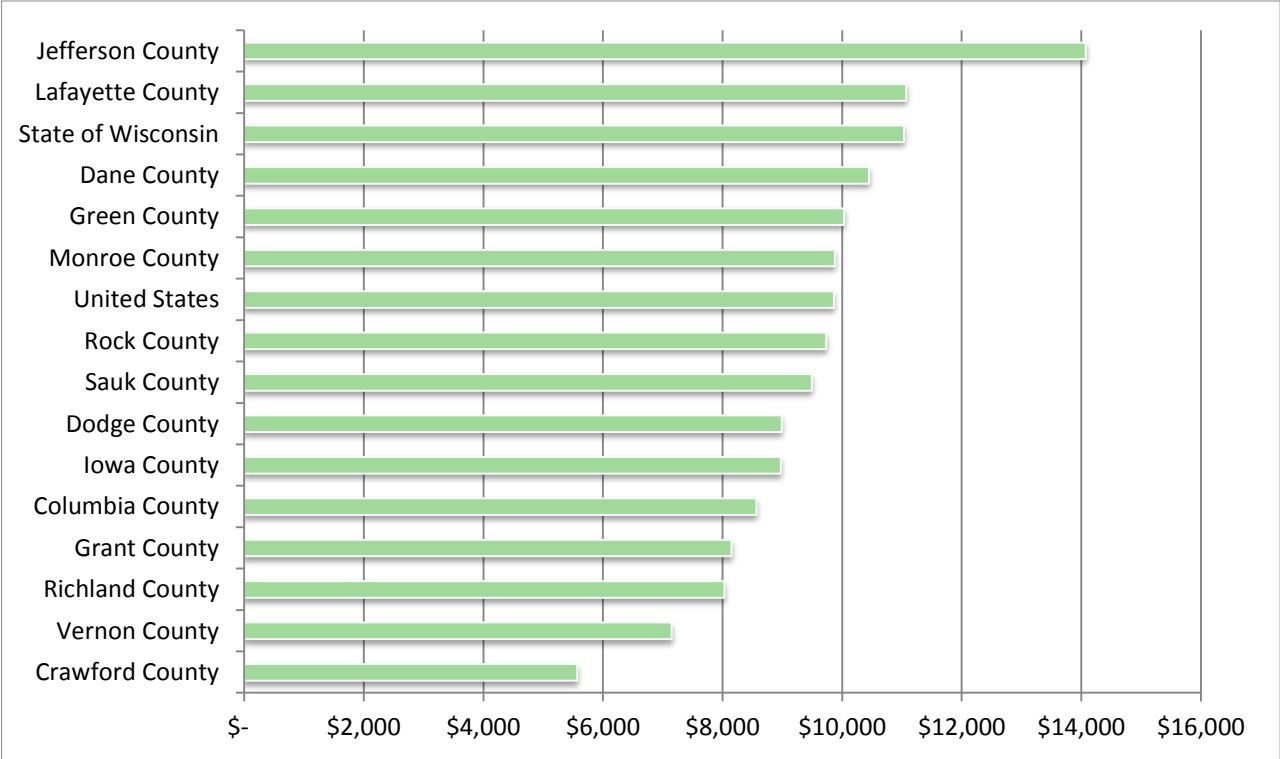
³⁵ Again, limited data precludes an extensive analysis of wages in beverage manufacturing.

³⁶ Median wages will differ somewhat from average wages, but the job zone distribution mentioned earlier is largely skewed toward occupations with lower wages.

³⁷ As reported by the Quarterly Census of Employment and Wages.

Payroll data for hired farm labor provide another perspective on wages in the cluster (Figure 4.9). As noted by the Bureau of Labor Statistics, earnings for hired farm labor tend to be low. Jefferson County has the highest average payroll per worker at slightly over \$14,000 per year, while Crawford County has the lowest at just under \$5,600. However, these figures must be considered from a broader perspective. As noted in Section 2, hired farm labor is largely part-time in nature, with a low share of hired laborers working more than 150 days per year. Hired farm labor may also receive other monetary benefits (such as housing) not necessarily included in these figures. These data also exclude payments made to contract labor such as contractors, crew leaders, cooperatives, or any other organization hired to furnish a crew of laborers to do a job. Finally, the figures also do not include farm proprietor income, which is an important source of earnings for many workers who are not considered hired farm labor.

Figure 4.9 – Average Annual Payroll per Worker for Hired Farm Labor (2012)



Source: USDA 2012 Census of Agriculture

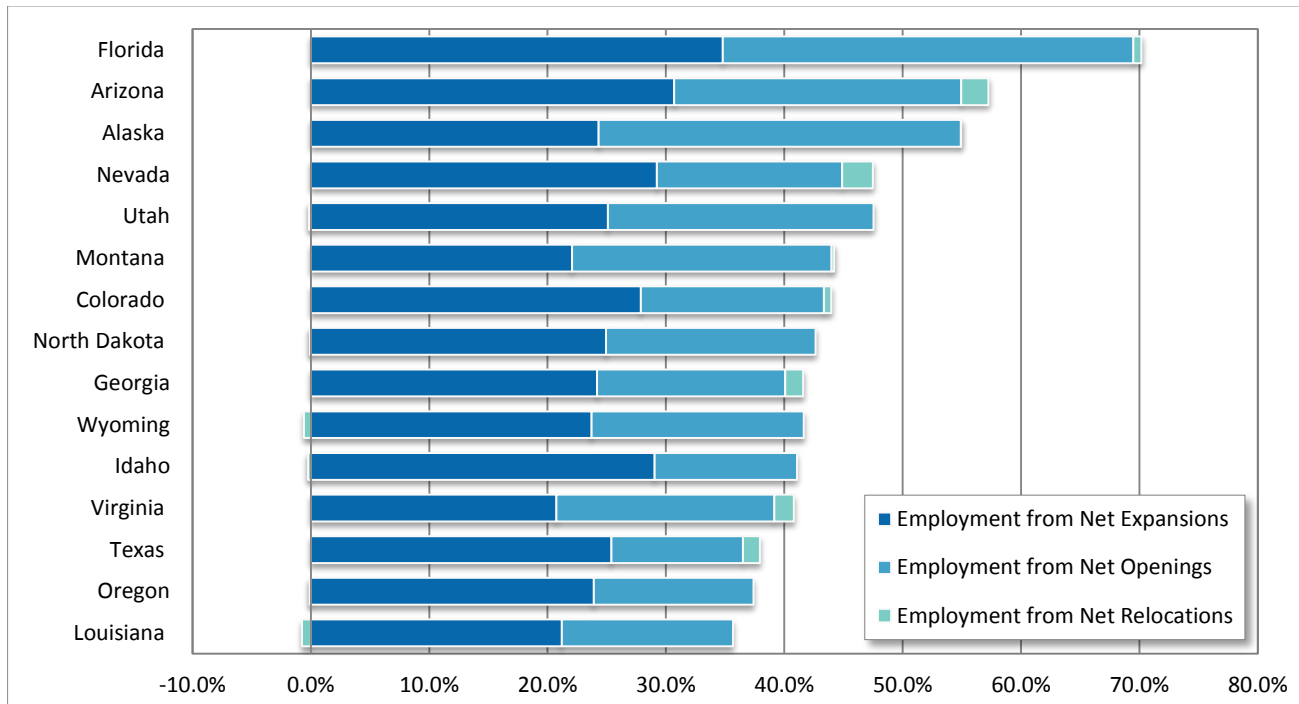
Building Opportunities and Support for Entrepreneurs

Economic development initiatives are traditionally segmented into attraction, retention, expansion and start-up activities. Attraction involves economic development organizations or other entities trying to entice new businesses (or other forms of capital) to move to their community from elsewhere. Retention activities intend to help existing firms remain in the community or maintain employment levels. Initiatives surrounding expansion attempt to help firms grow revenues or employment. Finally, start-up strategies support the formation of new firms or enterprises.

Economic development organizations (EDOs) often engage in one or all these activities. However, industry attraction frequently receives the greatest emphasis. Many communities devote significant resources (financial and otherwise) on trying to lure firms to relocate or build new facilities in their jurisdiction. While attracting a new employer to a community can be an important and visible event, the influence of industry attraction on overall job growth is questionable. As an example, consider the 15 states with the greatest employment growth rates between 1995 and 2012 (Figure 4.10).³⁸ Job growth in these states can be segmented into three components of change:

1. *Net establishment openings* - Jobs in establishment openings minus jobs in establishment closings;
2. *Net establishment expansions* - Jobs in establishment expansions minus jobs in establishment contractions;
3. *Net establishment relocations* - Jobs in establishments moving into a region minus jobs in establishments moving out of a region;

Figure 4.10 - Components of Job Growth for the 15 States with the Greatest Employment Growth Rates (1995 to 2012)



Source: National Establishment Time Series Database and Author's Calculations

38. While 2012 provides the most recent data available, the period between 1995 and 2012 provides a relevant timeframe for exploring job growth dynamics as it included periods of rapid job growth, tepid employment changes and steep job declines.

The data in Figure 4.10 show that establishment expansions and net openings *by far* contribute the greatest shares of new jobs in these fastest growing states.³⁹ Employment from net openings does involve some level of industry attraction, but a large share is also from endogenous new start-ups. In contrast, employment attributed to net relocations provides only minor influences on new employment in some states, with no contributions in others. While these figures offer just one perspective, additional research shows similar links between economic growth and business start-up and expansion activity across the rural-urban continuum⁴⁰

If business expansions and openings are in fact the drivers of job growth, then why do communities continue to prioritize industry attraction? That is, why do communities often have a reluctance to emphasize entrepreneurial support? In short, developing initiatives and policies to further entrepreneurship often entail significant challenges. Specific concerns include those outlined by Markely et al (2005):⁴¹

- Communities frequently face a shortage of institutional support for economic development strategies rooted in entrepreneurship;
- Policies that effectively encourage the development of entrepreneurs are well not understood, particularly at the local level;
- Similarly, there are limited examples of state and local strategies that can serve as models for EDOs seeking to support entrepreneurs;
- The outcomes of entrepreneurship tend to be incremental and may not be immediately visible to funders, taxpayers or elected officials;

A lack of widespread support for entrepreneurs also arises from loosely-defined characterizations of an “entrepreneur.” Practitioners and academics in economics, sociology, psychology and political science do not have consensus as to what constitutes an entrepreneur. While the debate over definitions is outside the scope of this abstract, at least some formal definition is needed for this discussion of entrepreneurs and entrepreneurial ventures.

Ahmad and Hoffman (2008) define entrepreneurs as “people who design, produce and generate value through the creation or expansion of economic activity.” This definition, or a similar one, is significant for two reasons. First, the focus of the definition is on people and not economic institutions. *In other words, entrepreneurs are a source of human capital to be leveraged.* Consequently, a primary strategy for fostering entrepreneurs should be developing people, not merely enhancing infrastructure and business climate. Second, Ahmad and Hoffman’s definition encompasses *all* economic activity and is not restricted to the creation or expansion of businesses. As noted by Drucker (1985), entrepreneurial ventures are not limited to businesses, but can include non-profits, universities and government institutions.

39. Rankings of fastest growing states will vary depending on the data source. The rankings in Chart 4.10 rely on the National Establishment Time Series (NETS) database used by YourEconomy.org.

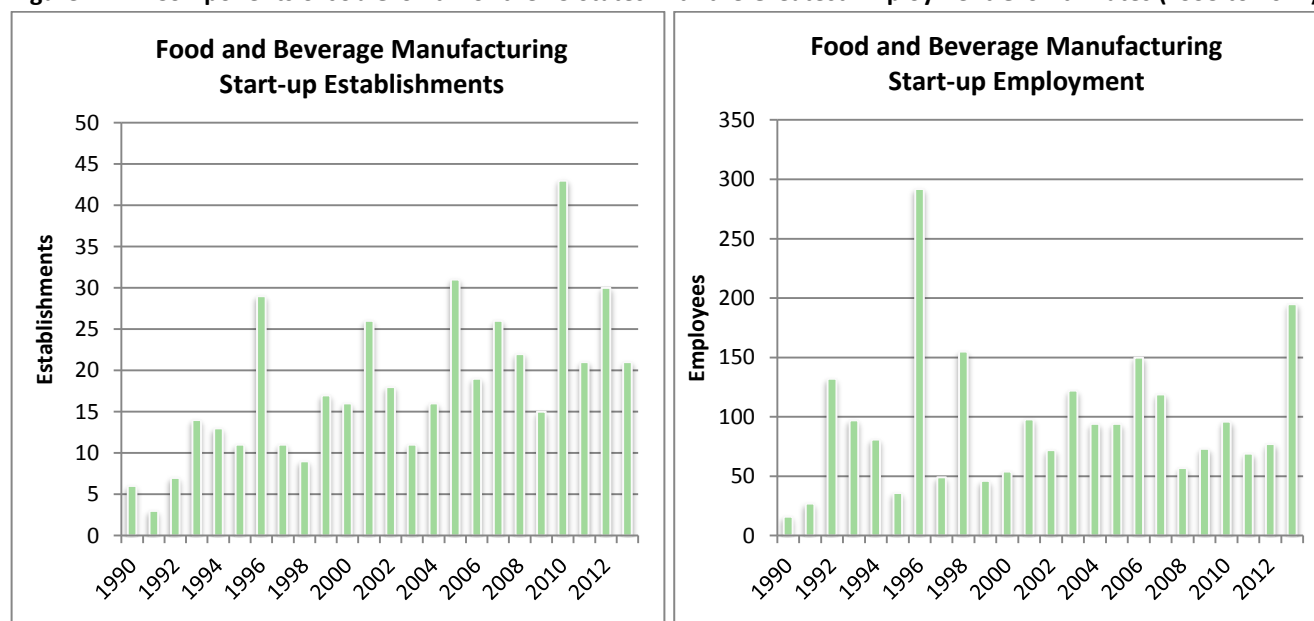
40. Some examples include Acs and Armington 2003; Walzer, Athiyaman and Hamm 2007; and Glaeser, Kerr and Kerr 2012;

41. Some of the information in this discussion of entrepreneurship is based on previous research conducted by the author and published elsewhere.

The preceding numbers in Figure 4.10 focus on the importance of business start-ups and expansions to state employment growth across all industries. However, does a similar importance of entrepreneurs also extend to the food and beverage manufacturing industry locally? In 2013, the National Establishment Time Series (NETS) database reported over 1,800 food manufacturing establishments in the State of Wisconsin. Only 34 of these establishments currently in existence previously relocated from another state at some point over the past two decades. Employment within these 34 relocating establishments accounted for approximately 1,900 jobs in 2013, or only *three percent* of current food manufacturing employment in Wisconsin.

Another perspective comes from food and beverage manufacturing start-up figures in the Madison Region and Driftless Region. According to NETS data, 435 new food and beverage manufacturing start-ups occurred in the 14-county study area between 1990 and 2013. These establishments accounted for 2,300 jobs over this period (Figure 4.11). Not all of the establishments in Figure 4.11 are still in business, but in the last four years alone, start-up establishments account for almost three percent of the region's total current employment in food and beverage manufacturing.

Figure 4.11 - Components of Job Growth for the 15 States with the Greatest Employment Growth Rates (1995 to 2012)



Source: National Establishment Time Series Database and Author's Calculations

Since 2004, the 14-county study area has averaged at least 15 new start-up establishments per year. Some of these firms have closed. Not all of these firms have high growth potential. In fact, the establishment spike that occurred in 2010 may partly reflect individuals that started new firms out of necessity after facing layoffs or other employment challenges that arose during the recent recessionary period. However, others have remained in business and increased their revenue and employment levels. As noted in Section 1, the region also has numerous establishments with 1 to 9 employees (stage 1 firms) and 10 to 99 employees (stage 2) who may not necessarily be new firms, but could have the desire to grow into larger enterprises. *The challenge for communities and EDOs is to find new and existing entrepreneurs that want to grow and help them achieve their desired scale.* In some ways, this challenge is no different than assisting the region's small agricultural producers mentioned in Section 2.

Each entrepreneur may face unique needs related to technical assistance, access to capital or workforce development. Consequently, broad assumptions should not be made about how to best serve these firms. Instead, community leaders and economic developers should learn more about the needs of existing and nascent firms in the AFB cluster through one-on-one conversations or other learning opportunities. Importantly, many of these conversations are already occurring in the region.

While the exact needs of individual entrepreneurs will vary, communities and EDOs can also broadly support entrepreneurship by creating an ecosystem where latent, new and existing entrepreneurs can succeed. In other words, the region needs to continually enhance its *entrepreneurial culture*. While a detailed discussion the region's entrepreneurial culture is beyond the scope of this study, an entrepreneurial culture can be broadly described as one in which a community is aware of the importance of entrepreneurs to the local economy. It is open to new and different ideas and it accepts failure. It is willing to experiment. Ultimately, it encourages and supports a breadth of entrepreneurs.

More specifically, Hustedde (2007) and Macke et al (2014) maintain that an entrepreneurial culture and support system are fostered by:

- *Welcoming fresh voices and embracing diversity* – Communities often have preconceptions about entrepreneurs. In reality, not all entrepreneurs have the same vision or goals for starting a firm. Some entrepreneurs are interested in generating high-growth companies. Other individuals may desire a limited enterprise that supports a specific lifestyle. A nascent entrepreneur may have never started a company before, while another may be a serial entrepreneur who has started many companies. Consequently, creating an entrepreneurial culture and support system for the AFB cluster requires understanding the needs and motivations of many entrepreneurial types;
- *Creating opportunities to learn, question and think differently about entrepreneurship* - Too often in communities, entrepreneurship outreach and learning are delivered in a reactionary manner. For instance, individuals may be introduced to entrepreneurship in response to an economic shock such as a plant closing. Learning opportunities should occur proactively throughout the community and can start with young residents rather than waiting until they become adults. Importantly, learning opportunities are not just about developing existing and prospective entrepreneurs. Not everyone should be an entrepreneur and outreach also should stress how entrepreneurship is not a good fit for many people;⁴²
- *Mobilizing resources for entrepreneurs* – Resources can include technical assistance, access to capital, workforce development, broadband, business spaces, business support services, places to network and other forms of support;
- *Cultivating networks for entrepreneurs to thrive* – Entrepreneurs learn from each other, whether or not they are engaged in the same industry or produce a similar product. Connections can be fostered

⁴² Economic environments, family backgrounds, employment histories, organizational experiences, social networks, and personality traits all affect the probability of someone acting entrepreneurially (Rauch and Frese 2000). Some of these factors are deeply engrained in individuals and in societies and may vary within the region. However, some of these factors can be influenced in manners that grow a community's pipeline of entrepreneurs.

through entrepreneur networks, peer groups, mentors and advisory boards. These networks can occur in physical and virtual spaces;

- *Focusing on assets instead of deficits* – Too often communities focus on what is missing rather than what is present. AFB entrepreneurs in the Madison Region and Driftless Region have access to many competitive assets including a diversity of producers, prime agricultural land, access to significant markets, robust university resources, a growing number of entrepreneur networks, and other comparative advantages;
- *Building a shared vision about entrepreneurship* – Placing an emphasis on entrepreneurs does not mean that industry attraction or other economic development strategies should be abandoned. Instead, communities in the region need a shared understanding about the importance of creating new firms and helping existing firms grow;
- *Fostering entrepreneurial leaders and advocates* – Communities need individuals and organizations who understand entrepreneurs and who can advocate for their needs. These leaders also tolerate failure and celebrate success;

Existing entrepreneurial support organizations (ESOs) and institutions such as Capital Entrepreneurs, Sector67, gener8tor, 100State, MERLIN, small business development centers, chambers of commerce, EDOs, FEED Kitchens, the VEDA Food Enterprise Center, the Wisconsin Innovation Kitchen, other incubators, UW-Extension's Food and Finance Institute, WWBIC and many others are important partners in building this culture, whether they directly serve AFB businesses or not. *In fact, there may be opportunities to connect entrepreneurs working in other industries or sectors that can build resources or products for firms in the AFB Cluster.* However, more advocates, organizations and partners are likely needed. Importantly, the creation of an entrepreneurial culture and support environment does not explicitly depend on infrastructure and financing. While funding, scalable facilities, traditional built infrastructure (roads, water, and power) and broadband access are necessary and important, these factors are not necessarily the most critical in developing a community's culture of entrepreneurship (Yenerall 2008).

Finally, the region's educational system should be viewed as a primary partner in creating and supporting entrepreneurs. As noted in Section 3 and the aforementioned IMCP application, there are many educational institutions providing support to the region's AFB establishments. The region's K-12 system, colleges, and universities provide assistance in workforce development. UW-Madison has tremendous research and development capacity in food science, animal science, dairy science, food systems, food safety, and horticulture. Furthermore, the Wisconsin Alumni Research Foundation holds over 200 inventions and patents in agriculture and food and supplements.

While workforce development, technology transfer, and research activities are commonly recognized contributions from educational institutions, the region's colleges and universities also support the entrepreneurial ecosystem in other manners. Specific opportunities suggested by Boh, De-Haan and Strom (2012) are largely present in the region's universities and colleges and include:

1. *Project-based classes on technology commercialization* – These classes create interdisciplinary teams or teams of MBA students to develop business plans and roadmaps for commercialization of university

technologies. Instructors often work directly with a technology licensing office (TLO) to identify appropriate invention disclosures or those with provisional or utility patents filed. Faculty primary investigators of the selected inventions also participate. Other interested faculty or graduate students may apply to participate in the class using their own technology for potential commercialization;

2. *Mentoring programs* – Mentors offer guidance and advice to new entrepreneurs at the university level (both faculty and students). Other services include referrals to lawyers, industry experts, potential customers, licensees, and investors who help founding teams build their networks;
3. *Business plan competitions* – These competitions can play a key role in spinoff development by providing a platform for team formation and offering an opportunity to develop a business plan and strategic roadmap. Competitions can also enhance credibility and publicity;
4. *Entrepreneurship education for students* – Entrepreneurship education is integral to building an entrepreneurial culture. Education can help inspire students to pursue entrepreneurship and provide knowledge of the skills needed in the future;
5. *Accelerator/incubator programs* - Accelerator or incubator programs help startups over longer periods of time by providing mentoring, funding, office space, enhanced credibility, oversight, and management;
6. *Entrepreneurship education for faculty* – Faculty members can be unfamiliar with the commercialization process and may not be aware of entrepreneurial options. While faculty can be reluctant to participate in workshops or educational programs not related to their research, universities and colleges still can offer entrepreneurial educational programs and resources available for access if faculty choose to do so.

Conclusion

In summary, the success of the AFB cluster will depend on the current and future levels of human capital in the region. The region's workforce shows specializations of important occupations found in the food and beverage manufacturing industry. The occupational distribution by job zone provides potential opportunities to many workers without a formal post-secondary degree. The industries also tend to have a younger workforce and lower rates of churn compared than many sectors in the region. Nonetheless, food manufacturers in the study area are currently replacing 2,000 workers per quarter. Technology requirements in the industry are growing. The industry also is facing a potentially smaller pool of workers that could be in demand from other sectors. Working with AFB businesses and workforce development providers to continually track demand for existing and future occupations will be vital to creating a pool of workers for the cluster.

AFB human capital in the form of current and future entrepreneurs will also be a determinant in the future success of the AFB cluster. Developing entrepreneurs and enhancing their support systems are not necessarily a panacea for growing the cluster. However, new start-ups and the growth of existing businesses likely provide more growth opportunities than overly focusing on industry attraction. Increasing entrepreneurial activity and the region's overall culture will take a long-term, focused effort. MadREP is already part of this endeavor. Other components are in place in the form existing entrepreneurial support organizations, but a better understanding of entrepreneurship is needed throughout the region. This abstract broadly mentions how to support the region's entrepreneurial culture, but more in-depth work and research are needed.