BALTIMORE COUNTY | Economic & Workforce DEVELOPMENT

# JOBS OF THE FUTURE

## Trends in Occupational Employment

## 2015-2024


**Department of Economic and Workforce Development**
Will Anderson, Director
Sharon Klots, Deputy Director
Jen Horton, Policy Manager

BaltimoreCountyBusiness.com



The Jacob France Institute
University of Baltimore

Valbridge PROPERTY ADVISORS

Baltimore County Executive Kevin Kamenetz and the Baltimore County Council

Valbridge
PROPERTY ADVISORS
Lipman Frizzell & Mitchell LLC

Mr. Will Anderson
Director
Baltimore County Department of Workforce & Employment Development
400 Washington Avenue
Suite 100
Towson, MD 21204

**SUBJECT: TRENDS IN OCCUPATIONAL EMPLOYMENT—BALTIMORE COUNTY MARKET ANALYSIS**

Dear Mr. Anderson:

Enclosed please find the Valbridge Property Advisors-Jacob France Institute analysis of trends in employment in the Baltimore County workforce.

Our labor market supply and demand analysis identifies the key strengths that Baltimore County can build on and challenges that it must address in implementing its integrated economic and workforce development strategy. We find that the County overall is well positioned to meet the needs of its employer community, though the County is experiencing somewhat slower rates of growth of Millennials and residents employed in Management, business, science, and arts occupations than national, state and regional rates; and in-County resident job creation has not matched the growth in the County's workforce.

Based on our analysis, the Valbridge-JFI Team makes policy recommendations to inform DEWD's efforts to promote economic and workforce development and meet industry and workforce demands over the next 5 to 10 years.

It has been a great pleasure working with you and the DEWD staff on this project.

Respectfully submitted,

VALBRIDGE PROPERTY ADVISORS/
LIPMAN FRIZZELL & MITCHELL LLC

*Joseph M. Cronyn*

Joseph M. Cronyn
Senior Managing Director

JACOB FRANCE INSTITUTE/
UNIVERSITY OF BALTIMORE

*Richard P. Clinch, Ph.D.*

Richard P. Clinch, Ph.D.
Director

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# Executive Summary

In order to fulfill its mission to promote economic and workforce development and meet industry and workforce demands over the next 5 to 10 years, the Baltimore County Department of Economic and Workforce Development (DEWD) commissioned this study to identify and assess new and emerging job trends in its employment clusters. The goals of this analysis are to:

- Identify new and emerging job trends (including types of jobs, skills and applicants) within the County's core industries, with analysis of how these job trends affect each industry;
- Develop projections in job number trends for the County's core industries and provide strategies for Baltimore County to better meet workforce and industry demands, citing examples from other metropolitan regions;
- Analyze future opportunities and gaps in workforce training programs and initiatives to better address future industry needs;
- Provide case study examples from other metropolitan counties and regions that have pursued promising solutions to address the evolving trends in jobs and nature of work; and
- Provide recommendations for the roles Baltimore County government can play to meet the future needs of its workforce and core industries.

Baltimore County DEWD retained the team of Valbridge Property Advisors (Valbridge) and the Jacob France Institute (JFI), the Valbridge-JFI Team, to prepare this Labor Market Supply and Demand Report for the County. This report will consist of the following elements:

Chapter 1: An Assessment of Current and Projected Trends in Occupational Employment;
Chapter 2: A Description of County's Workforce Demographic and Occupational Profile;
Chapter 3: The Identification of Opportunities and Gaps in Baltimore County's Workforce Development System;
Chapter 4: Case Studies of Best Practices in Similar Jurisdictions;
Chapter 5: High Level Recommendations to Guide the County's Strategy, based on the analyses conducted; and
Chapters 6-14: Data on industry and occupational employment trends for Baltimore County's core industries.

**Table 1-6: Current and Projected Employment in Baltimore County, by Key Industry Cluster**

| Industry | 2015 Employment |
|---|---|
| **Total County Employment** | **372,748** |
| % of Total | 50% |
| **Nine Key Industry Drivers** | **185,917** |
| Industry 1: Corporate Operations Centers/Shared Services | 25,528 |
| Industry 2: Federal Agencies | 14,230 |
| Industry 3: Healthcare | 52,923 |
| Industry 4: Information Technology Services | 7,347 |
| Industry 5: Manufacturing | 14,589 |
| Industry 6: Port Industries, Logistics and Distribution Centers | 13,778 |
| Industry 7: Construction | 23,248 |
| Industry 8: Financial Services | 22,771 |
| Industry 9: Public and Private Higher Education | 11,502 |

Source: JFI Analysis of EMSI and related data.

Selected key findings from each of the report's sections are presented below.

## Baltimore County Industry Performance Overview

***Patterns of industry employment growth in the County have been mixed.*** Baltimore County has performed well in terms of employment growth in the high skilled and high wage sectors, such as the Management of Companies and Enterprises, Educational Services, Health Care and Social Assistance, Professional, Scientific and Technical Services, and Finance and Insurance sectors that dominate the state and regional economy. The traditional Manufacturing, Wholesale and Retail trade sectors that have historically driven the County economy have all experienced declines in employment since 2001 and are projected to continue to decline through 2024.

***Baltimore County's nine core industry clusters contribute three-quarters of net employment growth.*** Despite mixed patterns of employment growth since 2001, with three of Baltimore County's nine core industry clusters[1] (Federal Agencies, Manufacturing; and Port-Related Industries) experiencing declines in employment since 2001, the nine core industry drivers analyzed in this report generated almost three-quarters of job gains since 2001. Despite expected continued weakness in manufacturing, port-related

[1] The Baltimore County Economic Development Strategy identifies six core industry clusters for the County – these are Corporate Headquarters/Operations Centers/Shared Services; Federal Agencies and Contractors; Healthcare; Information/Advanced Technology; Manufacturing; and Port-Related Industries, Logistics & Distribution Centers. These six industries were refined for this analysis and three additional clusters – Construction; Finance and Insurance; and Public and Private Higher Education were added.

industries[2] and federal employment, these nine sectors are expected to continue to contribute three quarters of net employment growth through 2024.

***The composition of County jobs is changing, favoring higher skilled occupations.*** As the traditional manufacturing and wholesale/distribution sectors declined and the finance, information technology, professional and health care sectors grew, patterns of occupational employment in the County have shifted. Baltimore County employers have experienced strong growth in their employment of Management, Business, Science and Arts and Service occupations since 2001 and this occupational grouping is projected to continue to experience growth through 2024.

***Baltimore County employers are demanding a more highly skilled and educated workforce.*** Employment in high skilled occupations (requiring a Bachelor's and above) increased by 13 percent in 2001-15 and is expected to continue to grow by 6 percent through 2024. In contrast, employment in low skilled (high school or less) occupations fell by 1 percent since 2001, and is projected to grow by only 2 percent through 2024.

***Baltimore County's targeted industry clusters require a higher degree of skills and education than the County's traditional sectors, indicating an increased need for core educational and workforce development services in the County***. Thirty-two percent of jobs in the nine targeted industry clusters are high skilled jobs that require a Bachelor's degree above, versus 25 percent of all jobs in Baltimore County. While creative and technology-based sectors are critical growth drivers; cities, counties and region's that create employment opportunities across a broad spectrum of sectors have the greatest economic resilience.

***Baltimore County has a diversified economy, with workforce demands across sectors and skill levels***. Employment in Middle Skill occupations increased by 12 percent since 2001 and is projected to grow by 5 percent through 2024. Healthcare support occupations where employment grew by 34 percent since 2001 are projected to grow by 10 percent through 2024.

## Workforce Demographics and Talent Generation Overview

***Baltimore County is well positioned in terms of both the generation of talent and the skilled and educational profile of its incumbent workforce***. Fourteen percent of Baltimore County's population is in the 25-34 year old age bracket identified with working millennials. Baltimore County's share of millennial population is comparable to the state and region and behind only Baltimore City, which has seen tremendous growth in this population. Thirty-seven percent of Baltimore County residents have a Bachelor's Degree or above, higher than the national average (30 percent) and only slightly lower than the Maryland average (38 percent). Only two counties in the region, Anne Arundel (39 percent) and Howard (60 percent) have a higher percentage of these highly educated workers.

***While the overall composition of Baltimore County's workforce is competitive within the nation, State and region, there are some areas of concerns in patterns of post-recession growth.*** While the overall post-recession population growth of the County is competitive to the State and nation, the rates of growth for Millennials and residents employed in Management, business, science, and arts occupations are well below national, state and regional rates and the growth in college educated residents is slightly below national, state and regional rates. Another area of concern is the growth of the County's civilian employed population, or persons engaged in work activities or looking for work, lagged the nation, State and region both in the long

[2] The EMSI data used in this analysis projects continued declines in Port-related industries based on historical trends. The development of the Tradepoint Atlantic project at the former Sparrows Point site creates an opportunity for the County to promote employment growth in this cluster.

term (2000-14) and most critically in the post-recession (2009-14) periods. This may indicate the ongoing need for training programs to reposition workers that lost their jobs in the Great Recession.

***Baltimore County has a strong and diverse workforce***. Compared to the nation, Baltimore County has a high share, 43 percent compared to 37 percent nationally, of employed residents working in high skilled occupations, but tends to lag the State and region in terms of its concentration of workers in these occupations. However, Baltimore County tends to have higher concentrations of workers employed in Middle and Lower Skilled occupations than the State or region (but generally lower than the nation). ***As a result, the County offers a diverse workforce across the high, middle and low skilled spectrum of jobs***.

## Alignment of Workforce with Employer Occupational Demands

***There is a strong level of alignment between the Occupational Composition of the County's Workforce and the needs of its nine target industry clusters***. There are multiple levels of alignment, meaning similarities in the composition of the workforce and demands of the employer community, in the occupational composition of the County's workforce in six of the nine target industry clusters. Areas with strong alignment are: Corporate Operations Centers/Shared Services; Federal Agencies; Healthcare; Information Technology Services; Financial Services; and Public and Private Higher Education clusters, where the County offers a high concentration of resident workers in all of the core areas of occupational demand.

***There is a strong level of alignment between the Talent Generation of the County's Workforce and the needs of its nine target industry clusters***. Baltimore County is generating substantially more graduates in higher-skilled occupational areas than projected County demand. Baltimore County is home to two major public universities (UMBC and Towson), a public community college and private higher education institutions. As a result, it generates a large number of graduates in key occupational areas that exceeds in-County demand.

## Summary of Findings, Recommendations and Conclusion

The key findings and challenges are as follows:

**Finding #1:** The workforce demands of Baltimore County's employer community are changing, and employers are increasing requiring better educated workers in more skilled occupations.

**Finding #2:** There is a strong level of alignment between the County's existing workforce and the demands of its employer community.

**Finding #3:** The County is well positioned to meet the changing demands of its employer community, and with its strong higher education and training system the County is a source of talent for the larger State and regional economy.

**Finding #4:** Baltimore County is a net exporter of talent in terms of both skilled and educated out-commuters as well as graduates from the County's strong higher education/training system. As a result talent retention needs to be a core element of its economic and workforce development strategy.

**Finding #5:** While the County is well positioned to meet the needs of its employer community, gaps and challenges remain in growth and in-county job creation.

Based on this analysis of Baltimore County's workforce supply and demand conditions, the Valbridge-JFI Team suggests the following seven high level policy recommendations on how the County can better align the needs of its employer community with its resident workforce and workforce development system assets.

- **Continue to pursue an integrated, sector-based economic and workforce development system.** By integrating economic and workforce development into a single organization and commissioning this study to identify and develop strategies between workforce supply and demand, Baltimore County is at the forefront of national best practices to meet the needs of its core target cluster industries.
- **Capitalize on the highly educated and skilled workers residing in the County by targeting a sector-based strategy on high-skilled sectors.** DEWD should create target industry working groups that bring together both the core employers and education/training providers serving each of the nine core target industry clusters in the County. These working groups would inventory existing interactions and develop new services and programs to promote enhanced industry workforce development initiatives.
- **Promote efforts to retain talent in the County.** Baltimore County is a net exporter of talent. It primarily exports talent of out-commuters and higher education graduates. DEWD should develop a talent bank where out-commuters interested in County employment opportunities could be matched with employers and job openings. DEWD should promote enhanced interactions between the County's employer community and four-year colleges and employer community through vehicles such as internships, co-op programs, and business participation and support for academic programs can promote the hiring and retention of graduates in the County.
- **Promote Place-Based economic development strategies.** Millennial workers favor denser, live-work-play environments, therefore Baltimore County should examine the development of innovation district-style developments in the areas surrounding its three anchor universities, as a land-use strategy that promotes broader economic development and workforce development goals.
- **Enhance opportunities for upgrading the skills of local residents.** Baltimore County will need to support the transition of resident workers into more skill and education intensive occupations, including the workforce needs of lesser skilled residents. As a result, the need for community college and related career education is likely to grow.
- **Invest in meeting the needs of the County's diverse workforce.** While the County's better educated and skilled workers are well integrated into the County and regional workforce system, the County's lesser educated and skilled workers may need more intensive workforce development services. In particular, we recommend expanding Career and Technical Education (CTE) in secondary and post-secondary schools and investing in Pre-K education beyond the current capacity.
- **Invest in growing the County's entrepreneurial ecosystem.** Baltimore County's entrepreneurial ecosystem should be expanded toward the formation and growth of small businesses in service, healthcare, construction and industries which are more likely to provide employment for mid- and low-skills workers.

# Introduction

The objective of this study is to provide the Baltimore County Department of Economic and Workforce Development with information on the alignment of the County's workforce development system with the occupational needs of its employer community. ***Economic development and workforce development are becoming increasingly linked***, as is made clear in the following quote from the International Economic Development Council's (IEDC) *Shifting Workforce Development into High Gear* report*,*

> For economic developers, the nationwide mismatch between jobs and workers translates into a business attraction, retention and expansion issue. Communities without a talented workforce cannot compete when the most important factor in in company relocation or retention is human talent. This is a game-changer for economic developers; tools such as tax incentives and utility or land deals are no longer enough to entice businesses. [3]

The IEDC report goes on to recommend that sector driven strategies to link economic and workforce development are a "best practice" for communities to promote development. The report goes on to say that "as primary liaisons with the business community, economic development organizations (EDOs) have an essential role to play in linking business needs to workforce development efforts."[4] In order to facilitate both economic and workforce development, jurisdictions are increasingly analyzing workforce supply and demand conditions, with a focus on identifying and meeting the needs of the core industry drivers. This report provides Baltimore County with information on how international, national, state and regional economic trends are impacting the workforce development needs of its overall employment base and of the nine target industry clusters driving County growth. This information can facilitate the development of an integrated Baltimore County economic and workforce development strategy.

The increasing importance of access to skilled and educated workers in supporting and generating economic growth is driven by changes in the national and international economy. Creative and technology based industries, or industries such as information technology and life sciences that rely on the generation or exploitation of knowledge and information, have been the most important contributors to employment and economic growth both in the business expansion leading up to and recent recovery from the "Great Recession." Furthermore, changes in the production function of industries across the economy, not just in creative and technology based industries, have increased the demand for skilled and educated labor in all sectors of the economy. ***As a result, access to talent has become a key driver of economic development success.*** The regions that possess and generate the talent required by employers tend to outperform other regions. This report will assess trends in Baltimore County in terms of both the performance and labor demands of its key industry clusters as well as the alignment of its resident workforce and workforce development system with the demands of these clusters.

Workforce development organizations, such as DEWD, often commission ***Labor Market Supply and Demand Analyses*** to assess local economic and workforce conditions. A Labor Market Supply and Demand Report analyzes the alignment of a region's workforce with the needs of its employer community. According to a National Skills Coalition report, *How Many More Skilled Workers Do We Need? Using Supply and Demand Reports for State Workforce Planning*[5] the core elements of a labor market supply and demand analysis, which consist of:

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[3] Economic Development Research Partners, International Economic Development Council, Shifting Workforce Development into High Gear, 2015, p. 4.

[4] IBID, p. 5.

[5] See http://www.nationalskillscoalition.org/resources/publications/file/how-many-more-skilled-workers.pdf.

1. **Measuring Labor Market Supply** – often in the form of the local generation of educated, skilled and credentialed workers, but also in the form of the existing workforce;
2. **Measuring Demand** – generally in the form of the occupational demand which needs to include both current and projected future demand; and
3. **Identifying Skills Gaps** by comparing labor market supply and demand.

This report includes these three elements along with an analysis of how regional and national job trends may impact the County workforce development system, a best practices assessment, and high level recommendations on workforce and related policy options.

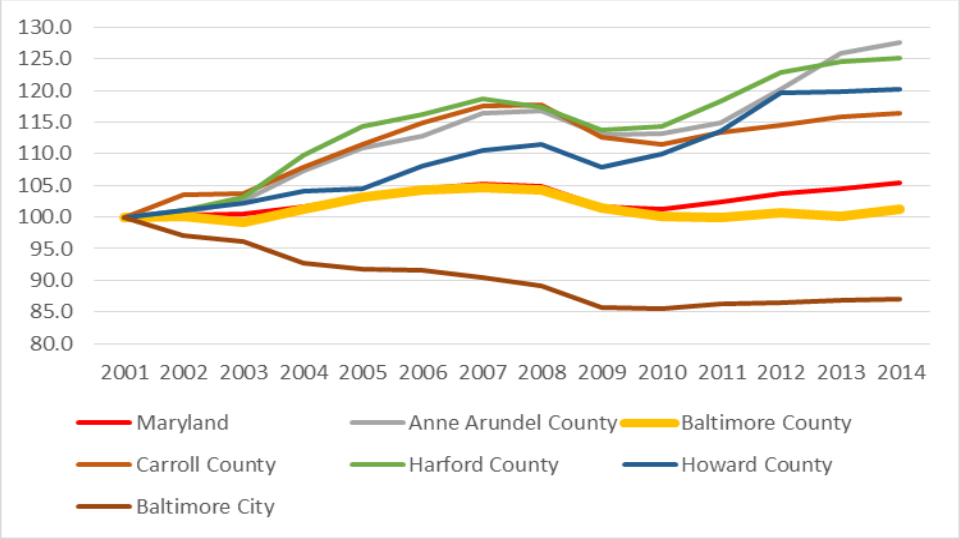
# Chapter 1: Current and Projected Trends in Occupational Employment

A labor market supply and demand analysis compares the supply of local workers to the demands of the regional employer community. This analysis of labor market supply and demand in Baltimore County, Maryland begins with an assessment of the past and projected future performance of the County economy. It then estimates and analyses the occupational composition of regional employment and employment growth. Data are presented for the historical (2001-2015) and projected future (2015-2024) performance of Baltimore County in terms of overall and occupational employment growth. This chapter begins with an analysis of the performance of the County compared to the State and region based on available State and federal data. The overall performance of the County; of the six High Employment Clusters identified in the County's 2012 Department of Economic Development Strategic Operations Plan; and of three additional industry clusters identified based on the research and analyses conducted by the Valbridge-JFI Team and discussions with the County are described below. Unless otherwise indicated, the industry employment and occupational data in this report are based on data from EMSI Analyst.[6]

## Regional Employment Overview

Baltimore County is the largest employment center in the Baltimore Metropolitan area and the second largest employment center in the State, after Montgomery County. However, as presented in Chart 1-1, the County has lagged the state and region in terms of employment growth since 2000, and while 2014 employment is above 2001 levels, the County has yet to regain pre-recession employment levels.

**Chart 1-1: State and Regional Employment Growth**




Source: BLS

As presented in Table 1-1, Baltimore County's share of total Metropolitan Area employment has fallen modestly since 2001, from 31% in 2001 to 30 percent in 2015. While the County lagged peer Metropolitan

[6] See http://www.economicmodeling.com/analyst/ for a description of EMSI and the data used. In order to be comparable to the core data used by the state and other, the EMSI estimated QCEW data were used in this analysis. EMSI, a CareerBuilder company, turns labor market data into useful information that helps organizations understand the connection between economies, people, and work. The QCEW is the core employment data produced by state Labor Market Information (LMI) offices and includes all employees covered by unemployment insurance. EMSI estimates the employment in all industries at a detailed level, while state LMI data often do not disclose employment for all industries. EMSI also produces detailed estimates of occupational employment at the industry level. EMSI also prepares projections of future, through 2024, employment growth and occupational staffing patterns. The combination of EMSI historical and projected industry and occupational employment data allows for the analysis of both industry and occupation employment at a level of detail not available from state LMI data.

Area counties in terms of the rate of employment growth in 2001-15, the County added the second largest number of new jobs since 2001, experiencing employment growth of 52,896 jobs, lagging only Anne Arundel County[7] in terms of the total number of jobs created since 2001. According to data from the Maryland Department of Planning, Baltimore County is projected to continue to represent just under a third of regional jobs over the next quarter century, but lag the region and peer suburban counties in terms of the rate of employment growth and lag Anne Arundel and Howard Counties in terms of total jobs created through 2040.

**Table 1-1: Baltimore Metropolitan Area Employment, 2001-2040**

| Area | 2001 | 2013 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|---|---|---|
| Baltimore Metro Area | 1,527,550 | 1,707,843 | 1,753,700 | 1,846,400 | 1,900,200 | 1,943,100 | 1,986,500 | 2,032,000 |
| Anne Arundel County | 306,992 | 387,665 | 404,700 | 428,800 | 441,500 | 452,000 | 463,600 | 476,200 |
| Baltimore County | 467,004 | 513,361 | 519,900 | 541,700 | 553,600 | 562,300 | 570,800 | 579,900 |
| Carroll County | 70,528 | 83,452 | 85,800 | 91,300 | 95,900 | 98,600 | 101,800 | 104,500 |
| Harford County | 96,015 | 122,359 | 126,600 | 137,100 | 143,200 | 147,500 | 151,200 | 154,700 |
| Howard County | 165,691 | 205,071 | 216,100 | 235,200 | 247,000 | 258,200 | 269,300 | 281,000 |
| Baltimore City | 421,320 | 395,935 | 400,600 | 412,300 | 419,000 | 424,500 | 429,800 | 435,700 |
| Baltimore Metro Area | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Anne Arundel County | 20% | 23% | 23% | 23% | 23% | 23% | 23% | 23% |
| Baltimore County | 31% | 30% | 30% | 29% | 29% | 29% | 29% | 29% |
| Carroll County | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Harford County | 6% | 7% | 7% | 7% | 8% | 8% | 8% | 8% |
| Howard County | 11% | 12% | 12% | 13% | 13% | 13% | 14% | 14% |
| Baltimore City | 28% | 23% | 23% | 22% | 22% | 22% | 22% | 21% |

Source: Maryland Department of Planning – Based on BEA Data.

**Baltimore County has lagged the region in employment growth.** While the County has lagged the region in terms of employment growth; it remains the largest employment center in the region and experienced the second largest growth in employment since 2001. However, the County is projected to continue to lag the region in the rate of employment growth and lag both Anne Arundel and Howard Counties in terms of job creation through 2040. Improving the alignment between the County's employer and workforce development system and enhancing the performance of core industry drivers will be a critical means of maintaining, if not improving the competitive position of the County.

## Baltimore County Industry and Occupational Employment Performance

In order to analyze the recent and projected future performance of Baltimore County in terms of industry and occupational employment, the Valbridge-JFI Team analyzed estimated Quarterly Census of Employment and Wages (QCEW) and occupational employment data from EMSI[8]

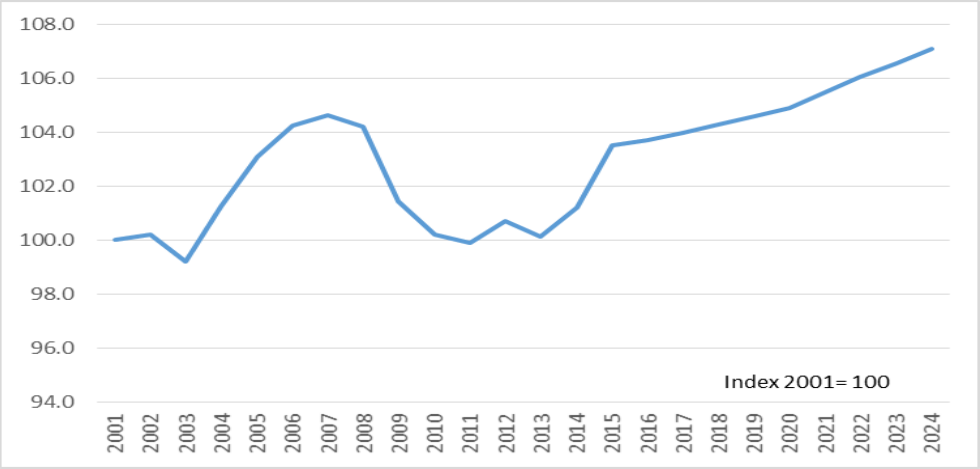
### Baltimore County Industry Employment

[7] Anne Arundel County was significantly impacted by the Base Realignment and Closure (BRAC) process in the past decade and has also benefitted significantly from expansions in national security and cybersecurity activities at Fort Meade.

[8] It is important to note that in the analyses of occupational employment and employment by education level presented below and in later sections of this report that total employment by occupation and education level do not sum to total industry employment. This is because the EMSI data used in this analysis does not disclose employment in occupations where less than ten jobs are present. The omission of these occupations does not materially impact the findings of this analysis.

As presented in Chart 1-2, total employment in Baltimore County increased by more than 4 percent in the recovery from the 2001 recession, falling to just under 2001 levels at the trough of the recession in the County in 2011. County employment levels have recovered and surpassed 2001 levels, but have not yet regained their pre-recession levels. The County is projected to experience slow and steady employment growth, with employment projected to increase by 12,902 jobs or 3.5 percent, to 385,650 jobs in 2024.

**Chart 1-2: Baltimore County Total Employment - 2001-2015 and Projections Through 2024**




Source: EMSI

***Baltimore County experienced strong growth in high skilled and high wage sectors that dominate the state and regional economy.*** The structure and performance of the County economy is described in Table 1-2, which presents data on historical and projected employment and the current level of specialization, measured in terms of location quotients[9], of the County economy by major economic sector. Over the 2001-2015 period, the County experienced strong growth in the Management of Companies and Enterprises, Educational Services, Health Care and Social Assistance, Professional, Scientific and Technical Services, and Finance and Insurance sectors of the County economy. These sectors represent the traditional leading sectors of the State and regional economy and all provide a strong mix of high and middle skilled jobs with strong wages and access to benefits. These sectors are projected to continue to generate the strongest employment growth through 2024.

***The traditional County manufacturing and wholesale sectors have declined in importance.*** Since 2001, Manufacturing employment in the County has fallen by more than half, by 17,243 jobs and Wholesale Trade employment fell by 18 percent, or 2,319 jobs. Employment in both of these sectors is projected to continue to decline through 2024. The County's Retail sector declined since 2001 and is projected to continue to decline through 2024, possibly due to the rise of online retailing and the development of competing retail centers in neighboring jurisdictions that have challenged the County's traditional role in this sector. Despite

[9] According to the U.S. Bureau of Labor Statistics - Location Quotients (LQs) are ratios that allow an area's distribution of employment by industry to be compared to a reference or base area's distribution (in this analysis they were compared to the national average). If an LQ is equal to 1, then the industry has the same share of its area employment as it does in the reference area. An LQ greater than 1 indicates an industry with a greater share of the local area employment than is the case in the reference area and a LQ lower than 1 indicated a lower share. LQs are used to measure the concentration of employment in a particular economy with high LQs (generally a threshold of 1.2 is used) indicating the potential presence of a comparative advantage and the existence of a core industry cluster in that sector.

these declines, the County remains specialized in Retail, with a Location Quotient (LQ) of 1.26, signifying a concentration of employment 26 percent above the national average. This indicates that the County continues to be a retail destination for both County and out-of-County residents.

***The County specializes in a diverse mix of high and middle/lower skill industries***. Baltimore County has a high degree of specialization, an LQ of more than 1.2, in several sectors including Administrative and Support and Waste Management and Remediation Services, Retail Trade, Healthcare and Social Assistance, Finance and Insurance, and Construction. Of these specialized industries, only Retail Trade, is projected to experience declines in employment through 2024, indicating an ongoing need to diversify the County economy. All of the other specialized sectors, Administrative and Support and Waste Management and Remediation Services, Healthcare and Social Assistance, Finance and Insurance, and Construction, are projected to experience stable employment growth through 2024. One area of particular importance is Professional, Scientific and Technical Services where the County has a higher than national average concentration of employment, but a lower concentration of employment than the state or region. This is the core industry driver of both the Maryland and Baltimore Metropolitan Area economy and improving the County's competitive position in this key industry should be a core economic and workforce policy goal.

**Table 1-2: Baltimore County Total Employment, by Key Industry - 2001, 2015 and 2024**

| Industry | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|
| Total Employment | | **360,132** | **372,748** | **385,650** | **12,616** | 3.5% | **12,902** | 3.5% |
| Crop and Animal Production | 0.13 | 415 | 386 | 358 | (28) | (6.9%) | (28) | (7.2%) |
| Mining, Quarrying, and Oil and Gas Extraction | 0.08 | 115 | 91 | 84 | (24) | (20.8%) | (6) | (7.0%) |
| Utilities | 0.67 | 1,118 | 1,552 | 1,558 | 434 | 38.8% | 6 | 0.4% |
| Construction | 1.21 | 22,857 | 23,248 | 24,991 | 391 | 1.7% | 1,742 | 7.5% |
| Manufacturing | 0.70 | 31,835 | 14,592 | 12,461 | (17,243) | (54.2%) | (2,131) | (14.6%) |
| Wholesale Trade | 0.81 | 12,911 | 10,593 | 10,105 | (2,319) | (18.0%) | (488) | (4.6%) |
| Retail Trade | 1.26 | 52,937 | 49,251 | 48,225 | (3,685) | (7.0%) | (1,027) | (2.1%) |
| Transportation and Warehousing | 0.52 | 5,997 | 6,228 | 5,992 | 231 | 3.8% | (236) | (3.8%) |
| Information | 0.70 | 6,946 | 5,265 | 5,020 | (1,682) | (24.2%) | (245) | (4.7%) |
| Finance and Insurance | 1.22 | 19,095 | 22,782 | 24,347 | 3,688 | 19.3% | 1,564 | 6.9% |
| Real Estate and Rental and Leasing | 1.45 | 8,209 | 8,327 | 8,035 | 119 | 1.4% | (292) | (3.5%) |
| Professional, Scientific, and Technical Services | 1.08 | 20,559 | 27,591 | 31,424 | 7,032 | 34.2% | 3,833 | 13.9% |
| Management of Companies and Enterprises | 0.27 | 1,282 | 4,168 | 4,867 | 2,886 | 225.2% | 699 | 16.8% |
| Administrative and Support and Waste Management and Remediation Services | 1.29 | 27,740 | 26,258 | 28,796 | (1,482) | (5.3%) | 2,538 | 9.7% |
| Educational Services | 1.15 | 6,018 | 8,847 | 10,068 | 2,829 | 47.0% | 1,221 | 13.8% |
| Health Care and Social Assistance | 1.22 | 43,790 | 61,885 | 66,485 | 18,096 | 41.3% | 4,600 | 7.4% |
| Arts, Entertainment, and Recreation | 1.12 | 5,541 | 6,018 | 5,983 | 477 | 8.6% | (36) | (0.6%) |
| Accommodation and Food Services | 0.88 | 24,746 | 27,514 | 28,312 | 2,767 | 11.2% | 798 | 2.9% |
| Other Services (except Public Administration) | 0.94 | 11,015 | 10,963 | 11,095 | (52) | (0.5%) | 132 | 1.2% |
| Government | 1.00 | 56,603 | 57,189 | 57,447 | 586 | 1.0% | 258 | 0.5% |
| Unclassified Industry | 0.57 | 405 | 0 | 0 | (405) | (100.0%) | 0 | n.a. |

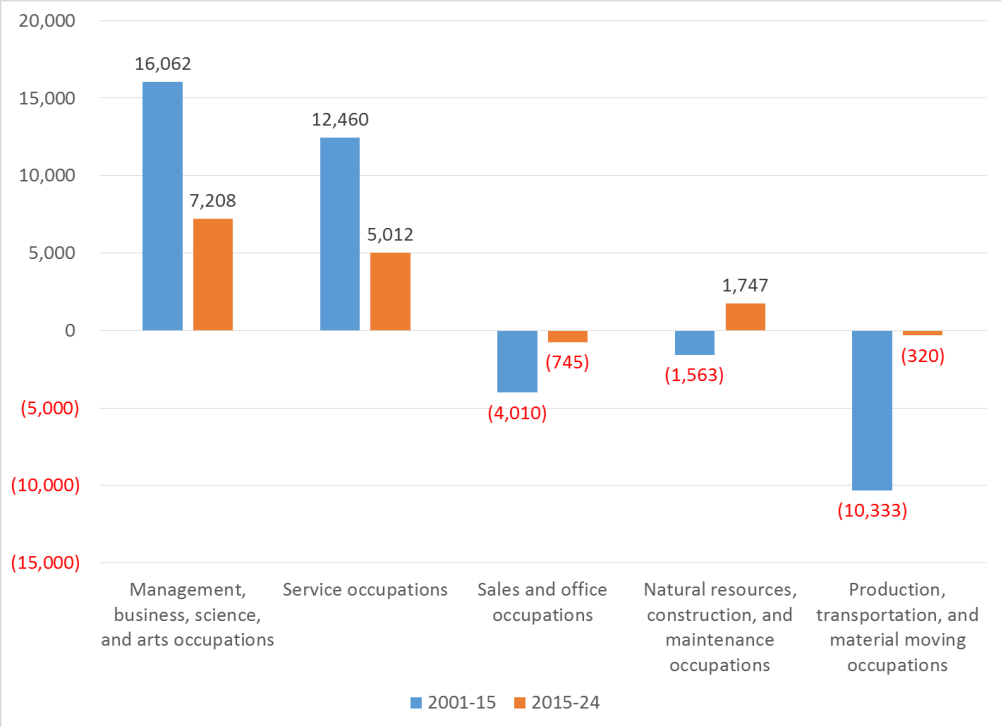
Source: JFI analysis of EMSI Data

## Baltimore County Occupational Employment

The Valbridge-JFI Team analyzed patterns of occupational employment using the EMSI data to analyze the types of jobs in the County, the educational and skills profile of these jobs, and to present data on the leading occupations in the County for both the historical 2001-2015 period as well as for the 2015-24 projection period.

***Patterns of occupational employment are changing in Baltimore County, driven by national changes in business workforce needs as well as the changing composition of the Baltimore County economy.*** Data on the overall occupational profile of jobs in Baltimore County is presented in Table 1-3, data on the educational and overall skill level profiles of these occupations are presented in Table 1-4, and a list of the top five occupations by overall skill level are presented in Table 1-5. As presented in Chart 1-3, Baltimore County has experienced strong growth in employment in Management, Business, Science and Arts and Service occupations since 2001 and this occupational grouping is projected to continue to experience the strongest growth through 2024. As a result of declines in employment in the Manufacturing and Wholesale/Distribution sectors as well as increased automation and technology utilization, the County experienced declines in Production, transportation and materials moving occupations jobs since 2001, and employment in these occupations is expected to continue to fall through 2024. Recession driven declines in construction activity caused a decline in employment in Natural Resource, Construction and Maintenance jobs since 2001; however, employment in these occupations is projected to recover and grow through 2024.

**Chart 1-3: Changes in Occupational Employment, 2001-15 and Projected 2015-2024**




Source: JFI Analysis of EMSI data

**Baltimore County has experienced growth in key leading high skilled occupations.** As presented in Table 1-3, since 2001, Baltimore County has added large numbers of jobs in: Management; business and financial operations; and Computer and mathematical occupations employment. One area of concern is that between 2001 and 2015, County employment in Architecture and engineering occupations declined and employment in Life, physical and social sciences occupations grew only modestly. These have been areas of substantial employment growth at the State and regional level. One area to highlight is that Baltimore County also experienced strong growth in employment in Healthcare Practitioners and Technical and Healthcare support occupations, creating a number of Middle Skill job opportunities for County residents. All of these occupational groupings are projected to continue to experience strong employment growth through 2024. Employment in Construction and extraction and installation, maintenance, and repair occupations declined with recession driven declines in construction activity, but employment growth, strong employment growth in the case of Construction occupations, is projected through 2024.

**Table 1-3: Baltimore County Total Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **360,132** | **372,748** | **385,650** | **12,616** | 3.5% | **12,902** | 3.5% |
| Management Occupations | 18,163 | 19,387 | 20,228 | 1,223 | 6.7% | 841 | 4.3% |
| Business and Financial Operations Occupations | 21,774 | 25,273 | 27,190 | 3,499 | 16.1% | 1,917 | 7.6% |
| Computer and Mathematical Occupations | 12,443 | 14,283 | 15,410 | 1,840 | 14.8% | 1,127 | 7.9% |
| Architecture and Engineering Occupations | 7,043 | 6,694 | 7,346 | (349) | (5.0%) | 651 | 9.7% |
| Life, Physical, and Social Science Occupations | 3,483 | 3,515 | 3,591 | 32 | 0.9% | 76 | 2.2% |
| Community and Social Service Occupations | 4,627 | 5,978 | 6,268 | 1,352 | 29.2% | 289 | 4.8% |
| Legal Occupations | 3,117 | 3,484 | 3,611 | 367 | 11.8% | 127 | 3.7% |
| Education, Training, and Library Occupations | 19,610 | 23,121 | 24,300 | 3,511 | 17.9% | 1,179 | 5.1% |
| Arts, Design, Entertainment, Sports, and Media Occupations | 4,072 | 4,358 | 4,378 | 286 | 7.0% | 20 | 0.5% |
| Healthcare Practitioners and Technical Occupations | 18,630 | 22,933 | 23,912 | 4,303 | 23.1% | 979 | 4.3% |
| Healthcare Support Occupations | 9,443 | 12,660 | 13,981 | 3,218 | 34.1% | 1,321 | 10.4% |
| Protective Service Occupations | 10,540 | 10,864 | 11,040 | 325 | 3.1% | 175 | 1.6% |
| Food Preparation and Serving Related Occupations | 25,078 | 28,662 | 29,847 | 3,584 | 14.3% | 1,185 | 4.1% |
| Building and Grounds Cleaning and Maintenance Occupations | 9,400 | 11,694 | 12,675 | 2,294 | 24.4% | 981 | 8.4% |
| Personal Care and Service Occupations | 11,538 | 14,578 | 15,929 | 3,040 | 26.3% | 1,351 | 9.3% |
| Sales and Related Occupations | 46,065 | 42,507 | 41,894 | (3,559) | (7.7%) | (613) | (1.4%) |
| Office and Administrative Support Occupations | 60,641 | 60,190 | 60,057 | (451) | (0.7%) | (133) | (0.2%) |
| Farming, Fishing, and Forestry Occupations | 464 | 357 | 330 | (107) | (23.1%) | (27) | (7.6%) |
| Construction and Extraction Occupations | 16,940 | 16,768 | 18,071 | (172) | (1.0%) | 1,303 | 7.8% |
| Installation, Maintenance, and Repair Occupations | 15,405 | 14,120 | 14,591 | (1,285) | (8.3%) | 471 | 3.3% |
| Production Occupations | 20,190 | 11,650 | 11,104 | (8,540) | (42.3%) | (546) | (4.7%) |
| Transportation and Material Moving Occupations | 21,465 | 19,672 | 19,898 | (1,794) | (8.4%) | 227 | 1.2% |

Source: JFI analysis of EMSI Data

## Baltimore County Employment by Occupational Skill and Level of Educational Attainment

In addition to understanding the composition of local employment by occupation, it is also important to understand how changes in employment impact the skill level and educational requirements of County employment opportunities. The EMSI occupational employment data has information on the typical minimum, entry level educational requirement for entry into the occupation. It is important to note that this is the minimum level of education required to enter an occupation, not the level of education of most workers in the occupation or the level of education necessarily required by an employer. Many employers require a higher level of education than this minimum level of educational attainment and many persons are employed in occupations that require a lower level of educational attainment than they have earned. It is similarly important to note the overall skills requirements of County jobs. In order to sort County employment into overall skills levels, the Valbridge-JFI Team sorted County occupational employment by the typical minimum level of educational attainment required to enter the occupation with:

- High skilled jobs being in occupations that require a Bachelor's or Above;
- Middle skilled jobs[10] being in occupations that require more than a High School Diploma but less than a Bachelor's Degree; and
- Low skilled jobs being in occupations that require a High School Diploma or Less.

***The educational and skills needs of the Baltimore County employer community have been increasing and are expected to continue to increase in the future.*** Employment in high skilled occupations (requiring a Bachelor's and above) increased by 13 percent in 2001-15 and is expected to continue to grow by 6 percent through 2024. In contrast, employment in low skilled (high school or less) occupations fell by 1 percent since 2001, and is projected to grow by only 2 percent through 2024. Employment in Middle Skill occupations increased by 12 percent since 2001 and is projected to grow by 5 percent through 2024. It is clear that as the national, State and Baltimore County economies have changed and that the outlook for better educated workers has and will continue to improve. As a result, programs to enhance the skills and education levels of the County's workforce can be expected to become more important over time.

***Employment in very high education requirement occupations expanded significantly.*** County employment in very high level of education requirement occupations grew rapidly since 2001, with 26 percent growth in occupations requiring a Master's degree and 15 percent growth in occupations requiring a doctorate or professional degree. While these occupations represent only a small portion, 5 percent, of total employment, the rapid employment growth in these occupations indicates the importance of the County's strong higher education system. Employment in occupations requiring a Bachelor's, Master's and Doctoral/ Professional degree are all projected to increase by more than 6 percent through 2024, far outpacing growth in other, less skilled occupations. This strong demand for highly educated workers indicates that that the educational requirements of County jobs is shifting towards more highly skilled positions requiring greater education and training.

[10] The definition of Middle Skilled jobs used in this analysis is less complex and expansive than the definition used in national reports on middle skilled jobs, which often combine data on occupational training requirements and other factors. As a result, when comparing to other national or state reports, this more simple analysis will estimate a lower number of Middle Skill jobs and higher number of Lower Skilled jobs.

**Table 1-4: Baltimore County Total Employment, by Degree Requirements and Skill Level - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **359,764** | **372,326** | **385,215** | **12,563** | **3.5%** | **12,889** | **3.5%** |
| High Skilled Jobs[2] | 81,126 | 91,827 | 97,661 | 10,701 | 13.2% | 5,834 | 6.4% |
| Middle Skilled Jobs[3] | 38,096 | 42,563 | 44,458 | 4,468 | 11.7% | 1,895 | 4.5% |
| Low Skilled Jobs[4] | 240,542 | 237,936 | 243,096 | (2,606) | (1.1%) | 5,160 | 2.2% |
| | | | | | | | |
| Total | **360,132** | **372,748** | **385,650** | **12,616** | **3.5%** | **12,902** | **3.5%** |
| Less than high school | 93,238 | 97,358 | 101,175 | 4,120 | 4.4% | 3,817 | 3.9% |
| High school diploma or equivalent | 147,304 | 140,578 | 141,921 | (6,727) | (4.6%) | 1,343 | 1.0% |
| Postsecondary non-degree award | 19,446 | 21,382 | 22,435 | 1,936 | 10.0% | 1,053 | 4.9% |
| Some college, no degree | 4,549 | 4,900 | 5,047 | 351 | 7.7% | 147 | 3.0% |
| Associate's degree | 14,101 | 16,282 | 16,977 | 2,181 | 15.5% | 695 | 4.3% |
| Bachelor's degree | 65,885 | 73,682 | 78,383 | 7,796 | 11.8% | 4,701 | 6.4% |
| Master's degree | 5,321 | 6,702 | 7,111 | 1,381 | 25.9% | 409 | 6.1% |
| Doctoral or professional degree | 9,919 | 11,443 | 12,167 | 1,524 | 15.4% | 723 | 6.3% |
| Unallocated | 368 | 422 | 435 | 53 | 14.5% | 13 | 3.1% |

(1) Does not sum to total jobs because of unallocated employment.
(2) Occupations requiring a Bachelor's or Above.
(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.
(4) Occupations requiring a High School Diploma or Less.
Source: JFI analysis of EMSI Data

## Leading Occupations by Skill Level in Baltimore County

The goal of this labor market supply and demand analysis is to better inform the Baltimore County workforce development system of the major occupational employment requirements of the County's employer community. In order to provide this information, data on the employment, median wage, and typical entry level of education required for the top five occupations in each of the three skill levels described above are presented in Table 1-5. Many of these top occupations are related to the nine core industry clusters for the County.

**Table 1-5: Baltimore County Total Employment, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| General and Operations Managers | 11-1021 | 6,415 | $52.97 | Bachelor's degree |
| Accountants and Auditors | 13-2011 | 4,368 | $32.41 | Bachelor's degree |
| Postsecondary Teachers | 25-1099 | 4,274 | $32.94 | Doctoral or professional degree |
| Elementary School Teachers, Except Special Education | 25-2021 | 3,676 | $27.60 | Bachelor's degree |
| Secondary School Teachers, Except Special and Career/Technical Education | 25-2031 | 3,247 | $26.87 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Registered Nurses | 29-1141 | 7,110 | $33.69 | Associate's degree |
| Nursing Assistants | 31-1014 | 4,932 | $12.98 | Postsecondary non-degree award |
| Heavy and Tractor-Trailer Truck Drivers | 53-3032 | 2,845 | $20.00 | Postsecondary non-degree award |
| Teacher Assistants | 25-9041 | 2,817 | $11.64 | Some college, no degree |
| Licensed Practical and Licensed Vocational Nurses | 29-2061 | 2,105 | $23.63 | Postsecondary non-degree award |
| **Low Skilled Occupations** | | | | |
| Cashiers | 41-2011 | 12,775 | $8.97 | Less than high school |
| Retail Salespersons | 41-2031 | 12,170 | $9.87 | Less than high school |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 43-6014 | 8,598 | $16.84 | High school diploma or equivalent |
| Customer Service Representatives | 43-4051 | 7,841 | $15.91 | High school diploma or equivalent |
| Combined Food Preparation and Serving Workers, Including Fast Food | 35-3021 | 6,475 | $8.62 | Less than high school |

Source: JFI analysis of EMSI Data

## Overview Baltimore County Nine Core Industry Drivers

The Valbridge-JFI Team also analyzed the historical (2001-15) and projected (2015-24) industry and occupational employment performance of nine core industry clusters in Baltimore County. In its 2012 Department of Economic Development Strategic Operations Plan report, Baltimore County identified Six High Employment Clusters that represent the highest concentrations of employment in the County and are the core focus of the County's economic development efforts.[11] These are:

1. Corporate Headquarters/Operations Centers/Shared Services;
2. Federal Agencies and Contractors;
3. Healthcare;
4. Information/Advanced Technology;
5. Manufacturing; and
6. Port-Related Industries, Logistics & Distribution Centers.

The Valbridge-JFI Team refined these industries into six cluster groupings of discrete industries so that the overall role and importance of these industries could be assessed. The core changes to these definitions are as follows:

- Corporate Headquarters/Operations Centers/Shared Services was broadened to include the core (non-IT) professional services sectors;
- Federal Agencies and Contractors was restricted to just federal government employment since federal contractors would be included in the manufacturing, professional services, information technology and other sectors; and
- Information/Advanced Technology was restricted to include only information technology and related services.

Based on the analyses conducted by the Valbridge-JFI Team and discussions with the Baltimore County Department of Economic and Workforce Development, three additional industries were added to create a total of nine core County industry clusters. The three clusters added were:

7. Construction – added because of the high level of employment and County specialization in that sector;
8. Financial Services – added because of the high level of employment and County specialization in that sector; and
9. Public and Private Higher Education – added because of the employment growth and presence of two of the State's largest universities (UMBC and Towson), private higher educational institutions, such as Goucher and Stevenson, and the County's strong Community College system.

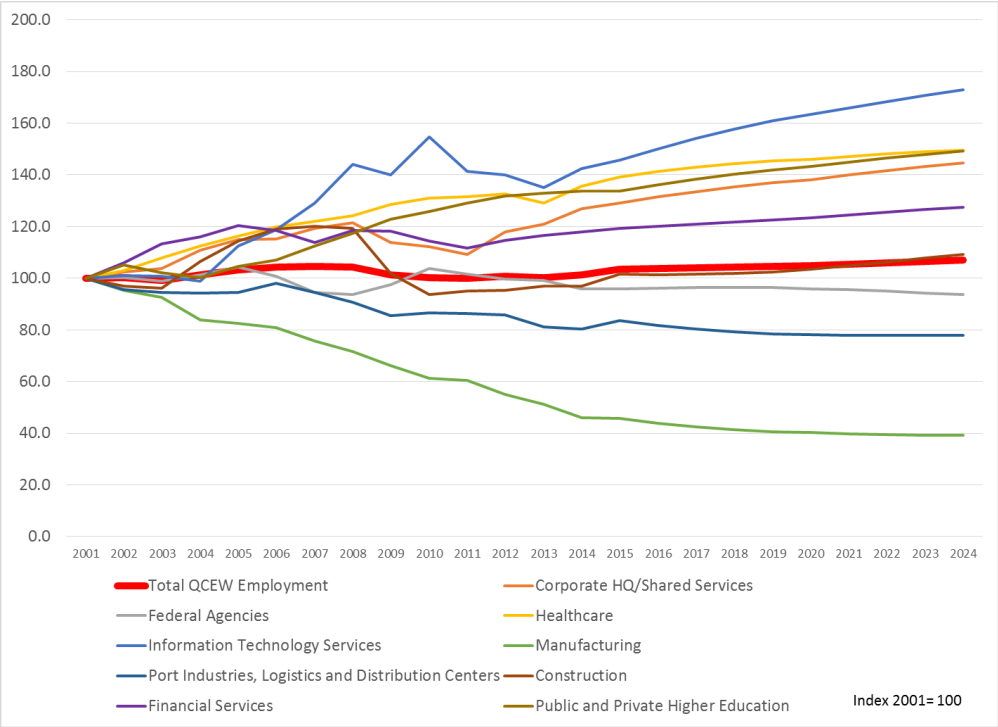
These nine clusters represent half of overall employment in the County. Detailed data on the composition, employment, and educational/occupational composition of each of these clusters is presented in Chapters 6 through 14, with the overall results of the analysis of each cluster summarized below.

**Baltimore County's nine core industry clusters are driving employment growth**. Despite declining employment in three of the nine clusters, in aggregate, these nine core industry clusters generated nearly three quarters of County net employment growth since 2001 and are projected to generate three quarters of employment growth through 2024. Growth in these clusters was led by four core industries. Since 2001, the Healthcare sector added the most jobs at almost 15,000, the Information Technology experienced the

[11] http://baltimorecountybusiness.com/FinalStrategicPlan2012.pdf

strongest rate of growth, with employment increasing by 46 percent, Public and Private Higher Education employment grew by 34 percent and the Corporate Operations Centers/Shared Services sector grew by 29 percent. Information Technology, Corporate Operations Centers/Shared Services and Public and Private Higher Education are all projected to continue to lead in the rate of employment growth through 2024. Between 2001 and 2015, Manufacturing sector employment fell by more than half and 17,246 jobs, Port Industries, Logistics and Distribution Centers employment fell by 16 percent and 2,718 jobs, and Federal Agency employment declined modestly. EMSI projects that these three clusters are projected to continue to decline though 2024; however, the development of Tradepoint Atlantic at the former Sparrows Point site creates an opportunity to support the growth of the County's Port Industries, Logistics and Distribution Centers cluster.

**Chart 1-4: Employment Performance of Baltimore County's Nine Core Industry Clusters**




Source: JFI Analysis of EMSI Data

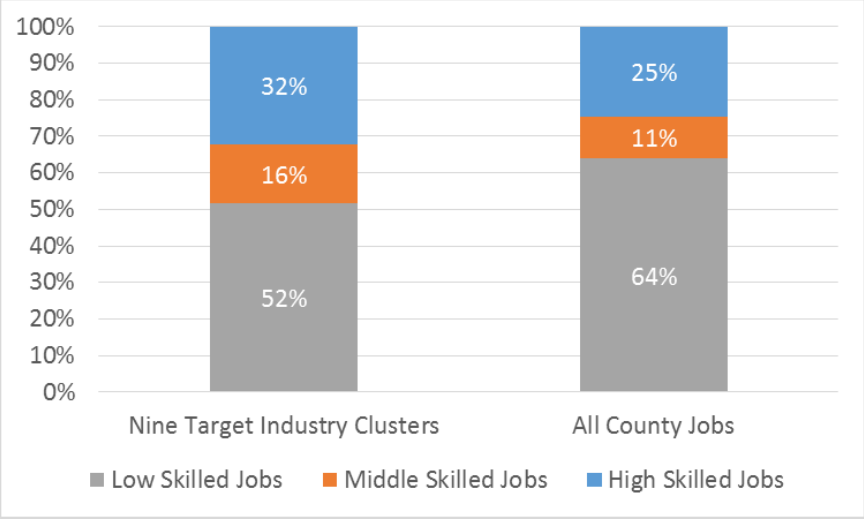
**Table 1-6: Current and Projected Employment in Baltimore County, by Key Industry Cluster**

| Industry | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total | 360,132 | 372,748 | 385,650 | 12,616 | 4% | 12,902 | 3% |
| % of Total | 49% | 50% | 51% | 74% | | 75% | |
| **Nine Key Industry Drivers** | **176,543** | **185,917** | **195,559** | **9,374** | **5%** | **9,642** | **5%** |
| Industry 1: Corporate Operations Centers/Shared Services | 19,763 | 25,528 | 28,604 | 5,765 | 29% | 3,076 | 12% |
| Industry 2: Federal Agencies | 14,853 | 14,230 | 13,925 | (623) | (4%) | (305) | (2%) |
| Industry 3: Healthcare | 37,995 | 52,923 | 56,850 | 14,928 | 39% | 3,926 | 7% |
| Industry 4: Information Technology Services | 5,045 | 7,347 | 8,724 | 2,302 | 46% | 1,377 | 19% |
| Industry 5: Manufacturing | 31,835 | 14,589 | 12,454 | (17,246) | (54%) | (2,135) | (15%) |
| Industry 6: Port Industries, Logistics and Distribution Centers | 16,497 | 13,778 | 12,822 | (2,718) | (16%) | (957) | (7%) |
| Industry 7: Construction | 22,857 | 23,248 | 24,990 | 391 | 2% | 1,742 | 7% |
| Industry 8: Financial Services | 19,088 | 22,771 | 24,334 | 3,683 | 19% | 1,563 | 7% |
| Industry 9: Public and Private Higher Education | 8,610 | 11,502 | 12,855 | 2,892 | 34% | 1,353 | 12% |

Source: JFI Analysis of EMSI and related data.

***Baltimore County's targeted industry clusters require a higher degree of skills and education than the County's traditional sectors, indicating an increased need for core educational and workforce development services in the County***. Thirty-two percent of jobs in the nine targeted industry clusters are high skilled jobs that require a Bachelor's degree above, versus 25 percent of all jobs in Baltimore County.

**Chart 1-5: Overall Skill Level of Nine Target Industry Clusters Compared to all County Employment**




Source: JFI analysis of EMSI Data

# Chapter 2: County Workforce Demographic and Occupational Profile

Labor market supply and demand analyses compare the supply of workers to the demands of the employer community. The goal of the second part of this analysis of labor market supply and demand in Baltimore County, Maryland is to analyze the demographic, educational and occupational profile of the County's workforce. This analysis will allow the County's labor supply – in the form of its resident workforce – to be compared to its labor demand – in the form of the occupational demands of the County's employer community. This chapter begins with an analysis of the performance of the County relative to the region in terms of broad patterns of population growth and migration. It then presents data on the demographic composition of the County's resident workforce. The occupational composition of the County's workforce is then compared to the nation, State and region in order to identify differences in the occupational composition of the County workforce followed by an analysis of how recent migration trends impact the composition of the County's workforce. Finally, because a large number of County residents commute to jobs outside of the County, an assessment of the level and characteristics of out-commuters is presented. The workforce data presented in this chapter will be compared to the occupational demands from Chapter 1, as well as to the generation of workers from the County's higher education system in Chapter 3, in order to assess the alignment of the County's workforce to the needs of its employer community and identify gaps in its workforce development system.

## Baltimore County Population Growth and Migration

Broad population trends play an important role in shaping a region's workforce. A region's population grows or declines based on the growth of its resident population as well as from the in- and out-migration of new residents. Jurisdictions with a growing population base are generally better able to meet the needs of their employer communities.

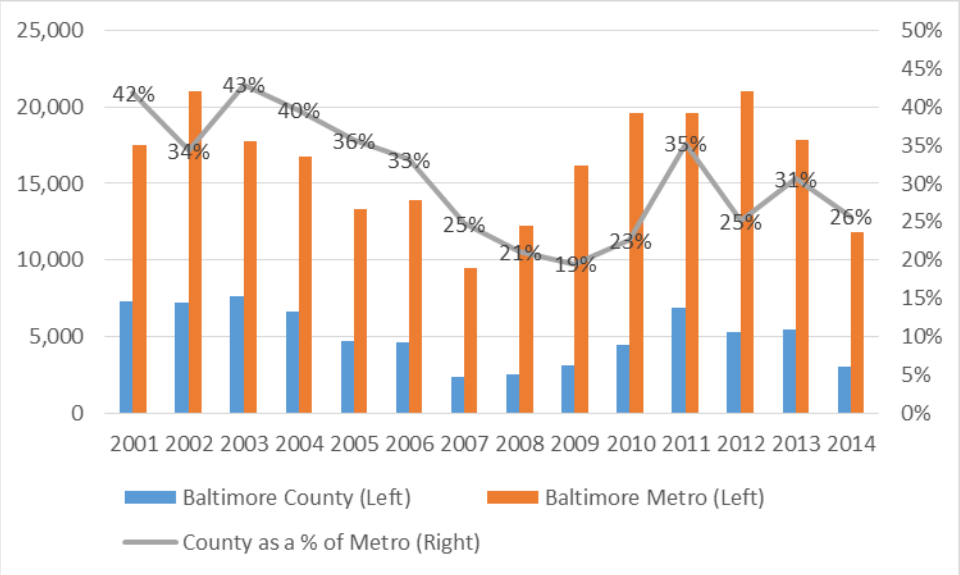
**Since 2000, Baltimore County added the largest number of residents in the region, but its rate of growth has lagged other Maryland counties**. Baltimore County is the largest population center in the Baltimore region and has the third largest population of all of Maryland's twenty four counties. However, as presented in Table 2-1, while Baltimore County gained the largest population of all the jurisdictions in the region, it lagged all of the regional jurisdictions except Baltimore City in the rate of population growth since 2001. While it is not unusual for larger, mature jurisdictions like Baltimore County to experience lower rates of growth compared to smaller jurisdictions, Baltimore County lagged both Montgomery and Prince George's Counties, similar large mature inner-suburban jurisdictions, in 2001-14 growth. Of course these two counties are parts of the dynamic, rapidly growing Washington, D.C. Metropolitan Area. The County's changing role in regional population growth is described in Chart 2-1, which shows the declining role of Baltimore County in Baltimore Metropolitan Area growth. According to Maryland Department of Planning projection, the County's population is projected to grow slowly through 2025 and continue to lag its large, mature inner-suburban county peers.

**Table 2-1: Baltimore Metropolitan Area Population Growth, 2000-2015 and Projections Through 2025**

| | | | | 2000-15 | | 2015-25 | |
|---|---|---|---|---|---|---|---|
| County | 2000 | 2015 | 2025 | # | % | # | % |
| Maryland | 5,296,486 | 6,010,150 | 6,429,750 | 713,664 | 13% | 419,600 | 7% |
| Baltimore Metropolitan Area | 2,552,994 | 2,796,400 | 2,943,000 | 243,406 | 10% | 146,600 | 5% |
| Anne Arundel County | 489,656 | 559,600 | 593,600 | 69,944 | 14% | 34,000 | 6% |
| Baltimore County | 754,292 | 832,050 | 857,000 | 77,758 | 10% | 24,950 | 3% |
| Carroll County | 150,897 | 168,550 | 179,450 | 17,653 | 12% | 10,900 | 6% |
| Harford County | 218,590 | 252,000 | 265,100 | 33,410 | 15% | 13,100 | 5% |
| Howard County | 247,842 | 309,050 | 346,500 | 61,208 | 25% | 37,450 | 12% |
| Queen Anne's County | 40,563 | 50,150 | 57,350 | 9,587 | 24% | 7,200 | 14% |
| Baltimore City | 651,154 | 625,000 | 644,000 | (26,154) | (4%) | 19,000 | 3% |

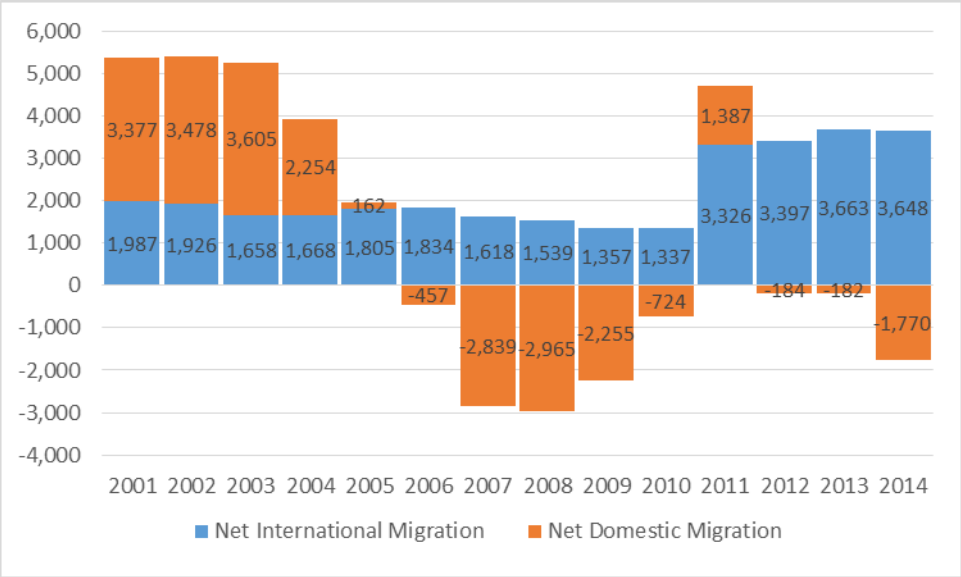
Source: Maryland Department of Planning Population Projections

**Chart 2-1: Baltimore County and Metropolitan Area Population Growth**



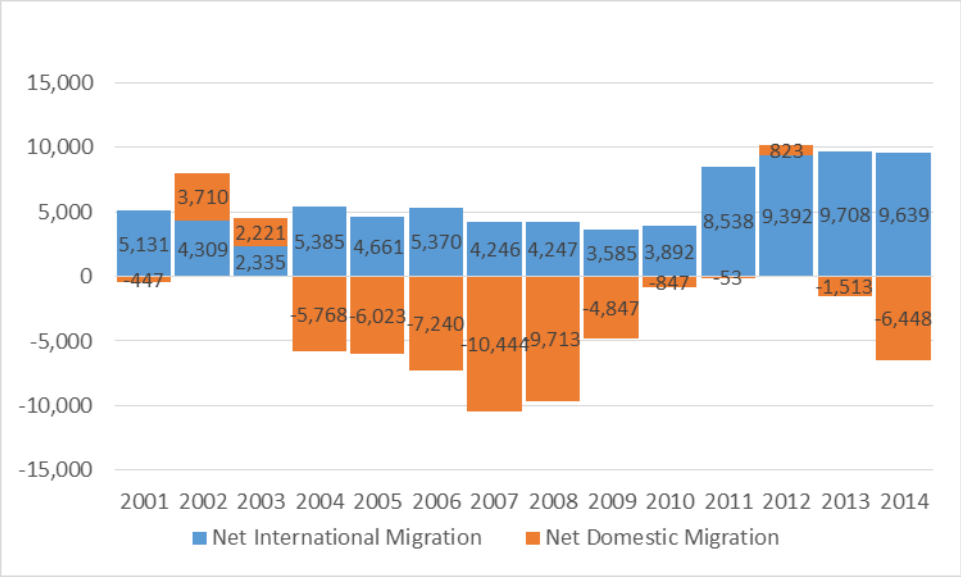

**Domestic outmigration is an area of concern, International in-migration has been a source of strength.** Baltimore County is experiencing a net out-migration of residents moving to other jurisdictions in the United States. In-migration is the movement of residents into the County, out-migration is the movement of residents out of the County, and net migration is th difference between the two. Both in- and out- migration can be domestic, or occuring from or within in the U.S., or international, or migration to or from other counties. In the early part of the past decade, Baltimore County gained residents from both other parts of the nation (domestic) as well as international migration; however, more recently, the County experienced a net outmigration of residents to other places in the U.S. This loss of population from domestic outmigration has been more than offset by population growth from international in-migration, and the County accounts for a large share of regional growth from foreign in-migration. The impact of migration on the composition of the County's workforce will be analyzed in more detail below; however, slow population growth and out-migration represent an area of concern to the County.

**Chart 2-2: Baltimore County Net Migration, 2001-14**




Source: Maryland Department of Planning

**Chart 2-3: Baltimore Metropolitan Area Net Migration, 2001-14**




Source: Maryland Department of Planning

Overall, as the region's largest population center, Baltimore County plays a major role in the regional laborshed. While the County is experiencing slower rates of population growth than regional and large-inner suburban peer Maryland counties, it remains a major population and workforce center. Population loss from domestic out-migration is a recent area of concern, but the County has been successful in attracting foreign residents.

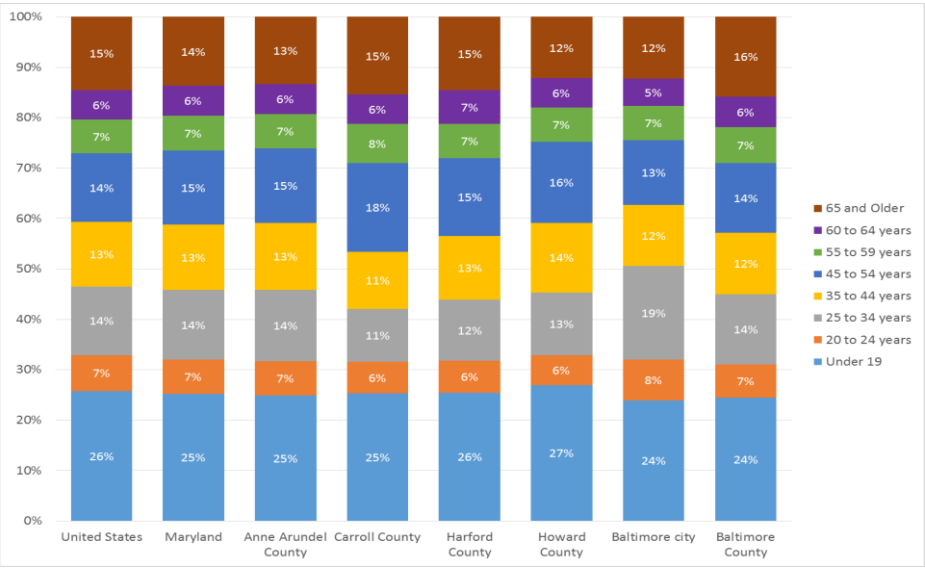
## Baltimore County Demographic and Workforce Characteristics

The characteristics of a region's workforce have a significant impact on its overall economic development success. Talent is the driver of economic development success, especially for the creative, innovation and technology driven industries important to the growth of the State and region. In today's economic development competition, the key hallmark of a successful region is its ability to attract, develop and retain the talented workforce demanded by its leading employers.

***Baltimore County is well positioned in terms of the quality of its resident workforce.*** The Valbridge-JFI team analyzed the competitive position of Baltimore County focusing on three measures of access to talent: 1) age of population, with a focus on Millennials; 2) educational attainment; and 3) occupation. Dynamic economies are typically the ones that can attract, develop and retain younger workers, an educated workforce, and workers in management and creative occupations. Baltimore County is generally competitive with the nation, state and region in all three.

***Baltimore County is competitive in its share of Millennial population***. Noted regional economist Richard Florida has written that the most economically successful regions are those that have attracted "Creative Class" jobs and workers. The Creative Class is made up of knowledge workers, intellectuals, artists and other persons engages in knowledge-based and creative occupations. According to Florida, one indication of a creative region is its ability to attract and retain younger, better educated workers. Fourteen percent of Baltimore County's population is in the 25-34 year old age bracket most identified with working Millennials. With two major public and several private universities, Baltimore County's share of Millennial population is comparable to the State and region and behind only Baltimore City, which has seen tremendous growth in this population. While the County's Millennial share of total population is below the City's, the number of Millennials residing in each is similar, with both home to over 115,000 Millennials. The County is also well positioned in terms of workers in the prime 35-54 working age demographic, but does have a higher concentration of older residents than the nation, state and several peer regional jurisdictions. Indeed, the median age of the County's population is above the national, state and regional average (Table 2-2).

**Chart 2-4: Age Distribution in the Baltimore Metropolitan Area**




**Baltimore County has a highly educated, professional workforce.** Thirty-seven percent of Baltimore County residents have a Bachelor's Degree or above, higher than the national average (30 percent) and only slightly

lower than the Maryland average (38 percent). Only two counties in the region, Anne Arundel (39 percent) and Howard (60 percent) have a higher percentage of these highly educated workers. Similarly, the share of the County's population employed in Creative Class-related Management, business, science, and arts occupations is higher than the nation, comparable to Maryland and comparable to regional peers.

**Chart 2-5: Educational Attainment of Adults 25 and Older in the Baltimore Metropolitan Area**

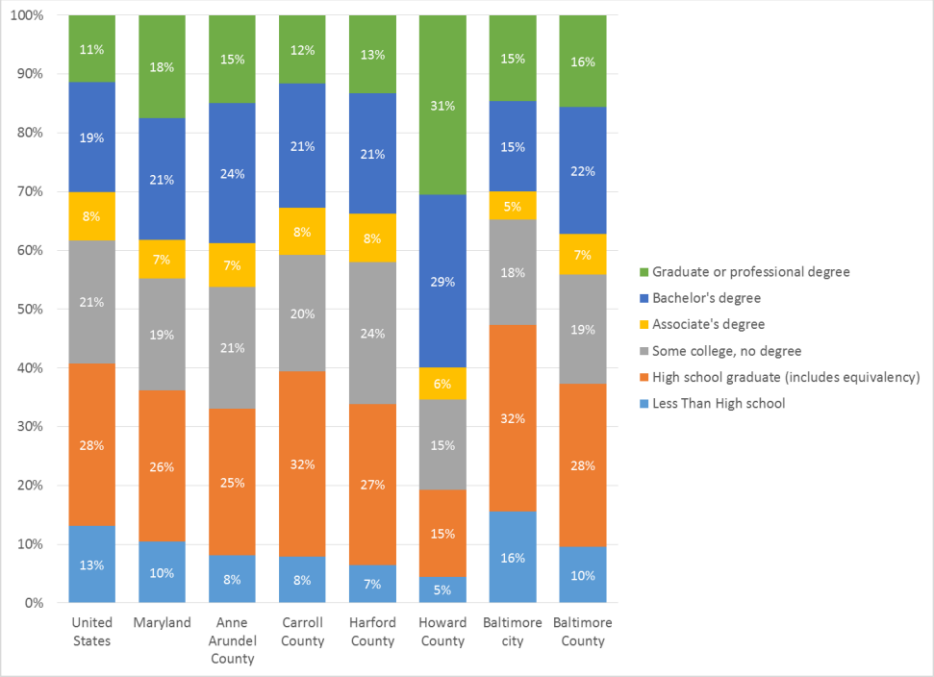
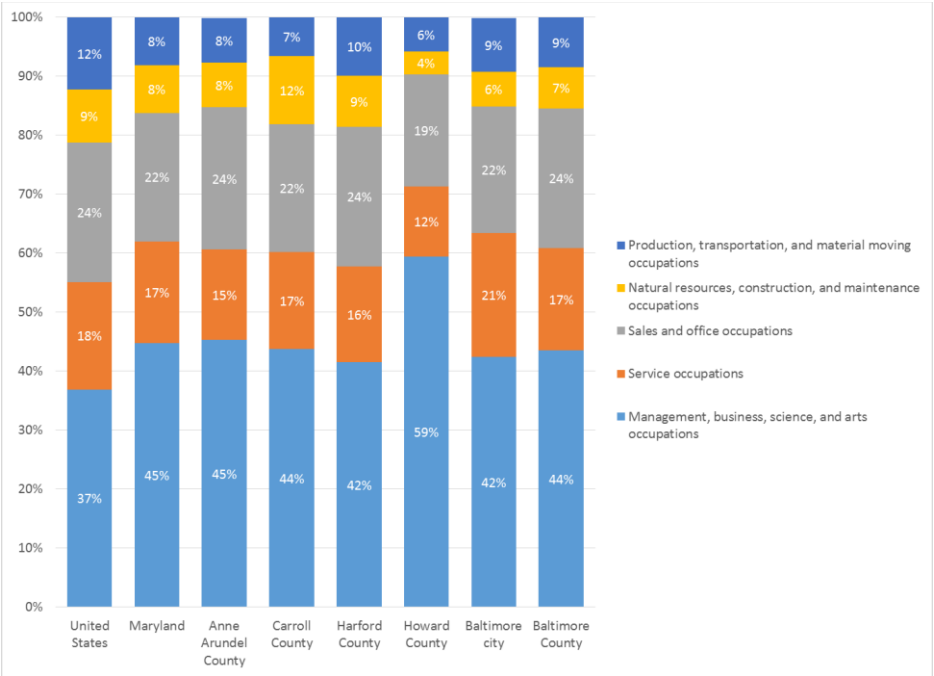


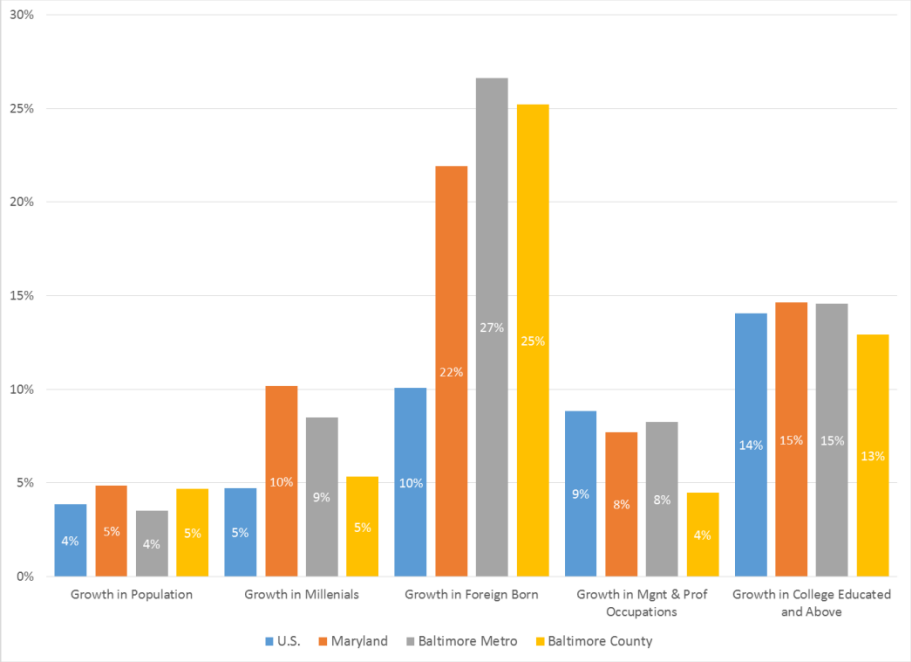

**Chart 2-6: Occupation of Civilian Employed Population 16 and Older in the Baltimore Metropolitan Area**




***While the overall composition of Baltimore County's workforce is competitive within the nation, State and region, there are some areas of concerns in patterns of post-recession growth.*** While the overall post-

recession population growth of the County is competitive to the State and nation, the rates of growth in Millennials and residents employed in Management, business, science, and arts occupations are well below national, state and regional rates and the growth in college educated residents is slightly below national, state and regional rates. The County's slower than regional growth in these areas may be attributable to the increasing preferences for younger and more educated people to move into cities. This trend has been described in reports such as the City Observatory's Young and Restless report, which analyzed trends in what it terms the "Young and Restless" or 25 to 34 year-olds with a bachelor's degree or higher level of education, who are increasingly moving into urban areas. The movement of these key classes of workers into cities points to the importance of ***place-making***, or developing denser ***live-work-play environments*** as not only a land-use policy, but also an increasingly important economic and workforce development policy. The development of live-work-play environments as a means of attracting and retaining key population groups, most importantly Millennials, has become a central strategy, even in suburban population centers. Towson, with a major public university and cluster of professional services employment is a prime potential location for such development. Baltimore County continued to be successful in attracting foreign born residents in the post-recession period.

**Chart 2-7: Key Characteristics of Demographic Change, 2009-14**




The data for Charts 2-3 through 2-7 are presented in Table 2-2 below. One area of concern in this data is that the growth of the County's civilian employed population, or persons engaged in work activities or looking for work lagged the nation, State and region both in the long term (2000-14) and most critically in the post-recession (2009-14) periods. The number of County residents engaged in work activites is only slightly higher than at the trough of the recession. This may indicate the ongoing need for training programs to reposition workers that lost their job in the Great Recession.

## Table 2-2: Summary Demographic Characteristics - U.S., Maryland, the Baltimore Metro Area and Baltimore County, 2000-2014

| | United States | | | % Change | | Maryland | | | % Change | | Baltimore MSA | | | % Change | | Baltimore County | | | % Change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Demographic Characteristic | 2000 | 2009 | 2014 | 2000-14 | 2009-14 | 2000 | 2009 | 2014 | 2000-14 | 2009-14 | 2000 | 2009 | 2014 | 2000-14 | 2009-14 | 2000 | 2009 | 2014 | 2000-14 | 2009-14 |
| Total Population | 281,421,906 | 307,006,556 | 318,857,056 | 13.3% | 4% | 5,296,486 | 5,699,478 | 5,976,407 | 12.8% | 5% | 2,552,994 | 2,690,886 | 2,785,874 | 9% | 4% | 754,292 | 789,814 | 826,925 | 9.6% | 5% |
| One Race White | 211,460,626 | 229,773,131 | 233,963,128 | 11% | 2% | 3,391,308 | 3,432,154 | 3,432,582 | 1% | 0% | 1,719,315 | 1,722,490 | 1,707,689 | (1%) | (1%) | 561,132 | 541,781 | 516,823 | (8%) | (5%) |
| One Race African American | 34,658,190 | 38,093,725 | 40,379,066 | 17% | 6% | 1,477,411 | 1,652,857 | 1,774,618 | 20% | 7% | 699,962 | 764,778 | 815,130 | 16% | 7% | 151,600 | 208,272 | 230,073 | 52% | 10% |
| Hispanic | 35,305,818 | 48,356,760 | 55,279,452 | 57% | 14% | 227,916 | 412,453 | 556,179 | 144% | 35% | 51,329 | 99,642 | 147,928 | 188% | 48% | 13,774 | 26,380 | 41,407 | 201% | 57% |
| Foreign Born | 31,107,889 | 38,517,234 | 42,391,794 | 36% | 10% | 518,315 | 730,400 | 890,439 | 72% | 22% | 146,128 | 222,678 | 281,972 | 93% | 27% | 53,784 | 82,811 | 103,692 | 93% | 25% |
| Households | 105,480,101 | 113,616,229 | 117,259,427 | 11% | 3% | 1,980,859 | 2,095,122 | 2,165,438 | 9% | 3% | 974,071 | 1,005,051 | 1,032,604 | 6% | 3% | 299,877 | 308,039 | 311,099 | 4% | 1% |
| Median Age | 35.3 | 36.8 | 37.7 | | | 36 | 37.7 | 38.3 | | | n.a. | 37.8 | 38.2 | | | 37.7 | 38.8 | 39.2 | | |
| Population by Selected Age Group | | | | | | | | | | | | | | | | | | | | |
| Under 19 | 80,473,265 | 83,634,477 | 82,433,403 | 2% | (1%) | 1,492,965 | 1,521,232 | 1,508,866 | 1% | (1%) | 713,064 | 702,020 | 692,067 | (3%) | (1%) | 197,692 | 196,339 | 201,854 | 2% | 3% |
| 20 to 24 years | 18,964,001 | 21,419,696 | 22,698,029 | 20% | 6% | 314,129 | 380,507 | 404,728 | 29% | 6% | 151,413 | 184,493 | 190,444 | 26% | 3% | 45,112 | 53,627 | 54,721 | 21% | 2% |
| 25 to 34 years | 39,891,724 | 41,373,577 | 43,323,099 | 9% | 5% | 748,521 | 751,062 | 827,460 | 11% | 10% | 354,647 | 370,084 | 401,557 | 13% | 9% | 101,340 | 109,340 | 115,167 | 14% | 5% |
| 35 to 44 years | 45,148,527 | 41,674,213 | 40,751,359 | (10%) | (2%) | 916,156 | 804,593 | 771,141 | (16%) | (4%) | 438,027 | 369,750 | 349,080 | (20%) | (6%) | 123,444 | 103,169 | 100,913 | (18%) | (2%) |
| 45 to 54 years | 37,677,952 | 44,597,268 | 43,353,277 | 15% | (3%) | 755,032 | 886,428 | 877,068 | 16% | (1%) | 362,570 | 415,644 | 402,514 | 11% | (3%) | 108,542 | 120,011 | 113,629 | 5% | (5%) |
| 55 to 59 years | 13,469,237 | 18,781,293 | 21,314,688 | 58% | 13% | 268,647 | 359,480 | 415,303 | 55% | 16% | 128,656 | 168,436 | 195,041 | 52% | 16% | 37,849 | 51,231 | 59,917 | 58% | 17% |
| 60 to 64 years | 10,805,447 | 16,019,384 | 18,768,308 | 74% | 17% | 201,729 | 304,840 | 349,670 | 73% | 15% | 97,419 | 145,194 | 164,594 | 69% | 13% | 29,978 | 42,754 | 49,952 | 67% | 17% |
| 65 and Older | 34,991,753 | 39,506,648 | 46,214,893 | 32% | 17% | 599,307 | 691,336 | 822,171 | 37% | 19% | 307,198 | 335,265 | 390,577 | 27% | 16% | 110,335 | 113,343 | 130,772 | 19% | 15% |
| Population 16 years and over | 217,168,077 | 241,002,178 | 253,588,947 | 17% | 5% | 4,085,942 | 4,512,846 | 4,775,143 | 17% | 6% | 1,977,083 | 2,144,721 | 2,234,808 | 13% | 4% | 595,770 | 638,844 | 668,127 | 12% | 5% |
| In labor force | 138,820,935 | 157,334,979 | 160,532,722 | 16% | 2% | 2,769,525 | 3,153,477 | 3,249,757 | 17% | 3% | 1,313,310 | 1,466,465 | 1,499,762 | 14% | 2% | 396,897 | 442,565 | 442,773 | 12% | 0.0% |
| Civilian labor force | 137,668,798 | 156,044,453 | 159,550,452 | 16% | 2% | 2,737,359 | 3,117,747 | 3,225,569 | 18% | 3% | 1,297,887 | 1,451,742 | 1,485,315 | 14% | 2% | 396,226 | 441,548 | 442,442 | 12% | 0.2% |
| Employed | 129,721,512 | 140,602,470 | 148,019,908 | 14% | 5.3% | 2,608,457 | 2,867,600 | 2,994,301 | 15% | 4.4% | 1,232,921 | 1,336,532 | 1,384,210 | 12% | 4% | 379,705 | 410,017 | 414,767 | 9% | 1% |
| Unemployed | 7,947,286 | 15,441,983 | 11,530,544 | 45% | (25%) | 128,902 | 250,147 | 231,268 | 79% | (8%) | 64,966 | 115,210 | 101,105 | 56% | (12%) | 16,521 | 31,531 | 27,675 | 68% | (12%) |
| Armed Forces | 1,152,137 | 1,290,526 | 982,270 | (15%) | (24%) | 32,166 | 35,730 | 24,188 | (25%) | (32%) | 15,423 | 14,723 | 14,447 | (6%) | (2%) | 671 | 1,017 | 331 | (51%) | (67%) |
| Not in labor force | 78,347,142 | 83,667,199 | 93,056,225 | 19% | 11% | 1,316,417 | 1,359,369 | 1,525,386 | 16% | 12% | 663,773 | 678,256 | 735,046 | 11% | 8% | 198,873 | 196,279 | 225,354 | 13% | 15% |
| Civilian employed population 16 years and over | 129,721,512 | 140,602,470 | 148,019,908 | 14% | 5% | 2,608,457 | 2,867,600 | 2,994,301 | 15% | 4% | 1,232,921 | 1,336,532 | 1,384,210 | 12% | 4% | 379,705 | 410,017 | 414,767 | 9% | 1% |
| Management, business, science, and arts | 43,646,731 | 50,179,987 | 54,622,492 | 25% | 8.9% | 1,076,233 | 1,242,526 | 1,338,363 | 24% | 7.7% | 490,723 | 578,664 | 626,381 | 28% | 8% | 149,884 | 172,657 | 180,380 | 20% | 4% |
| Service occupations | 19,276,947 | 25,066,647 | 26,950,798 | 40% | 8% | 363,833 | 482,261 | 518,961 | 43% | 8% | 173,156 | 214,206 | 233,204 | 35% | 9% | 50,193 | 60,046 | 72,154 | 44% | 20% |
| Sales and office occupations | 34,621,390 | 35,425,756 | 35,098,114 | 1% | (1%) | 688,728 | 694,414 | 652,000 | (5%) | (6%) | 337,893 | 337,113 | 314,640 | (7%) | (7%) | 110,226 | 110,923 | 98,072 | (11%) | (12%) |
| Natural resources, construction, and maintenance occupations | 13,207,948 | 13,261,967 | 13,191,538 | (0%) | (1%) | 231,241 | 226,949 | 241,191 | 4% | 6% | 105,860 | 96,434 | 97,360 | (8%) | 1% | 30,765 | 30,419 | 28,917 | (6%) | (5%) |
| Production, transportation, and material moving occupations | 18,968,496 | 16,668,113 | 18,156,966 | (4%) | 9% | 248,422 | 221,450 | 243,786 | (2%) | 10% | 125,289 | 110,115 | 112,625 | (10%) | 2% | 38,637 | 35,972 | 35,244 | (9%) | (2%) |
| Population 25 and over | 182,211,639 | 201,952,383 | 213,725,624 | 17% | 6% | 3,495,595 | 3,797,739 | 4,062,813 | 16% | 7% | 1,691,080 | 1,804,373 | 1,903,363 | 13% | 5% | 511,434 | 539,848 | 570,350 | 12% | 6% |
| Less than High School | 35,715,625 | 29,785,248 | 27,992,034 | (22%) | (6%) | 565,086 | 447,385 | 422,614 | (25%) | (6%) | 306,272 | 214,717 | 184,557 | (40%) | (14%) | 80,054 | 58,517 | 55,022 | (31%) | (6%) |
| High school graduate | 52,168,981 | 57,551,671 | 59,249,552 | 14% | 3% | 933,836 | 1,013,865 | 1,043,926 | 12% | 3% | 458,761 | 495,551 | 511,969 | 12% | 3% | 141,035 | 150,356 | 158,116 | 12% | 5% |
| Some college, no degree | 38,351,595 | 43,087,484 | 44,799,481 | 17% | 4% | 711,127 | 747,161 | 776,715 | 9% | 4% | 341,196 | 358,249 | 363,805 | 7% | 2% | 105,147 | 112,733 | 106,104 | 1% | (6%) |
| Associate's degree | 11,512,833 | 15,192,326 | 17,429,531 | 51% | 15% | 186,186 | 234,060 | 265,874 | 43% | 14% | 91,009 | 109,137 | 124,999 | 37% | 15% | 28,857 | 30,530 | 39,115 | 36% | 28% |
| Bachelor's degree | 28,317,792 | 35,494,367 | 39,864,014 | 41% | 12% | 629,304 | 748,377 | 841,315 | 34% | 12% | 292,770 | 358,995 | 406,135 | 39% | 13% | 92,487 | 108,011 | 122,997 | 33% | 14% |
| Graduate or professional de | 16,144,813 | 20,841,287 | 24,391,012 | 51% | 17% | 470,056 | 606,891 | 712,369 | 52% | 17% | 201,072 | 267,724 | 311,898 | 55% | 16% | 63,854 | 79,701 | 88,996 | 39% | 12% |

Source: JFI Analysis of Census ACS Data

## Attraction and Retention of Talent

While broad patterns of population change and migration have supported Baltimore County population growth, analyzing post-recession trends in migration yields some relevant insights into overall workforce trends impacting the County.

***Post-recession trends in County migration patterns are mixed in terms of their impact on the County's workforce***. Since 2009, Baltimore County has gained residents from in-State migration but is losing residents to out-of-State migration. This is important because dynamic economies are generally those that are successful in attracting talent from outside of the region. Baltimore County is gaining Millennials from in-State migration, but losing some to out-state migration (Table 2-3). The County is losing residents in the prime high income earning years of 45-59 years old to outmigration, with most moving within Maryland. Since 2009, the County is losing better educated workers to both other Maryland jurisdications and to out-of-state migration (Table 2-4). Based on IRS migration data and consistent with the loss of better educated and older workers to outmigration, the residents moving into the County tend to have lower incomes than those moving out of the County (Table 2-5). These outmigration trends again point to the need to promote placemaking strategies and the development of the live-work-play environments within the County that are increasingly important for talent retention.

**Table 2-3: Baltimore County Net Migration by Age, 2009-14**

| | Within Maryland | Out of State |
|---|---|---|
| Total | 12,438 | (5,456) |
| Under 19 | 6,676 | (5,308) |
| 20 to 24 years | 3,149 | 2,879 |
| 25 to 34 years | 3,492 | (620) |
| 35 to 44 years | 466 | (1,468) |
| 45 to 54 years | (3,600) | 1,729 |
| 55 to 59 years | (304) | (450) |
| 60 to 64 years | 128 | (854) |
| 65 and Older | 2,431 | (1,364) |

Source: U.S. Bureau of the Census ACS

**Table 2-4: Baltimore County Net Migration by Educational Attainment, 2009-14**

| | Within Maryland | Out of State |
|---|---|---|
| Total | 2,613 | (3,027) |
| Less than high school graduate | 231 | 1,593 |
| High school graduate (includes equivalency) | 757 | (173) |
| Some college or associate's degree | 9,081 | (798) |
| Bachelor's degree | (5,559) | (2,390) |
| Graduate or professional degree | (1,897) | (1,259) |

Source: U.S. Bureau of the Census ACS

**Table 2-5: Baltimore County Migration Trends**

| Item | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|---|---|---|---|---|---|
| Total In-Migration (Returns) | 20,950 | 20,139 | 19,968 | 22,150 | 22,296 |
| In-State | 14,150 | 14,059 | 13,556 | 15,074 | 15,280 |
| Out of State and Foreign | 6,800 | 6,080 | 6,412 | 7,076 | 7,016 |
| Average Income | $42,882 | $42,439 | $43,544 | $50,311 | $50,672 |
| Total Out-Migration (Returns) | 21,711 | 20,363 | 19,897 | 21,970 | 23,106 |
| In-State | 13,649 | 13,372 | 12,515 | 13,959 | 14,467 |
| Out of State and Foreign | 8,062 | 6,991 | 7,382 | 8,011 | 8,639 |
| Average Income | $47,470 | $46,282 | $48,603 | $51,984 | $59,401 |
| Net In-Migration | (761) | (224) | 71 | 180 | (810) |
| In-State | 501 | 687 | 1,041 | 1,115 | 813 |
| Out of State and Foreign | (1,262) | (911) | (970) | (935) | (1,623) |
| Income Difference | ($4,588) | ($3,843) | ($5,059) | ($1,672) | ($8,729) |

Source: IRS Migration Data

## Occupational Profile of Baltimore County Workforce

The composition of and changes in resident occupational employment are also critically important variables in assessing the strength of Baltimore County's overall workforce and its alignment to the demands of the County's employer community. The Valbridge-JFI Team analyzed the current occupational composition of the County's workforce using occupational location quotients[12] and post-recession trends in occupational employment in the County as compared to the nation, state and region.

***Baltimore County has a high share of its workforce employed in higher wage, higher skilled occupations.*** The overall occupational composition of Baltimore County is competitive nationally in terms of the concentration of employment in higher wage occupations, but the County has a somewhat lower

[12] According to the U.S. Bureau of Labor Statistics "Location quotients are useful for studying the composition of jobs in an area relative to the average, or for finding areas that have high concentrations of jobs in certain occupations. As measured here, a location quotient shows the occupation's share of an area's employment relative to the national average. For example, a location quotient of 2.0 indicates that an occupation accounts for twice the share of employment in the area than it does nationally, and a location quotient of 0.5 indicates the area's share of employment in the occupation is half the national share." See http://www.bls.gov/oes/highlight_location_quotients.pdf.

concentration of employed residents in these occupations than the State and region. Overall, the County is competitive nationally in terms of its share of resident workers in: Management, business, and financial occupations; Computer, engineering, and science occupations; Education, legal, community service, arts, and media occupations; and Healthcare practitioners and technical occupations. These occupations tend to be high wage, high skilled occupations. Several areas of resident occupational employment stand out and are consistent with the key industry clusters identified in Chapter 1. These are:

- Management, business, and financial occupations where the County's occupational LQ is 1.08, indicating a concentration of resident employment 8 percent above the national average. The County is particularly competitive in Business and financial operations occupations, where its concentration of employed residents is 26 percent above the national average. While these occupations can be found in industries across the economy and core industry clusters, they are critical to the: Corporate Operations Centers/Shared Services; Federal Agencies; and Financial Services clusters;
- Computer, engineering, and science occupations where the County's resident occupational LQ is 1.33, indicating a concentration of resident employment 33 percent above the national average. The County is particularly strong in terms of its resident employment concentration in Computer and mathematical occupations, with an occupational LQ of 1.57. While these occupations can again be found in industries across the economy, they are critical to the: Corporate Operations Centers/Shared Services; Federal Agencies and Information Technology Services clusters; and
- Baltimore County stands out in terms of its concentration of resident employment in both Healthcare practitioners and technical occupations and Healthcare support occupations where its concentrations of resident employment are higher than the state and regional levels. It is clear that Baltimore County has the workforce to support its targeted Healthcare cluster and is an important source of healthcare workers to the State and region.

***Baltimore County has a diverse workforce***. While the County has a strong concentration of resident employment in the higher skilled occupations discussed above, the County also has higher concentrations of workers employed in many Middle and Lower Skilled occupations than the State or region (but generally lower than the nation) in: Protective service occupations, with an occupational LQ of 1.40; Sales and office occupations, with an occupational LQ of 1.00; and Production, transportation, and material moving occupations, with an occupational LQ of 0.69. While the County Occupational LQ's for Sales and office occupations signifies an employment concentration at the national average and the occupational LQ for Production, transportation, and material moving occupations, indicates a concentration of employment below the national average, the concentration of resident employees in these occupations is above the state and regional average for both. Many of these occupational groupings are important to the Manufacturing and Port Industries, Logistics and Distribution Centers clusters.

***While the County has a strong concentration of employment in several key occupational areas, post-recession growth in some of these occupations has lagged the nation, State and region***. The County has experienced strong growth in resident employment in: Business and financial operations occupations; Life, physical, and social science occupations; and Healthcare support occupations; but has lagged the nation, State or region in terms of growth in: Management occupations; Architecture and engineering occupations; and Healthcare practitioners and technical occupations.

**Table 2-6: Occupational Location Quotient of Civilian Employed Population 16 Years and Older by Occupation**

| Occupation | Maryland | Baltimore Metro | Baltimore County |
|---|---|---|---|
| **Total** | | | |
| Management, business, science, and arts occupations: | 1.21 | 1.23 | 1.18 |
| Management, business, and financial occupations: | 1.17 | 1.18 | 1.08 |
| Management occupations | 1.14 | 1.16 | 1.00 |
| Business and financial operations occupations | 1.25 | 1.25 | 1.26 |
| Computer, engineering, and science occupations: | 1.61 | 1.55 | 1.33 |
| Computer and mathematical occupations | 1.81 | 1.80 | 1.57 |
| Architecture and engineering occupations | 1.10 | 1.13 | 0.83 |
| Life, physical, and social science occupations | 2.01 | 1.60 | 1.61 |
| Education, legal, community service, arts, and media occupations: | 1.14 | 1.15 | 1.16 |
| Community and social service occupations | 1.13 | 1.25 | 1.43 |
| Legal occupations | 1.37 | 1.27 | 1.21 |
| Education, training, and library occupations | 1.11 | 1.12 | 1.07 |
| Arts, design, entertainment, sports, and media occupations | 1.11 | 1.10 | 1.15 |
| Healthcare practitioners and technical occupations: | 1.07 | 1.17 | 1.32 |
| Health diagnosing and treating practitioners and other technical occupations | 1.09 | 1.26 | 1.45 |
| Health technologists and technicians | 1.03 | 0.99 | 1.06 |
| Service occupations: | 0.95 | 0.93 | 0.96 |
| Healthcare support occupations | 0.97 | 1.06 | 1.15 |
| Protective service occupations: | 1.36 | 1.38 | 1.40 |
| Fire fighting and prevention, and other protective service workers including supervisors | 1.47 | 1.51 | 1.52 |
| Law enforcement workers including supervisors | 1.23 | 1.21 | 1.24 |
| Food preparation and serving related occupations | 0.84 | 0.84 | 0.86 |
| Building and grounds cleaning and maintenance occupations | 0.92 | 0.75 | 0.74 |
| Personal care and service occupations | 0.91 | 0.89 | 0.95 |
| Sales and office occupations: | 0.92 | 0.96 | 1.00 |
| Sales and related occupations | 0.85 | 0.92 | 0.94 |
| Office and administrative support occupations | 0.97 | 0.99 | 1.05 |
| Natural resources, construction, and maintenance occupations: | 0.90 | 0.79 | 0.78 |
| Farming, fishing, and forestry occupations | 0.39 | 0.30 | 0.31 |
| Construction and extraction occupations | 0.94 | 0.77 | 0.79 |
| Installation, maintenance, and repair occupations | 0.97 | 0.94 | 0.89 |
| Production, transportation, and material moving occupations: | 0.66 | 0.66 | 0.69 |
| Production occupations | 0.50 | 0.50 | 0.49 |
| Transportation and material moving occupations | 0.82 | 0.82 | 0.89 |

Source: Source: U.S. Bureau of the Census ACS

## Table 2-7: Employment by Occupation for the Civilian Employed Population 16 Years and Older

| | United States | | 2009-14 | Maryland | | 2009-14 | Baltimore Metro | | 2009-14 | Baltimore County | | 2009-14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2014 | % Change | 2009 | 2014 | % Change | 2009 | 2014 | % Change | 2009 | 2014 | % Change |
| **Total** | **140,602,470** | **148,019,908** | **5%** | **2,867,600** | **2,994,301** | **4%** | **1,336,532** | **1,384,210** | **4%** | **410,017** | **414,767** | **1%** |
| Management, business, science, and arts occupations: | 50,179,987 | 54,622,492 | 9% | 1,242,526 | 1,338,363 | 8% | 578,664 | 626,381 | 8% | 172,657 | 180,380 | 4% |
| Management, business, and financial occupations: | 20,037,815 | 21,946,506 | 10% | 492,727 | 521,186 | 6% | 224,317 | 243,120 | 8% | 67,010 | 66,674 | (1%) |
| Management occupations | 13,740,168 | 14,846,834 | 8% | 325,375 | 341,606 | 5% | 150,242 | 160,377 | 7% | 44,293 | 41,548 | (6%) |
| Business and financial operations occupations | 6,297,647 | 7,099,672 | 13% | 167,352 | 179,580 | 7% | 74,075 | 82,743 | 12% | 22,717 | 25,126 | 11% |
| Computer, engineering, and science occupations: | 7,421,301 | 8,073,244 | 9% | 252,533 | 262,465 | 4% | 113,922 | 116,778 | 3% | 29,577 | 30,087 | 2% |
| Computer and mathematical occupations | 3,472,221 | 4,119,236 | 19% | 137,016 | 150,862 | 10% | 62,676 | 69,398 | 11% | 17,537 | 18,100 | 2% |
| Architecture and engineering occupations | 2,594,829 | 2,663,497 | 3% | 63,726 | 59,056 | (7%) | 33,786 | 28,077 | (17%) | 7,204 | 6,160 | (14%) |
| Life, physical, and social science occupations | 1,354,251 | 1,290,511 | (5%) | 51,791 | 52,547 | 1% | 17,460 | 19,303 | 11% | 4,836 | 5,827 | 20% |
| Education, legal, community service, arts, and media occupations: | 15,170,971 | 15,971,308 | 5% | 335,097 | 367,898 | 10% | 152,768 | 172,167 | 13% | 44,252 | 51,743 | 17% |
| Community and social service occupations | 2,337,698 | 2,521,254 | 8% | 54,101 | 57,868 | 7% | 24,896 | 29,489 | 18% | 8,391 | 10,109 | 20% |
| Legal occupations | 1,662,509 | 1,661,609 | (0%) | 50,066 | 46,131 | (8%) | 19,501 | 19,729 | 1% | 6,335 | 5,625 | (11%) |
| Education, training, and library occupations | 8,551,258 | 8,910,030 | 4% | 171,210 | 199,252 | 16% | 82,597 | 93,428 | 13% | 21,694 | 26,736 | 23% |
| Arts, design, entertainment, sports, and media occupations | 2,619,506 | 2,878,415 | 10% | 59,720 | 64,647 | 8% | 25,774 | 29,521 | 15% | 7,832 | 9,273 | 18% |
| Healthcare practitioners and technical occupations: | 7,549,900 | 8,631,434 | 14% | 162,169 | 186,814 | 15% | 87,657 | 94,316 | 8% | 31,818 | 31,876 | 0% |
| Health diagnosing and treating practitioners and other technical occupations | 5,107,441 | 5,772,601 | 13% | 112,787 | 127,428 | 13% | 62,433 | 67,923 | 9% | 22,270 | 23,396 | 5% |
| Health technologists and technicians | 2,442,459 | 2,858,833 | 17% | 49,382 | 59,386 | 20% | 25,224 | 26,393 | 5% | 9,548 | 8,480 | (11%) |
| Service occupations: | 25,066,647 | 26,950,798 | 8% | 482,261 | 518,961 | 8% | 214,206 | 233,204 | 9% | 60,046 | 72,154 | 20% |
| Healthcare support occupations | 3,401,975 | 3,516,392 | 3% | 59,223 | 68,802 | 16% | 25,838 | 34,951 | 35% | 6,944 | 11,290 | 63% |
| Protective service occupations: | 3,204,989 | 3,269,090 | 2% | 90,881 | 90,196 | (1%) | 41,831 | 42,094 | 1% | 11,324 | 12,787 | 13% |
| Fire fighting and prevention, and other protective service workers including supervisors | 1,735,026 | 1,794,061 | 3% | 51,574 | 53,388 | 4% | 23,911 | 25,364 | 6% | 5,523 | 7,662 | 39% |
| Law enforcement workers including supervisors | 1,469,963 | 1,475,029 | 0% | 39,307 | 36,808 | (6%) | 17,920 | 16,730 | (7%) | 5,801 | 5,125 | (12%) |
| Food preparation and serving related occupations | 7,821,140 | 8,728,394 | 12% | 127,667 | 148,601 | 16% | 56,984 | 68,744 | 21% | 17,323 | 21,150 | 22% |
| Building and grounds cleaning and maintenance occupations | 5,586,647 | 5,945,384 | 6% | 102,069 | 110,060 | 8% | 43,388 | 41,878 | (3%) | 10,702 | 12,338 | 15% |
| Personal care and service occupations | 5,051,896 | 5,491,538 | 9% | 102,421 | 101,302 | (1%) | 46,165 | 45,537 | (1%) | 13,753 | 14,589 | 6% |
| Sales and office occupations: | 35,425,756 | 35,098,114 | (1%) | 694,414 | 652,000 | (6%) | 337,113 | 314,640 | (7%) | 110,923 | 98,072 | (12%) |
| Sales and related occupations | 15,741,762 | 15,864,596 | 1% | 270,187 | 273,591 | 1% | 131,800 | 137,041 | 4% | 43,431 | 41,728 | (4%) |
| Office and administrative support occupations | 19,683,994 | 19,233,518 | (2%) | 424,227 | 378,409 | (11%) | 205,313 | 177,599 | (13%) | 67,492 | 56,344 | (17%) |
| Natural resources, construction, and maintenance occupations: | 13,261,967 | 13,191,538 | (1%) | 226,949 | 241,191 | 6% | 96,434 | 97,360 | 1% | 30,419 | 28,917 | (5%) |
| Farming, fishing, and forestry occupations | 988,070 | 1,102,758 | 12% | 5,453 | 8,639 | 58% | 1,306 | 3,131 | 140% | 287 | 962 | 235% |
| Construction and extraction occupations | 7,573,078 | 7,470,757 | (1%) | 141,001 | 142,083 | 1% | 56,452 | 53,635 | (5%) | 15,527 | 16,478 | 6% |
| Installation, maintenance, and repair occupations | 4,700,819 | 4,618,023 | (2%) | 80,495 | 90,469 | 12% | 38,676 | 40,594 | 5% | 14,605 | 11,477 | (21%) |
| Production, transportation, and material moving occupations: | 16,668,113 | 18,156,966 | 9% | 221,450 | 243,786 | 10% | 110,115 | 112,625 | 2% | 35,972 | 35,244 | (2%) |
| Production occupations | 8,308,821 | 8,824,465 | 6% | 86,896 | 89,499 | 3% | 44,235 | 41,068 | (7%) | 14,602 | 12,029 | (18%) |
| Transportation and material moving occupations | 8,359,292 | 9,332,501 | 12% | 134,554 | 154,287 | 15% | 65,880 | 71,557 | 9% | 21,370 | 23,215 | 9% |

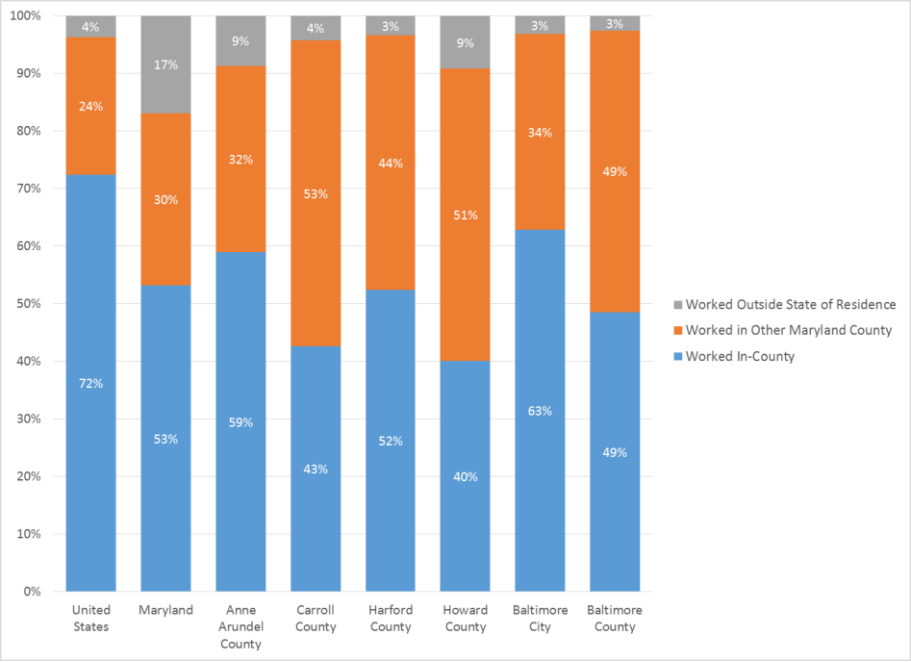
Source: U.S. Bureau of the Census ACS

## Baltimore County Commuting Patterns

Baltimore County is a major source of workers not just for employers located in the County but for employers across the state and region. As the third largest population center in the State and the largest in the Baltimore Metropolitan area, the County is a source of workers for employers across the State and region. As one of the larger inner-suburban counties in the nation, a large number of County residents commute outside of the County, and outside of the State for work. ***As described in the analysis below, these out-commuters are a vital potential source of labor for the County's employer community***.

***Out-Commuters represent a major and growing portion of the Baltimore County workforce***. Within the Metropolitan Area, Baltimore County has the third highest percentage of its resident workforce commuting out of the County, with 51 percent of workers commuting to other Maryland jurisdictions or out-of-State. Only Howard County (60 percent commuting outside the County) and Carroll County (57 percent commuting outside the County) have a higher share of out-commuters (Chart 2-8). Indeed, much of the growth in resident employment since 2000 has occurred with out-commuters, with the number of employed residents working in the County in 2014 only slightly higher than 2000 levels (Table 2-9). The number of employed residents working in the County has not yet recovered to pre-recession levels, indicating the stronger linkages between the County's workforce and the larger State and regional economy.

**Chart 2-8: Baltimore Metro Area Commuting Patterns**




Source: U.S. Bureau of the Census ACS

**Table 2-9: Baltimore County Employment by Place of Work, 2000-2014**

| Employment by Place of Work | 2000 | 2009 | 2014 | % Change 2000-14 | % Change 2009-14 |
|---|---|---|---|---|---|
| Total: | 373,496 | 402,385 | 407,683 | 9% | 1% |
| Worked in state of residence: | 364,564 | 389,925 | 397,362 | 9% | 2% |
| Worked in county of residence | 196,917 | 202,399 | 197,834 | 0.5% | (2%) |
| Worked outside county of residence | 167,647 | 187,526 | 199,528 | 19% | 6% |
| Worked outside state of residence | 8,932 | 12,460 | 10,321 | 16% | (17%) |

Source: U.S. Bureau of the Census ACS

**Baltimore County is a major source of workers for Baltimore City, but also for Anne Arundel, Howard and Montgomery Counties**. Not surprisingly given the County's location, it is a major source of workers for Baltimore City, where 28 percent of employed County residents work and the County has a net outflow (out-commuters going to less in-commuters coming from) of 49,129 workers. Eight percent of County residents work in Anne Arundel County and 6 percent work in Howard County, with a net outflow of 9,700 and 9,257 workers respectively. Baltimore County also has a net outflow of workers to Montgomery and Prince George's Counties and is a net exporter of workers as far away as Washington, DC and Virginia. Baltimore County experiences a net inflow of workers from Pennsylvania, and Harford and Carroll Counties in Maryland.

**Table 2-10: Place of Work, Place of Residence for County Resident Workers and County Employment**

| Work in/Live in | Baltimore County Resident Workers Total | % | Baltimore County Jobs Total | % | Net Inflow (+) Outflow (-) |
|---|---|---|---|---|---|
| Total Primary Jobs | 368,959 | 100% | 342,170 | 100% | (26,789) |
| Baltimore County | 148,955 | 40% | 148,955 | 44% | n.m. |
| Anne Arundel County | 28,023 | 8% | 18,323 | 5% | (9,700) |
| Carroll County | 5,668 | 2% | 16,110 | 5% | 10,442 |
| Harford County | 9,367 | 3% | 27,601 | 8% | 18,234 |
| Howard County | 23,755 | 6% | 14,498 | 4% | (9,257) |
| Baltimore City | 104,923 | 28% | 55,794 | 16% | (49,129) |
| Montgomery County | 12,976 | 4% | 8,777 | 3% | (4,199) |
| Prince George's County | 10,588 | 3% | 9,736 | 3% | (852) |
| Other Maryland Counties | 8,852 | 2% | 17,568 | 5% | 8,716 |
| District of Columbia | 4,407 | 1% | 1,515 | 0% | (2,892) |
| Virginia | 3,362 | 1% | 3,052 | 1% | (310) |
| Pennsylvania | 3,338 | 1% | 14,505 | 4% | 11,167 |
| All Other | 4,745 | 1% | 5,736 | 2% | 991 |

Source: Census LEHD

***Out-commuters are a critically important potential source of labor to the County's employer community***. As Baltimore County seeks to expand its high skilled, technology driven employment base, there are substantial opportunities to capitalize on its large base of out-commuters as a potential source of labor. County residents that commute to jobs outside of the County tend to be better educated than residents that work in the County. Forty-four percent of County residents that work in Baltimore City and half of residents that work outside of the Metro area have a Bachelor's Degree or above, compared to 38 percent of residents working in the County. More than half of employed County resident Millennials (25 to 34 year olds) commute to jobs outside of the County.[13]

***Many County residents commute to jobs in its targeted industry clusters outside of the County.*** These workers are a core potential source of labor for efforts to support the growth and development of these clusters. Some examples are as follows:

- More than two-thirds of County residents working for the federal government, one of the County's nine target industry clusters, work outside of the County, indicating and opportunity to attract more federal employment opportunities into the County;
- More than half (53 percent) of workers employed in the manufacturing sector work outside of the County, providing a potential source of labor to the targeted Manufacturing industry cluster;
- Sixty-four percent of workers employed in the wholesale sector work outside of the County, providing a potential source of labor to the targeted Port Industries, Logistics and Distribution Centers cluster; and
- At the occupational level, 63 percent of employed residents in Healthcare practitioners and technical occupations and 62 percent of employed residents in Computer, engineering, and science occupations commute to jobs outside of the County, providing a potential source of workers for the targeted Healthcare, Corporate Operations Centers/Shared Services and Information Technology Services clusters.

[13] Data on the characteristics of workers by place of work is based on an analysis of U.S. Bureau of the Census American Community Survey Public Use Microdata (PUMS) data tabulated by the JFI.

| Table 2-11: Workforce Demographic Characteristics of Employed Baltimore County Residents by Place of Work[1], 2014 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Place of Work | | | | | | | |
| | In-County | | Baltimore City | | Other Baltimore Metro | | Out of Metro | |
| **Item** | **#** | **%** | **#** | **%** | **#** | **%** | **#** | **%** |
| **Total Responses** | **203,567** | | **114,646** | | **64,094** | | **24,641** | |
| **Demographics** | | | | | | | | |
| White alone | 145,146 | 71% | 59,424 | 52% | 43,094 | 67% | 13,803 | 56% |
| Black or African American alone | 40,910 | 20% | 44,603 | 39% | 15,325 | 24% | 7,681 | 31% |
| Hispanic | 9,089 | 4% | 4,586 | 4% | 3,381 | 5% | 1,767 | 7% |
| **Citizenship** | | | | | | | | |
| U.S. Citizen by Birth | 173,484 | 85% | 94,464 | 82% | 55,767 | 87% | 19,779 | 80% |
| Naturalized Citizen | 17,699 | 9% | 12,232 | 11% | 4,945 | 8% | 2,301 | 9% |
| Not a Citizen | 12,384 | 6% | 7,950 | 7% | 3,382 | 5% | 2,561 | 10% |
| **Average Wage and Salary Income** | $50,880 | | $64,151 | | $56,740 | | $80,314 | |
| **Educational Attainment** | | | | | | | | |
| Less Than High School | 15,510 | 8% | 7,666 | 7% | 4,480 | 7% | 1,241 | 5% |
| High School Graduate | 50,615 | 25% | 25,178 | 22% | 13,968 | 22% | 5,270 | 21% |
| Some College | 46,000 | 23% | 21,562 | 19% | 17,251 | 27% | 3,728 | 15% |
| Associate Degree | 14,113 | 7% | 9,794 | 9% | 5,044 | 8% | 2,072 | 8% |
| Bachelor's Degree | 47,466 | 23% | 28,328 | 25% | 13,408 | 21% | 6,465 | 26% |
| Graduate or Professional Degree | 29,863 | 15% | 22,118 | 19% | 9,943 | 16% | 5,865 | 24% |
| **Class of Worker** | | | | | | | | |
| Private Company/Nonprofit Organization | 151,606 | 74% | 86,094 | 75% | 48,020 | 75% | 16,571 | 67% |
| Local Government | 16,487 | 8% | 8,790 | 8% | 4,289 | 7% | 777 | 3% |
| State Government | 6,827 | 3% | 9,725 | 8% | 3,413 | 5% | 1,308 | 5% |
| Federal Government | 7,396 | 4% | 5,285 | 5% | 5,442 | 8% | 4,696 | 19% |
| Self Employed | 20,922 | 10% | 4,684 | 4% | 2,816 | 4% | 1,289 | 5% |
| **Age** | | | | | | | | |
| 16 to 20 Years | 8,365 | 4% | 2,622 | 2% | 1,495 | 2% | 284 | 1% |
| 20 to 24 years | 18,364 | 9% | 6,141 | 5% | 5,296 | 8% | 1,735 | 7% |
| 25 to 34 years | 44,089 | 22% | 27,454 | 24% | 17,556 | 27% | 5,494 | 22% |
| 35 to 44 years | 36,685 | 18% | 26,193 | 23% | 12,441 | 19% | 4,343 | 18% |
| 45 to 54 years | 43,347 | 21% | 25,269 | 22% | 14,730 | 23% | 8,122 | 33% |
| 55 to 59 years | 22,478 | 11% | 11,800 | 10% | 6,894 | 11% | 1,876 | 8% |
| 60 to 64 years | 15,113 | 7% | 9,388 | 8% | 3,541 | 6% | 1,637 | 7% |
| 65 and Older | 15,126 | 7% | 5,779 | 5% | 2,141 | 3% | 1,150 | 5% |
| **Means of Transportation to Work** | | | | | | | | |
| Car, truck, or van | 178,623 | 88% | 100,669 | 88% | 61,388 | 96% | 20,543 | 83% |
| Public transportation | 4,689 | 2% | 12,077 | 11% | 656 | 1% | 3,346 | 14% |
| Walked | 5,632 | 3% | 391 | 0% | 756 | 1% | 133 | 1% |
| Bicycle, taxicab, motorcycle, or other means | 2,862 | 1% | 1,509 | 1% | 1,294 | 2% | 619 | 3% |
| Worked at home | 11,761 | 6% | | 0% | | 0% | | 0% |

[1] The total number is the estimated number of employed residents sorted by each characteristic using ACS Person Weights.

Source: 2014 American Community Survey, PUMS Data

| Table 2-12: Workforce Demographic Characteristics of Employed Baltimore County Residents by Place of Work[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Place of Work | | | | | | | |
| | In-County | | Baltimore City | | Other Baltimore Metro | | Out of Metro | |
| **Item** | **#** | **%** | **#** | **%** | **#** | **%** | **#** | **%** |
| **Total responses** | **203,567** | | **114,646** | | **64,094** | | **24,641** | |
| **Industry of Employment** | | | | | | | | |
| Agriculture, forestry, fishing and hunting, and mining | 1,217 | 1% | 137 | 0% | 75 | 0% | | 0% |
| Construction | 15,560 | 8% | 5,030 | 4% | 4,954 | 8% | 1,781 | 7% |
| Manufacturing | 10,553 | 5% | 6,977 | 6% | 3,217 | 5% | 1,738 | 7% |
| Wholesale trade | 3,440 | 2% | 2,309 | 2% | 2,312 | 4% | 1,442 | 6% |
| Retail trade | 24,829 | 12% | 7,628 | 7% | 7,378 | 12% | 2,122 | 9% |
| Transportation and warehousing, and utilities | 7,483 | 4% | 6,151 | 5% | 4,492 | 7% | 1,367 | 6% |
| Information | 3,597 | 2% | 1,472 | 1% | 1,377 | 2% | 604 | 2% |
| Finance and insurance, and real estate and rental and leasing | 20,223 | 10% | 5,785 | 5% | 3,286 | 5% | 1,803 | 7% |
| Professional, scientific, and management, and administrative and waste management services | 22,055 | 11% | 11,293 | 10% | 10,126 | 16% | 3,515 | 14% |
| Educational services, and health care and social assistance | 54,471 | 27% | 45,066 | 39% | 13,636 | 21% | 3,523 | 14% |
| Arts, entertainment, and recreation, and accommodation, and food services | 18,564 | 9% | 5,552 | 5% | 3,851 | 6% | 1,459 | 6% |
| Other services, except public administration | 9,897 | 5% | 5,494 | 5% | 2,424 | 4% | 1,361 | 6% |
| Public administration | 11,678 | 6% | 11,752 | 10% | 6,966 | 11% | 3,926 | 16% |
| **Occupational Employment** | | | | | | | | |
| Management, Business, and Financial Occupations | 33,547 | 16% | 17,205 | 15% | 9,250 | 14% | 6,257 | 25% |
| Computer, Engineering, and Science Occupations | 11,377 | 6% | 8,861 | 8% | 7,012 | 11% | 2,420 | 10% |
| Education, Legal, Community Service, Arts, and Media Occupations | 26,332 | 13% | 14,651 | 13% | 6,006 | 9% | 2,675 | 11% |
| Healthcare Practitioners and Technical Occupations | 11,979 | 6% | 16,489 | 14% | 3,543 | 6% | 801 | 3% |
| Service Occupations | 38,593 | 19% | 18,174 | 16% | 10,362 | 16% | 2,726 | 11% |
| Sales and Related Occupations | 24,495 | 12% | 8,308 | 7% | 5,911 | 9% | 2,260 | 9% |
| Office and Administrative Support Occupations | 27,136 | 13% | 15,036 | 13% | 9,407 | 15% | 2,243 | 9% |
| Natural Resources, Construction, and Maintenance Occupations | 15,998 | 8% | 5,656 | 5% | 4,800 | 7% | 1,913 | 8% |
| Production Occupations | 5,605 | 3% | 3,521 | 3% | 3,572 | 6% | 998 | 4% |
| Transportation and Material Moving Occupations | 8,505 | 4% | 6,745 | 6% | 4,231 | 7% | 2,348 | 10% |

[1] The total number is the estimated number of employed residents sorted by each characteristic using ACS Person Weights.

Source: 2014 American Community Survey, PUMS Data

## Summary and Conclusion Workforce Supply

***Baltimore County possesses substantial workforce development strengths***. The County's resident workforce is competitive in its share of Millennial workers and has a higher share of residents with a Bachelor's Degree or above and residents employed in in Creative Class-related Management, business, science, and arts occupations. Baltimore County has a high share of its workforce employed in higher wage, higher skilled occupations such as Computer, engineering and science occupations and Business and financial operations occupation than the national average, but also offers a diverse resident workforce crossing high, middle and lower skilled occupations. While the County is competitive in terms of its resident workforce, there are some warning signs in recent trends. Specifically: the post-recession rates of growth in Millennials and residents employed in Management, business, science, and arts occupations are well below national, state and regional rates; the County's growth in college educated residents is slightly below national, state and regional rates; and near and long term growth in the County's workforce lag the nation, State and region. The County is also losing educated residents as a result of out-migration to other states as well as to other Maryland jurisdictions. A key workforce development opportunity for the County is to tap into the large base of resident workers commuting to jobs outside of the County, many of whom are highly educated, work in skilled occupations, in many of the sectors targeted by the County for growth.

# Chapter 3: Opportunities and Gaps in Baltimore County's Workforce Development System

The ultimate goal of a labor market supply and demand analysis report is to:

1. Assess the alignment of a region's workforce development system and labor force to the needs of its employer community; and
2. Identify skills gaps by comparing labor market supply and demand.

Chapter 1 analyzed the historical and projected industry and occupational employment performance of the Baltimore County economy, identified patterns of past and projected occupational employment, and presented summary data on the performance of nine target industry clusters. Chapter 2 analyzed demographic trends and the occupational characteristics of the County's workforce. Thus, these two chapters assessed labor market supply (Chapter 2) and demand (Chapter 1). In this chapter, the Valbridge-JFI Team adds an analysis of the generation of local talent by the County's workforce development system and educational providers. The end result is an assessment of the overall level of alignment between the County's existing workforce and workforce development system and the needs of its employer community as well as the identification of any gaps between labor market supply and demand.

## The County Workforce Development System

Baltimore County has a robust workforce development system. The analysis focused on the generation of labor from the County's K through 16, public school and public and private higher education system. Some selected measures of workforce generation by the County's K through 12 education system are as follows (from Table 3-1):

- In FY2015, Baltimore County Public Schools graduated 7,100 students, making it the third largest source of high school graduates in the State, after Montgomery and Prince George's Counties;

- While there is no data on the post-graduation activities of high school graduates, most of the County's high school graduates plan on attending college full or part time according to the 2015 MSDE Class of 2015 High School Graduate Questionnaire;

    - While most high school graduates will go on to attend college, according to the survey as many as 18 percent plan to work fulltime. Extrapolating based on the total number of graduates, this means that an estimated 1,300 graduates will enter the workforce fulltime, with more entering part time. These represent a source of labor to the County's employer community;

- Based on MSDE Factbook data, the County has an estimated 890 high school dropouts, many of whom will need educational, job training, or educational services;

**Table 3-1: Selected Baltimore County High School Labor Market Supply Measures**

| Item | Baltimore County |
|---|---|
| High School Graduates | 7,100 |
| Graduation Plans[1] | 4,605 |
| College Fulltime | 3,030 |
| College Part-time | 901 |
| Bus. School Fulltime | 54 |
| Work Fulltime | 848 |
| Military Fulltime | 139 |
| Other | 241 |
| High School Dropouts (Grades 9-12) | 890 |

(1) Number of students who responded to the MSDE Class of 2015 High School Graduate Questionnaire. Note responses by category exceed total responses.

Source: MSDE Factbook 2014-15

Baltimore County has a particularly robust higher education system, with a major community college system, two public and two private higher education institutions. Some measures of the workforce generation by the County's public and private higher education system are (from Table 3-2):

- With enrollment of 22,887 full and part time students and 3,228 certificate and associated degrees awarded, the Community College of Baltimore County has the second highest enrollment and highest level of degrees awarded of all community college systems in Maryland;
- With 35,571 undergraduates enrolled in, and 7,984 undergraduate degrees awarded by Baltimore County public and private higher education institutions, the County is a major source of talent to the not only the region but the State and nation as well;
    - Towson University is Maryland's third largest and UMBC is Maryland's fourth largest public higher education undergraduate institution and among private colleges and universities, Stevenson University is the State's third largest;
    - Towson University is Maryland's fourth largest and UMBC is Maryland's fifth largest public higher education institution in terms of graduate degrees awarded;
- Baltimore County has among the largest public and private higher education systems in Maryland, and these institutions represent an important source of labor to the County's employer community.

**Table 3-2: Selected Baltimore County Community College and 4 Year Public and Private College and University Data**

| | Fall 2014 Enrollment | | | |
|---|---|---|---|---|
| | Undergraduate | | Graduate and Professional | |
| Item | Fulltime | Part-time | Fulltime | Part-time |
| Community College of Baltimore County | 7,301 | 15,586 | | |
| Four-Year Public and Private Institutions | 30,868 | 4,703 | 2,536 | 4,788 |
| Towson University | 16,575 | 2,232 | 1,115 | 2,363 |
| University of Maryland Baltimore County | 9,653 | 1,726 | 1,189 | 1,411 |
| Goucher College | 1,447 | 30 | 141 | 502 |
| Stevenson University | 3,193 | 715 | 91 | 512 |

| | Degrees Granted 2014-15 | | | |
|---|---|---|---|---|
| Item | Certificate | Associates | Bachelor's | Graduate and Professional |
| Community College of Baltimore County | 1,028 | 2,200 | | |
| Four-Year Public and Private Institutions | 0 | 0 | 7,984 | 2,241 |
| Towson University | | | 4,422 | 1,122 |
| University of Maryland Baltimore County | | | 2,432 | 794 |
| Goucher College | | | 290 | 146 |
| Stevenson University | | | 840 | 179 |

Source: MHEC 2016 Databook

## Gap Analysis – Alignment of County's Workforce and Workforce Development System to the Needs of the Employer Community

Labor Market Demand in terms of data on historical and projected industry employment and occupational employment were estimated in Chapter 1. Labor Market Supply in terms of the characteristics of the County's resident workforce was described in Chapter 2. The next step in conducting this Labor Market Supply and Demand analysis is to identify gaps between the supply of labor in the County and the demand for labor from the County's employer community. A workforce development system gap is the difference between the number of workers demanded by the employer community and the supply of workers available to meet that demand. In this report, the alignment in terms of how well the industry, education, training and workforce development resources in the County work together to support employment growth is described at two levels:

1. The alignment of the County's resident workforce to the occupational demands of the County's employer community; as well as for
2. The alignment of County's workforce development system in terms of degrees granted with a focus on the public and private education system to the occupational demands of the County's employer community.

## Alignment of the County's Resident Workforce to the Needs of the Employer Community

The first step in this assessment of the opportunities and gaps in Baltimore County's workforce development system is a comparison of the alignment of the County's current workforce and demographic trends to the occupational demands of the County's employer community.

***There is a strong level of alignment between the occupational composition of the County's current workforce and the needs of its nine target industry clusters***. The composition of the County workforce, using the occupational LQs described in Chapter 2 above, was compared to the occupational staffing patterns of the nine industry clusters to identify the core occupational groupings where both the concentration of County workforce is high (Occupational LQ greater than 1.05) and there is a strong level of employer occupational demand (more than 5 percent of cluster employment). The results of this analysis are presented in Table 3-3 below. Strong levels of alignment between the County's workforce and the needs of its employer community in the following areas:

- Baltimore County has a high concentration of resident workers employed in Business and financial operations occupations, which aligns with the high demand for these occupations in the Corporate Operations Centers/Shared Services; Federal Agencies; Information Technology Services; Manufacturing; and Financial Services clusters;
- Baltimore County has a high concentration of resident workers employed in Computer and mathematical occupations, which aligns with the high demand for these occupations in the Corporate Operations Centers/Shared Services; Federal Agencies; Information Technology Services; and Financial Services clusters;
- Baltimore County's high concentration of resident employment in Life, physical, and social science occupations aligns with the needs of the Federal Agencies cluster and its high concentration of employment in Education, training, and library occupations aligns with the needs of the Public and Private Higher Education cluster;
- Baltimore County is particularly well positioned in terms of the alignment of its workforce with the needs of the Healthcare Cluster, with high concentrations of resident workers in Healthcare practitioners and technical occupations; Community and social service occupations; and healthcare support occupations; and
- Overall there are multiple levels of alignment between the occupational composition of the County's workforce and six of the nine target industry clusters. Baltimore County has a high concentration of employment in the core occupations demanded by the: Corporate Operations Centers/Shared Services; Federal Agencies; Healthcare; Information Technology Services; Financial Services; and Public and Private Higher Education clusters.

There is a weaker level of alignment between the composition of the County's resident workforce and the needs of the Manufacturing; Port Industries, Logistics and Distribution Centers; and Construction clusters, with the County having somewhat low concentrations of resident employment in the Construction and extraction occupations; Production occupations; and Transportation and material moving occupations that are the major occupational groupings for these three clusters. It is important to note that the low concentration of employment does not necessarily indicate a workforce gap for these industries; simply a lower level of resident employment in these core occupations. Workers may commute to jobs in the County in these clusters from other jurisdictions. Furthermore, all three of these industries have experienced either long term, in the case of Manufacturing and Port Industries and Logistics and Distribution Centers, or recent, in the case of Construction, declines in County employment. Resident employees impacted by reductions in staffing may have changed occupations due to job losses in these industries.

**Table 3-3: Alignment of Current Workforce with Industry Cluster Needs**

| | | Supply | Demand - Share of Jobs by Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOC | Description | Baltimore County Occupational LQ | Industry 1: Corporate Operations Centers/Shared Services | Industry 2: Federal Agencies | Industry 3: Healthcare | Industry 4: Information Technology Services | Industry 5: Manufacturing | Industry 6: Port Industries, Logistics and Distribution Centers | Industry 7: Construction | Industry 8: Financial Services | Industry 9: Public and Private Higher Education |
| 11-0000 | Management Occupations | 1.00 | 10% | 9% | 4% | 9% | 7% | 7% | 7% | 8% | 6% |
| **13-0000** | **Business and Financial Operations Occupations** | 1.26 | **21%** | **28%** | 2% | **9%** | **6%** | 5% | 4% | **30%** | 5% |
| **15-0000** | **Computer and Mathematical Occupations** | 1.57 | **9%** | **9%** | 1% | **59%** | 4% | 4% | * | **8%** | 5% |
| 17-0000 | Architecture and Engineering Occupations | 0.83 | **12%** | **7%** | * | 4% | **7%** | 1% | 1% | * | * |
| **19-0000** | **Life, Physical, and Social Science Occupations** | 1.61 | 3% | **6%** | 1% | * | 3% | * | * | * | 4% |
| **21-0000** | **Community and Social Service Occupations** | 1.43 | * | 1% | **5%** | * | * | * | * | * | 2% |
| **23-0000** | **Legal Occupations** | 1.21 | 1% | 3% | * | * | * | * | * | 1% | * |
| **25-0000** | **Education, Training, and Library Occupations** | 1.07 | * | 1% | * | * | * | * | * | * | **44%** |
| **27-0000** | **Arts, Design, Entertainment, Sports, and Media Occupations** | 1.15 | 4% | 1% | * | 2% | 1% | 1% | * | * | 2% |
| **29-0000** | **Healthcare Practitioners and Technical Occupations** | 1.32 | 3% | **9%** | **33%** | * | * | * | * | 1% | 2% |
| **31-0000** | **Healthcare Support Occupations** | 1.15 | 1% | 2% | **20%** | * | * | * | * | * | * |
| **33-0000** | **Protective Service Occupations** | 1.40 | * | 5% | 1% | * | * | * | * | * | 2% |
| 35-0000 | Food Preparation and Serving Related Occupations | 0.86 | * | * | 4% | * | 1% | * | * | * | 1% |
| 37-0000 | Building and Grounds Cleaning and Maintenance Occupations | 0.74 | * | 1% | 2% | * | 1% | * | * | * | 3% |
| 39-0000 | Personal Care and Service Occupations | 0.95 | * | * | 8% | * | * | * | * | * | 1% |
| 41-0000 | Sales and Related Occupations | 0.94 | 5% | * | * | 6% | 4% | 19% | 2% | 14% | 1% |
| **43-0000** | **Office and Administrative Support Occupations** | 1.05 | **26%** | **10%** | **17%** | **10%** | **11%** | **22%** | **10%** | **38%** | **17%** |
| 45-0000 | Farming, Fishing, and Forestry Occupations | 0.31 | * | * | * | * | * | * | * | * | * |
| 47-0000 | Construction and Extraction Occupations | 0.79 | 1% | 2% | * | * | 1% | * | **62%** | * | 1% |
| 49-0000 | Installation, Maintenance, and Repair Occupations | 0.89 | 1% | 3% | 1% | 1% | 5% | **7%** | 8% | * | 2% |
| 51-0000 | Production Occupations | 0.49 | 1% | 1% | 1% | * | **41%** | 3% | 1% | * | * |
| 53-0000 | Transportation and Material Moving Occupations | 0.89 | 1% | 1% | 1% | * | **9%** | **29%** | 3% | * | * |

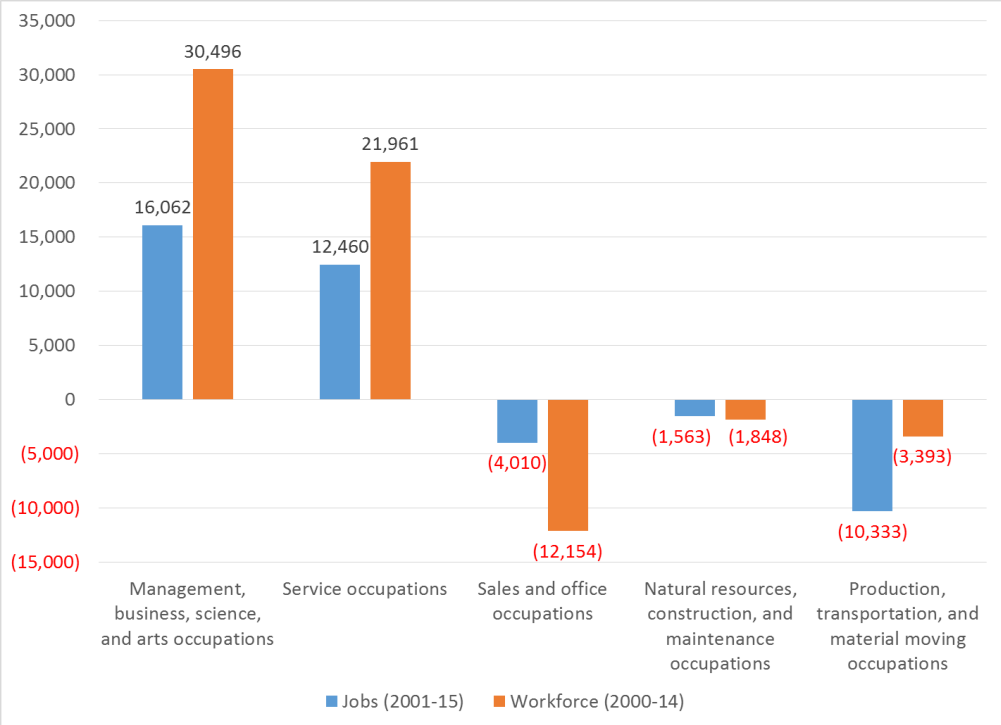
**Bold** = High Occupational LQ > 1.05 = **Area of Stong Alignment** - High Occupational LQ and High Industry Demand

(*) > 1% of jobs = **Area of Need** - Low Occupational LQ and High Industry Demand

Source: JFI Analysis of Census and EMSI Data

***Baltimore County is in the midst of a transformation towards higher skilled occupations in both the composition of its workforce as well as of its employment base.*** Long term changes in the occupational composition of the County's workforce have mirrored changes in the occupational composition of the County's employment base, with the County experiencing growth in both high skill and high education level jobs and residents.[14] As presented in Chart 3-1, the County has experienced rapid growth in both jobs and resident workers in higher skilled Management, business, science, and arts occupations while both in-County employment and the number of resident workers in lower skilled occupations has declined. Similarly, much of the County's employment growth has been in occupations requiring a Bachelor's or Advanced degree while share of County residents with a Bachelor's or above has increased even more rapidly (Chart 3-2). Indeed, the expansion of the County's workforce in high skilled Management, business, science, and arts occupations and with a higher degree of educational attainment has far outpaced the growth in jobs in the County, indicating the important regional role played by the County in providing a skilled and educated workforce for the State and region.

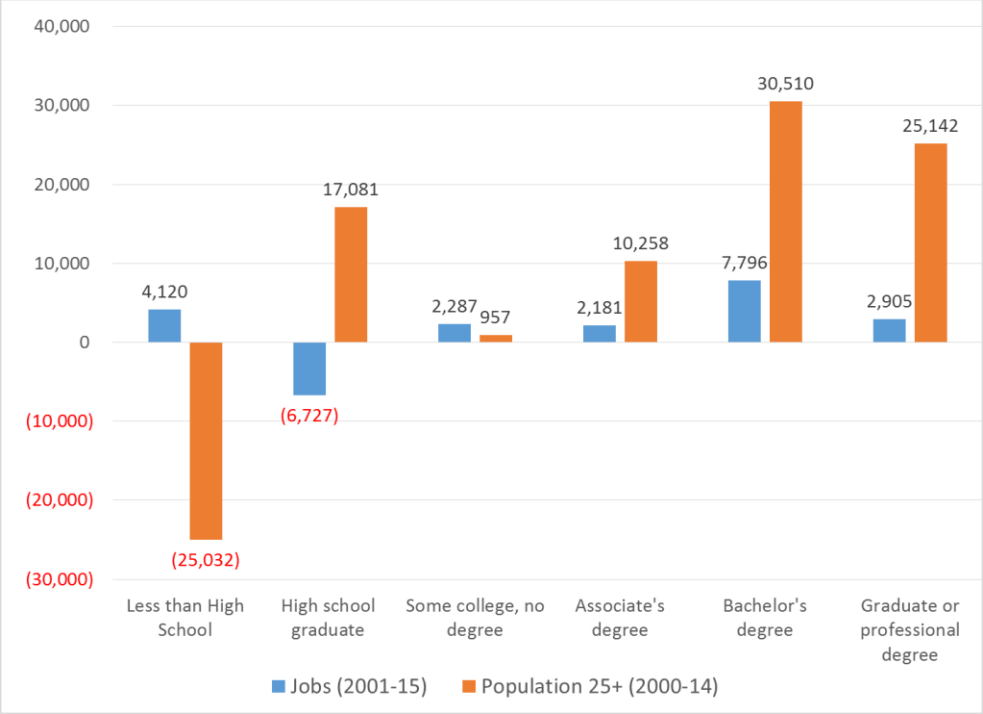
**Chart 3-1: Change in Composition of Baltimore County Jobs and Workforce**




Source: JFI analysis of EMSI and Census Data

[14] It is important to note that the time period for this analysis does not align. Data presented for both employment and population growth are both for 14 year periods, but employment data are for 2001-15 and population data are for 2000-14. This is because EMSI data on employment are only available for 2001 and beyond while County population is only available for 2000. Despite the mismatch in time periods presented, this data shows the alignment between long term County employment and population trends. Because of the long term nature of the analysis, this difference in time periods analyzed is unlikely to distort the core findings.

**Chart 3-2: Change in Composition of Baltimore County Jobs and Workforce**




Source: JFI analysis of EMSI and Census Data

***The size, composition and recent changes in the County's workforce are in general alignment with the needs of the County's employer community***. There are multiple levels of alignment between the occupational composition of the County's resident workforce and the occupational needs of six of the County's nine target growth industries. The County offers a high concentration of resident employment in the core areas of industry-occupational demand for the Corporate Operations Centers/Shared Services; Federal Agencies; Healthcare; Information Technology Services; Financial Services; and Public and Private Higher Education clusters. Furthermore, changes in the educational and occupation composition of the County's workforce have mirrored changes in the occupational demands of the employer community.

## Alignment of the County's Workforce Development System to the Needs of the Employer Community

The first step in measuring the alignment of the County's workforce development system to the needs of its employer community is to quantify the level of occupational openings in the County. Occupational openings are the estimated number of job openings in each occupation. These data are available from EMSI and represent the employment change and turnover for an occupation for a given year. The number is calculated as the sum of new and replacement jobs in an occupation over the entire selected timeframe, divided by the number of years in the timeframe. New jobs are defined as openings due to growth. Replacement jobs are openings due to attrition.[15] The EMSI data on the annual estimated Baltimore County estimated annual openings are presented in Table 3-4. Data for the estimated share of these openings occurring in the nine targeted industry clusters are presented as well.[16]

[15] http://kb.economicmodeling.com/glossary/annual-openings-estimate/?s=openings.

[16] The openings for the nine target industry clusters was estimated by the Valbridge-JFI Team. Openings from sector occupational growth were available from the separate industry analyses presented in Chapters 6 through 14. Replacement demand openings were estimated based on the share of each cluster's occupational employment in the 2015 base year.

**Table 3-4: Total Annual Openings by Major Occupational Area, Total for Baltimore County and for the Nine Target Industry Clusters**

| SOC | Description | Total QCEW Annual Openings | Estimated Nine Cluster Openings as a % of Total | Estimated Nine Cluster Annual Openings |
|---|---|---|---|---|
| Total | | **10,968** | **51%** | **5,556** |
| 11-0000 | Management Occupations | 499 | 69% | 343 |
| 13-0000 | Business and Financial Operations Occupations | 771 | 85% | 655 |
| 15-0000 | Computer and Mathematical Occupations | 370 | 92% | 339 |
| 17-0000 | Architecture and Engineering Occupations | 238 | 91% | 216 |
| 19-0000 | Life, Physical, and Social Science Occupations | 113 | 83% | 94 |
| 21-0000 | Community and Social Service Occupations | 180 | 63% | 113 |
| 23-0000 | Legal Occupations | 77 | 22% | 17 |
| 25-0000 | Education, Training, and Library Occupations | 624 | 29% | 183 |
| 27-0000 | Arts, Design, Entertainment, Sports, and Media Occupations | 128 | 43% | 55 |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 615 | 87% | 534 |
| 31-0000 | Healthcare Support Occupations | 412 | 89% | 367 |
| 33-0000 | Protective Service Occupations | 285 | 16% | 45 |
| 35-0000 | Food Preparation and Serving Related Occupations | 1,247 | 10% | 120 |
| 37-0000 | Building and Grounds Cleaning and Maintenance Occupations | 362 | 17% | 62 |
| 39-0000 | Personal Care and Service Occupations | 476 | 42% | 200 |
| 41-0000 | Sales and Related Occupations | 1,401 | 23% | 324 |
| 43-0000 | Office and Administrative Support Occupations | 1,442 | 62% | 901 |
| 45-0000 | Farming, Fishing, and Forestry Occupations | 10 | 14% | 1 |
| 47-0000 | Construction and Extraction Occupations | 476 | 92% | 437 |
| 49-0000 | Installation, Maintenance, and Repair Occupations | 426 | 36% | 154 |
| 51-0000 | Production Occupations | 285 | 78% | 221 |
| 53-0000 | Transportation and Material Moving Occupations | 531 | 33% | 177 |

Source: JFI analysis of EMSI and Census Data

The second step in measuring the alignment of the County's workforce development system to the needs of its employer community is to quantify the level of talent generated by the County's workforce development system in the areas of occupational employment demand. This was accomplished by preparing a crosswalk of the degrees and certificates granted by County educational institutions based on data from the Maryland Higher Education Commission (MHEC)[17] to the key occupational area that could be potentially filled by a person with the certificate/degree. MHEC data were provided by Classification of Instructional Programs (CIP) code. Degrees and certificates were coded into the major occupational areas based on the judgement of the Valbridge-JFI Team. Because degrees and certificates can apply to multiple occupational areas, they were coded to the occupational classification that represents the "best fit" between the degree/certificate granted and the selected occupation based on the determination of the Valbridge-JFI Team. Because occupational needs vary by employer and job, these represent a high level analysis of the alignment of the workforce system and County occupational demands. The results of this analysis are presented in Table 3-5.

[17] MHEC provided the Valbridge-JFI Team with a database of all degrees granted by Maryland educational institutions.

Table 3-5: Alignment of Graduates at Different Levels by Occupational Groupings, 2015

| SOC | Description | Certificates, All Types | Associate's | Bachelor's | Master's | Doctorate | Doctorate Professional Practice | Total, All Degrees & Certificates |
|---|---|---|---|---|---|---|---|---|
| Total | | 2,308 | 2,273 | 8,046 | 2,140 | 113 | 23 | 14,903 |
| 11-0000 | Management Occupations | 65 | 199 | 1,033 | 150 | 0 | 0 | 1,447 |
| 13-0000 | Business and Financial Operations Occupations | 68 | 29 | 447 | 86 | 0 | 0 | 630 |
| 15-0000 | Computer and Mathematical Occupations | 200 | 151 | 550 | 412 | 34 | 0 | 1,347 |
| 17-0000 | Architecture and Engineering Occupations | 23 | 37 | 180 | 29 | 17 | 0 | 286 |
| 19-0000 | Life, Physical, and Social Science Occupations | 7 | 44 | 1,520 | 160 | 26 | 0 | 1,757 |
| 21-0000 | Community and Social Service Occupations | 31 | 165 | 567 | 61 | 9 | 11 | 844 |
| 23-0000 | Legal Occupations | 11 | 22 | 63 | 100 | 0 | 0 | 196 |
| 25-0000 | Education, Training, and Library Occupations | 153 | 80 | 986 | 667 | 12 | 0 | 1,898 |
| 27-0000 | Arts, Design, Entertainment, Sports, and Media Occupations | 24 | 882 | 1,127 | 18 | 0 | 0 | 2,051 |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 551 | 403 | 432 | 179 | 1 | 0 | 1,566 |
| 31-0000 | Healthcare Support Occupations | 11 | 20 | 826 | 118 | 13 | 12 | 1,000 |
| 33-0000 | Protective Service Occupations | 724 | 82 | 73 | 0 | 0 | 0 | 879 |
| 35-0000 | Food Preparation and Serving Related Occupations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37-0000 | Building and Grounds Cleaning and Maintenance Occupations | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 39-0000 | Personal Care and Service Occupations | 36 | 72 | 207 | 3 | 0 | 0 | 318 |
| 41-0000 | Sales and Related Occupations | 1 | 0 | 35 | 0 | 0 | 0 | 36 |
| 43-0000 | Office and Administrative Support Occupations | 173 | 9 | 0 | 157 | 0 | 0 | 339 |
| 45-0000 | Farming, Fishing, and Forestry Occupations | 1 | 30 | 0 | 0 | 1 | 0 | 32 |
| 47-0000 | Construction and Extraction Occupations | 8 | 8 | 0 | 0 | 0 | 0 | 16 |
| 49-0000 | Installation, Maintenance, and Repair Occupations | 211 | 40 | 0 | 0 | 0 | 0 | 251 |
| 51-0000 | Production Occupations | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 53-0000 | Transportation and Material Moving Occupations | 8 | 0 | 0 | 0 | 0 | 0 | 8 |

Source: Valbridge-JFI Analysis of MHEC Data

In order to assess the level of alignment, between the Baltimore County workforce development system, with a focus on post-secondary education, and the demands of the County employer community, the number of certificates and degrees granted (from Table 3-5) are compared to the number of occupational openings (Table 3-4). The results, presented in Table 3-6, suggest that the talent pipeline in the County is well aligned with labor demands of both the overall County employer community and the nine target industry clusters.

***Baltimore County is generating substantially more graduates in higher-skilled occupational areas than projected demand.*** Baltimore County is home to two major public universities (UMBC and Towson), a public community college and two private higher education institutions (Goucher and Stevenson). As a result, it generates a large number of graduates in key occupational areas that exceeds in-County demand. This is not uncommon, because higher education institutions serve not only the local community, but the broader regional, state and even international market as well and as described above, Baltimore County has among the largest concentrations of public and private higher education students in Maryland. None-the-less, it is still important to assess local talent generation. Some key areas of Baltimore County strength in key demand areas are:

- ***Computer and Mathematical Occupations***, where County degree generation of 1,347 graduates far exceeds total local annual openings of 370. This is clearly a core area of occupational demand for the County's nine target industry clusters, especially for the Information Technology Services cluster, with the nine target industry clusters accounting for the overwhelming majority, 339, of these openings;
- Baltimore County is clearly a key regional driver in supplying ***Life, Physical, and Social Science Occupations***, where degree generation of 1,757 graduates far exceeds total local annual openings of 113. These occupations are of key importance to the County's pharmaceutical industry (described in Chapter 10 below) as well as for the Federal Agencies and Public and Private Higher Education clusters;
- Baltimore County is also a key regional driver in supplying both the ***Healthcare Practitioners and Technical Occupations*** and ***Healthcare Support Occupations*** demanded by not only the County's but the State and regional Healthcare Cluster. Despite lacking a medical school, the County generates 1,566 graduates in Healthcare practitioners and technical occupations and 1,000 graduates in Healthcare support occupations, far exceeding local demands of 615 openings and 412 openings respectively; and
- County generation of graduates in ***Management Occupations*** and ***Business and Financial Operations Occupations*** combined exceeds local openings for these occupations. While these occupations are demanded across the economy and nine target industry clusters, they are especially important to the targeted Corporate Operations Centers/Shared Services, Federal Agencies and Financial Services clusters; and
- One area of potential need is ***Architecture and Engineering Occupations***, where County degree generation is in alignment with County demand, but given the importance of these occupations to the core business and professional services cluster that is driving the State and regional economy, expanding degree offerings in this area may represent an important goal for the County.

***For lower-skilled occupations, as would be expected since many only require on-the-job training rather than the formal certificates/degrees analyzed here, there are more uncertainties about whether the talent pipeline in the County meets the demand for workers.*** Formalized training programs for Construction and extraction, installation, maintenance, and repair, Production, and Transportation and material moving occupations may represent an area of County need.

**Table 3-6: Comparison of 2015 Graduates to Projected Annual Average Job Openings for 2015 to 2024 by Major Occupational Groupings for Baltimore County**

| SOC | Description | Total, All Degrees & Certificates | Total QCEW Annual Openings | Estimated Nine Cluster Annual Openings |
|---|---|---|---|---|
| Total | | **14,903** | **10,968** | **5,556** |
| 11-0000 | Management Occupations | 1,447 | 499 | 343 |
| 13-0000 | Business and Financial Operations Occupations | 630 | 771 | 655 |
| 15-0000 | Computer and Mathematical Occupations | 1,347 | 370 | 339 |
| 17-0000 | Architecture and Engineering Occupations | 286 | 238 | 216 |
| 19-0000 | Life, Physical, and Social Science Occupations | 1,757 | 113 | 94 |
| 21-0000 | Community and Social Service Occupations | 844 | 180 | 113 |
| 23-0000 | Legal Occupations | 196 | 77 | 17 |
| 25-0000 | Education, Training, and Library Occupations | 1,898 | 624 | 183 |
| 27-0000 | Arts, Design, Entertainment, Sports, and Media Occupations | 2,051 | 128 | 55 |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 1,566 | 615 | 534 |
| 31-0000 | Healthcare Support Occupations | 1,000 | 412 | 367 |
| 33-0000 | Protective Service Occupations | 879 | 285 | 45 |
| 35-0000 | Food Preparation and Serving Related Occupations | 0 | 1,247 | 120 |
| 37-0000 | Building and Grounds Cleaning and Maintenance Occupations | 1 | 362 | 62 |
| 39-0000 | Personal Care and Service Occupations | 318 | 476 | 200 |
| 41-0000 | Sales and Related Occupations | 36 | 1,401 | 324 |
| 43-0000 | Office and Administrative Support Occupations | 339 | 1,442 | 901 |
| 45-0000 | Farming, Fishing, and Forestry Occupations | 32 | 10 | 1 |
| 47-0000 | Construction and Extraction Occupations | 16 | 476 | 437 |
| 49-0000 | Installation, Maintenance, and Repair Occupations | 251 | 426 | 154 |
| 51-0000 | Production Occupations | 1 | 285 | 221 |
| 53-0000 | Transportation and Material Moving Occupations | 8 | 531 | 177 |

Source: Valbridge-JFI Analysis of EMSI and MHEC Data

## Overall Alignment of the County's Resident Workforce and the Workforce Development System to the Needs of the Employer Community – Roundtable Summary

On April 26, 2016 DEWD convened an Industry Roundtable Discussion with 14 business/industry members of the Workforce Development Board in attendance, representing directly or indirectly each of the County's core industry sectors. The discussion addressed labor shortage issues specific to certain industries:

- Healthcare - Entry level CNA's and GNA's are in particular demand, but also RN's, technicians and entry front-line staff who have computer and critical thinking skills. Retirement of the Baby Boom generation of nurses and nurse instructors is creating demand, but Millennials are less drawn to the profession—particularly since women have more career paths open to them in other industries. Career expectations are different with LPN's aspiring to be RN's and Nurse Practitioners and other advanced positions more common. There is competition among the healthcare institutions to attract the limited talent available.
- Manufacturing & Skilled Trades - There is significant demand for skilled construction workers and younger manufacturing workers more open to acquiring/using digital skills. The skilled trades are not promoted as viable career options by guidance counselors in the public school system, despite the fact that they pay a family-supporting wage.
- Transportation, Distribution & Logistics – There is a shortage of drivers, with retiring drivers increasing demand. Younger drivers tend to be more comfortable with a shifting career path and often do not stay; older (35± years) drivers are more steady, having tested the water elsewhere.
- Multiple Industries - Do we know what the correct wage should be given the current education levels, experience and expectations of entitlement? Today's worker is much more comfortable shifting careers many times. How we brand qualifications and occupations is important in order to attract the right talent—for example, apprenticeship programs should be considered like going to college, just a parallel career track.
-

Specific types of training and education programs that are needed to meet the demand for skilled workers were identified as follows:

- Promoting the Skilled Trades – Public school system does not prepare students to meet the expectations to be successful in a career in the skilled trades occupations. Educators do not necessarily have the ability to change the messaging in their schools, since their goals are set by officials at higher levels of administration.
- Importance of Soft Skills/Basic Core Competencies - Essential soft skills (punctuality, honesty, communication skills, accountability, etc.) are critical and too often lacking. Building core education skills must begin no later than middle school—high school is too late. Messaging about criminal backgrounds at an early age: what you do early in your life will impact your opportunities in the future.
- Apprenticeship - Employers all learned their jobs by doing their jobs, whether they went to college or not; the best model for training and development has been demonstrated by the labor unions through apprenticeship. Employers with non-skilled positions want people who have cleared backgrounds, clean drug screenings, etc. but are often not offering salaries or career paths which are competitive. There has been a shift to people opting not to come into "corporate" work setting, but entering their own entrepreneurial ventures. How do we help to incubate and train people who want to start their own business?

- Providing Youth Work Experiences through Internships - Youth programming is critical for developing soft skills through summer youth employment opportunities. The need to pay interns for learning on the job can hurt businesses' ability to provide valuable internship opportunities.
- Questionable Technology Training – Certain training providers have created another economy by creating expensive coursework to receive minimal credentials/certifications and telling students they can expect to earn a lot of money—when the training really has no value to employers. There is an interesting contrast between the gaps between the skilled trade programs with great apprenticeship models but no candidates and the technology sector with lots of people coming through training programs who are not viable candidates
- Workforce Development System – How best to connect the 40,000 people per year who come through the County's workforce centers with local employers? Employers will stop using the resource if job seekers are not properly qualified before referrals are made.

Current technological trends which impact workforce recruitment, hiring and retention include the following:

- Quantity/Quality Issue - Employers recruitment processes need to be "mobile technology" ready since 70% of prospects access opportunities through their smartphones. More access to technology, however, creates a high quantity of candidates but low quality—with perhaps 90% not being viable.
- Responding to Candidates - Too much manual sifting through application information creates delays, often losing candidates because response is slow or non-existent. Human touch can be important in evaluating and responding to applicants. Some companies just use recruiters.
- Homegrown Talent - Networking and upskilling are important. A good strategy has been to get to people at a young age in the schools, developing them through internships and working in partnership with them to bring onboard additional talent (referral incentives).

Though the demands for skills vary from industry to industry, the common theme emerged from the employers regarding their need for a threshold level of soft skills in job candidates before an interview process can proceed successfully. The retirement of the Baby Boom generation workers and their replacement by a Millennial generation workforce with different life/career expectations is not altogether smooth. Preparing young people with appropriate educational goals from the earliest age, summer job, internship, apprenticeship and other facilitated employment training programs will increase their workforce readiness.

## Summary and Conclusion - Labor Market Supply and Demand Gap Analysis

***Overall, there is a strong level of alignment between Baltimore County's workforce supply and the demand for workers from the County's employer community***. This strong alignment extends to both the County's resident workforce, whose size and composition matches the occupational needs of the County's employer community, as well as to the County's higher education system, which produces graduates in many occupational areas that exceeds in-County employer demand. The County offers a high concentration of resident employment in the core areas of industry-occupational demand for six of the nine County targeted industry clusters (the Corporate Operations Centers/Shared Services; Federal Agencies; Healthcare; Information Technology Services; Financial Services; and Public and Private Higher Education clusters). Furthermore, changes in the educational and occupation composition of the County's workforce have mirrored changes in the occupational demands of the employer community. Finally, as a result of the high concentration of public and private higher education institutions in the County, the supply of skilled and educated workers generated in the County exceeds local demand.

## Chapter 4: Case Studies of Best Practices in Similar Counties

# Case Study I: Healthcare Workforce Development

Name: Baltimore Alliance for Careers in Healthcare (BACH)
Location: Baltimore City, Maryland

**Summary**

BACH has been a successful resource for the Baltimore City hospitals. Having career pathways and in-house training offers employees opportunities to stay with the employer and constructively work within a career advancement strategy. For the employers it offers an avenue to increase job retention and reduce turnover, as well as reduce the cost of training by offering on-site options rather than paying staff for off-site time and travel.

Launched in 2005 with the goal of helping Baltimore hospitals "grow their own" direct-care workforce, BACH's allied health career coaching model has evolved into a highly successful effort that boasts programs in six local hospitals and two long-term care facilities, and the advancement of more than 400 front-line and middle-skill workers.

Funding sources have earmarked the funds for the Baltimore City workforce population, but a similar model could be employed in any jurisdiction. In this case, it would be advantageous for Baltimore County to piggy-back on BACH since the partner organizations in employment and training are also present in Baltimore County.

**Objectives**

The BACH mission is to address unemployment, underemployment and healthcare workforce shortage issues in Baltimore City by identifying healthcare career pathways leading to economic independence and training residents to enter into and advance in them. The primary, long-term objective is to reverse the healthcare worker shortage in Baltimore City by developing and promoting a system for preparing residents for skilled positions in healthcare professions with the most serious shortages.

**Regional Background**

The Baltimore metropolitan area is home to three nationally top-ranked health care institutions, Johns Hopkins Hospital, University of Maryland Medical Center, and Sheppard and Enoch Pratt Hospital as well as eight other regionally ranked hospitals and 16 other hospital institutions.[18] Healthcare is a major force in Baltimore and the influence of the two primary teaching institutions in the city is far reaching to the suburban markets. In Baltimore County there are six hospitals:

- Medstar Franklin Square Medical Center
- Greater Baltimore Medical Center (GBMC)
- Sheppard and Enoch Pratt - Psychiatric

[18] US News & World Report. Best Hospitals Rankings: Best Hospitals in Baltimore, MD. July 21, 2015.

- Lifebridge Northwest Hospital
- University of Maryland St. Joseph Medical Center
- Spring Grove Hospital Center – Psychiatric

Additionally there are urgent care centers and specialty outpatient centers operated by the hospitals and numerous long-term providers.

The sheer magnitude of healthcare institutions in the region fuels a strong demand for healthcare-related workforce, especially at the mid- and lower-skilled areas such as nursing, aide and tech positions. All of the local hospitals are facing similar issues with job turnover, retention, advancement pathways and ongoing training in new and advanced skills. Reaching the market of entry level trained healthcare workforce is a universal issue for all of the healthcare providers in Baltimore. One approach to this problem is to engage the healthcare organizations in the training, by offering hospital-based workforce development.

**Program**

BACH was founded in 2005 as a nonprofit corporation designed to address a shortage of trained healthcare workers in Baltimore City. The organization was developed by the collaboration of competing hospitals to coordinate job training efforts, to address a shortage of healthcare workers in Baltimore City. BACH offers a variety of career mapping, training and advancement programs. They have developed career pathway maps in administrative, patient care, technician and long-term care, supported by training programs and coaching in at least five of the city hospitals.

At the heart of the BACH program is career coaching, wherein each participating healthcare provider uses trained coaching staff to work with incoming and incumbent healthcare workforce employees to attach them to the healthcare workplace and achieve career advancement. Tools include

- Career Coaching - The Alliance contributes to the salaries of career coaches in grantee hospitals in an effort to improve retention and advancement of frontline workers in entry level skilled healthcare jobs.

- Career Mapping diagrams career opportunities in Baltimore hospitals and outlines the education and experience needed for advancement or entry into particular healthcare occupations.

- "1st Span Training Program" - Unskilled employees are trained as nursing assistants in a work-based environment. Supported by the Robert Wood Johnson and Hitachi foundations, U.S. Department of Labor and the Mayor's Office of Employment Development, this program tested a work-based learning model for training unskilled hospital employees first as nursing assistants and then as nurse extenders and advances an acute-care-based CNA curriculum for State of Maryland approval.

- Pre-Allied Health Bridge Program - Assistance with pre-college coursework is offered for job seekers/incumbent employees prior to specific healthcare training. Short-term remediation for pre-college level courses is provided. It is a 60-hour English and reading course designed to advance candidates to 8th grade reading level.

- BACH Fellows – This six-week paid summer internship program for 60 high school rising seniors is funded by the Mayor's office and provides the students with a career-building workshop and paid work experience in a hospital setting. The initiative helps allied health students focus their careers and plan a path to college or the work place.

**Operational**

The programs and resources offered by BACH are available to Baltimore City residents who are seeking employment in healthcare or already have employment in the industry and seek to advance. Although the workforce supply that is eligible for the BACH services is residing in Baltimore City, many employers have opportunities outside the city as well and are free to assign the workforce where the need is located.

Among the successes in this program is the partnership with educational institutions, including the Community College of Baltimore County (CCBC) to send faculty to the hospitals to train on-site, as the need arises. They also send support coaches to work in each hospital to help entry-level employees (earning less than $14.00/hr.) with career planning and training. They also have funding for advancement training for certain positions, such as Certified Nursing Assistant to Patient Care Technician.

**Web-Based Toolkit**

BACH also offers a web-based toolkit to assist any health care provider who seeks a proactive role in developing and sustaining a stable workforce through employee training and support. The self-help resource takes BACH's coaching methods and puts them into a format that is quick to navigate and easy to adapt to the needs of almost any health care setting. The At-A-Glance page provides basic elements that a provider will need to initiate a career coaching program, with links to valuable resources.

- Core Coaching Skills/Resources - Coaches should be trained to use an IDP in conjunction with the organization's client tracking system and compatible with an electronic database such as ETO (Efforts to Outcomes) software. BACH offers templates and online support. Ability to assess coachee preparedness. Training and distribution of acute and long-term care career maps. Knowledge of available external academic resources including BACH's Pre-Allied Health Bridge. Create a career coach position description, expecting thorough understanding of allied health career coaching process. Develop intervention techniques necessary to avoid poor employee outcomes: e.g., sharpening coachee skills in conflict resolution, time management, etc.; ensuring workplace readiness; advocating for employees; knowledge of available internal/external resources. Multiple approaches to coach training in short sessions and full-day seminars.

- In-Depth - The In-Depth view outlines six categories of coaching duties and breaks them down into individual tasks that are required of each coach, as well as knowledge and skill sets necessary to make a successful coach. Overall, the tool kit is designed so that users can conveniently download pages and incorporate as much or as little of the model into their own program. Click below for your Career Kit downloads:

    - Maintain Currency in the Allied Health Profession
    - Coach Clients on Career Goals
    - Manage Multiple Cases
    - Use Internal and External Resources
    - Perform Administrative Duties
    - Provide Retention Services for Clients

**Funding**

Funding for BACH is largely from foundations including: Annie E. Casey Foundation; Abell Foundation; Baltimore Community Foundation; Goldseker Foundation; Hitachi Foundation; Robert Wood Johnson Foundation; Open Society Institute; Aaron Straus and Lillie Straus Foundation; Alvin and Fanny B. Thalheimer Foundation; Harry and Jeanette Weinberg Foundation.

**Partnership**

Principal medical partners in this organization include Johns Hopkins Health System, University of Maryland Medical System, Medstar Health, Genesis Healthcare Corporation, Northwest Hospital, GBMC, Good Samaritan Hospital and Sinai Hospital. Principal educational institutions include: Baltimore City and County Public Schools, Community College of Baltimore County, Stevenson University, Workforce Technology Center, the Mayor's office and others.

**Metrics**

Published metrics for BACH achievement include the following:

- Career Coaching - More than 400 entry level employees from five Baltimore hospitals are participating, with 72% having successfully completed some form of training and 40% having advanced to new jobs. The average wage progression between September 1, 2005 and May 31, 2007 was 13.5%.

- Career Mapping – 3,000 healthcare career maps have been printed and distributed to hospitals, schools and community-based organizations.

- 1st Span Training Program – 94% of the participants in the first cohort at Good Samaritan Hospital successfully completed the nursing assistant training

- Pre-Allied Health Bridge Program - Two initial cohorts of participants completed the program at Sinai and Good Samaritan hospitals in Spring 2008.

- BACH Fellows Program - 60 students participate each summer, with each completing an Individualized Development Plan. Six local hospitals are participating.

**Contact**

Ms. Laura Spada, Executive Director
217 East Redwood Street
15th Floor
Baltimore, Maryland 21202
(443) 692-9429 ext. 1
Lspada@baltimorealliance.org

# Case Study II: Manufacturing Workforce Development

Name: WIRE-Net
Location: Cleveland, Ohio

**Summary**

This organization is successful because it is a central hub of resources and support to a diverse manufacturing industry in a region of similar scale to Baltimore. All of the member industries recognize the benefit of a larger economy of scale of peers and neighbors and enlist WIRE-Net to enable the local relationships that keep everybody in business. More than just economic development – it is a clearing house that balances the best interests of all the members for the greater good. Their incremental successes over 30 years has garnered additional membership and support year after year, further expanding the available resources to the manufacturing industries.

The predominant workforce development effort by WIRE-Net has been through their youth programming at the Max Hayes High School, which is the only regional school with metalwork and machining facilities and programs. Additionally they coordinate adult workforce training through industry and educational partners. The greatest emphasis of WIRE-Net is to enable the collaboration of businesses and align them with one and other, as well as with workforce candidates and appropriate training partners and business resources.

Funding has been targeted to low-income and at-risk populations, but the business enhancement programming and networking could still be implemented in a Baltimore County atmosphere. Baltimore has several technical schools that could be feeder institutions to the manufacturing sector, if aligned and guided properly.

**Objectives**

The WIRE-Net mission is to strengthen manufacturing and related businesses in the Cleveland area by providing expertise, education opportunities and networking for business, employees and prospective employees. The long term vision for WIRE-Net is to keep manufacturing as an integral element of the local economy, in a global marketplace.

**Regional Background**

Cleveland is an industrial, Rust Belt city that has three primary economic sectors: Healthcare, Manufacturing and Education. The Cleveland Clinic is an international center of excellence in healthcare and the primary university in the area is Case-Western Reserve, in addition to Cleveland State University, DeVry University and a number of technical colleges and smaller universities. Historically this city supported the auto industry to the North in Detroit, with metal fabrication, forging, bending and production. As the auto industry has declined in the region, the large manufacturers have been seeking alternative product lines as well as business support to market outside of the region and state. Businesses have also been banding together to create better economies of scale for a larger and/or more distant competitive market share.

Clean energy producers has been a recent major stakeholder in the Cleveland market, hosting the nation's key source of materials for wind and solar power generation. Although Ohio is not a major user state for alternative clean energy the infrastructure and technologies are in place for the production and distribution

of the components to other sites worldwide. There are more than 480 companies in the area working in wind development and a major future project is a wind farm on Lake Erie. Recent industrial support in the region has been established for the natural gas fracking industries, since Cleveland is relatively central to the fracking regions extending from the Dakotas through Pennsylvania and pipeline transmission to coastal export locations.

Cleveland remains a major metalwork city with a steel production plant for ArcelorMittal, the world's largest steel manufacturer. There are many other metal fabricators, forgers and benders producing goods in the area as well.

**Program**

WIRE-Net was founded as the Westside Industrial Retention and Expansion Network in 1986 by three community development organizations for the purpose of strengthening the industrial economic base of the west side of Cleveland, Ohio. The organization bills itself as a problem-solver and collaborator that offers services, financial support and leadership with the goal to "nurture manufacturing jobs and prosperity that come with it."[19] In the ensuing years WIRE-Net grew to a membership of more than 300 companies employing over 21,000 people and $1 billion in wages. Their 2014 annual report states they grew membership by 95 companies in that year. The WIRE-Net business activities include:

- Business Consulting
- Collaboration
- Workforce Development
- Referrals
- Peer-to-Peer Knowledge Sharing
- Supply Chain Management
- Lobbying/Government Assistance
- Site Redevelopment

In addition to the above-mentioned services WIRE-Net also operates:

- Cleveland Industrial Retention Initiative (CIRI) – This is a program of the City of Cleveland, managed by WIRE-Net. They have a team of five managers who oversee in-plant support, hundreds of visits to companies to identify opportunities and challenges, identify and broker redevelopment opportunities. In 2014 CIRI was responsible for intervention at 15 firms, resulting in an economic impact of $6 million in retained sales, more than $3.3 million in investment, $840,000 in annual payroll taxes, and $308,000 in new payroll associated with job creation.

- Great Lakes Wind Network (GLWN) – A group started in 2007 to address the growing wind power industry both on land and off shore. This group is focused on supply chain management in this burgeoning industry.

- Manufacturing Advocacy & Growth Network (MAGNET) – This is a strategic partner to WIRE-Net that combined resources to assist nine firms with Lean projects in-house. MAGNET is the local organization that administers the National Institute of Standards and Technology – Manufacturing

[19] WIRE-Net.com

Extension Partnership (MEP) for an 18 county area around Cleveland. This is a federally funded program administered locally in all 50 states, with a heavy focus on workforce development.

- WIRE-Net Works – This is an adult workforce development program. Set up to receive job orders from industry and then train and fill the jobs in as little as 30 days. This group created a manufacturer-sponsored apprenticeship program targeting an Industrial Maintenance Engineer certification. They also developed an incumbent training strategy called WorkAdvance – a 4-5 year program that is industry sector-based.

- Max S. Hayes High School – This is a career and technology high school that opened a new state-of-the-art building in 2015. WIRE-Net has collaborated with the Cleveland Metropolitan School District, local foundations, colleges and businesses to develop opportunities for upcoming students for the past 25 years. In 2014 prior to the new school opening WIRE-Net managed a summer camp for 54 incoming 9th grade students, placed 53 students in internships and summer jobs, enlisted retired technicians to develop a programs and provided business liaison services to the school district to connect manufacturing to the classroom. The program developed is a general studies ninth grade and then the choice of four career pathways for 10th-12th grade: Building & Construction; Information Technology; Manufacturing; and Transportation/Automotive.

**Operational**

WIRE-Net is a small non-profit organization with 18 full time employees, with three assigned to youth programs and two assigned to adult programs. This organization is not a workforce training entity, but rather a coordinator of services, networking and resources for employers and the workforce seeking employment. Every person in Cleveland is eligible for services offered, and one grant in particular is restricted to low income or non-skilled applicants; although virtually all of the youth participants are eligible for the National School Lunch Program.

A major outreach by WIRE-Net is peer-to-peer networking, where the organizations facilitates events designed to bring plant managers out to other facilities and network with other operators in the region, thereby sharing information and insights on all things related to their businesses and production. This promotes idea sharing and larger competitive economies of scale on some product lines, as well as staying abreast of the advances in technologies, regulations and other critical factors affecting business.

**Funding**

WIRE-net operates primarily on grants followed by consulting fees and membership dues at a budget of just over $2 million. Most of that budget is earmarked for business networking and collaboration. Investor sponsors include the Cleveland Foundation, Towards Employment, ArcelorMittal, the community college, Huntington Learning Centers, several banks, hospitals, human resources agencies, many business entities and many charitable foundations.

**Partnership**

The principal partner to WIRE-Net is The Cleveland Foundation, Cleveland Metropolitan School District, and Towards Employment. The Cleveland Foundation is a philanthropic organization that has been supporting causes in Cleveland for more than 100 years. Towards Employment is a nonprofit organization formed in 1976 to develop and implement support services for individuals seeking jobs. These two organizations are key in fostering the relationship with the Cleveland school districts.

Additional prominent partners are ArcelorMittal, which provides leadership, materials, internships and financial support for school programs, as well as Eaton, Lincoln Electric, Rockwell Automation, Swagelock and other local small manufacturers.

There are more than 300 members of WIRE-Net, some of which are used periodically to sponsor factory tours, internships, or drop shadowing on an as-needed basis.

**Metrics**

Published metrics for WIRE-Net achievement include the following:

- Max Hayes Career and Technical High School – In the 2015-2016 school year there were 45 internships and 17 students who earned the American Welding Society Certification. In the 2013-2014 school year, there were 199 company tours and field trips, and 279 college and technical school trips posted.

- Network – WIRE-Net had a membership of 354 in 2014, employing over 21,000 people and over one billion dollars in wages.

- Cost Savings – Coordinated several cost savings programs for membership, such as supervisory training, energy cooperatives, Grainger Supply bulk discounts, and shipping partnerships, for a total of more than $180,000 in savings for participating businesses.

**Contact**

Ms. Julie King, Vice President
Resource Development and Communications
4855 West 130th Street, Suite 1
Cleveland, Ohio 44135-5137
(216) 588-1438
JKing@wire-net.org

# Case Study III: Construction Workforce Development

Name: Maryland Center for Construction Education and Innovation (MCCEI)
Location: State of Maryland

**Summary**

MCCEI was established in 2010 at Towson University as a public-private partnership derived from the Governor's Workforce Investment Board (GWIB). Construction trades are part of the essential fabric of the everyday life of humankind. The creation and maintenance of habitable space requires skilled trades. The growth in the technology industries and the use of technologies throughout the workforce and home life creates new demands for building performance and efficiency. Not only are there demands for new construction, but also redevelopment, upgrades and renovation of all of the built environment from underground utilities to rooftops and HVAC systems. New technologies are constantly improving building efficiency, such as solar panel modules, wind power, use of passive solar, LED lighting, water-efficient plumbing and security systems.

Baltimore County is a dynamic market for construction, from the renovation of century-old structures and facilities to the development of new homes and business, not to mention the repairs and maintenance demands of a suburban county that surrounds the largest city in the state.

The Great Recession of 2008 cast a devastating blow to the construction industry. As illustrated below, the Baltimore Construction workforce dropped by more than one-fifth (21.7%) from a high of 27,445 in 2007 to a low of 21,485 in 2010 at the peak of the recession.


Source: MD Dept. of Labor, Licensing & Regulation; compiled by Valbridge/LF&M, LLC.

Construction trades and skills were typically picked up on jobsites, with master or journeyman tradesmen learning advanced skills at community college or similar institutions. With the growth in technical applications in the built environment, the construction industry has had to evolve and grow with advanced training and learn skills not here-to-fore necessary or in demand.

As the economy slowly recovers from the Great Recession and housing starts increase, the demand for skilled construction workforce is expanding.

**Objectives**

The MCCEI mission is to be "an industry-led workforce intermediary that was established to create a world-class education system for Maryland's built environment."[20] The MCCEI program is statewide, based in Baltimore County. The primary market target for MCCEI is the high school population, to train them in construction management and prepare them for construction employment upon graduation.

**Regional Background**

MCCEI began by surveying the industry and compiled several reports: in particular, *The Critical Path* and *Digging Deeper.* These reports detail the changing trends in skills demands and the work product in general, and also the gaps and shortcomings in the education and supply of a skilled workforce. Some of the initial findings:

- There was rapid construction workforce retirement through the recession, which has not been followed with commensurate training and hiring of younger skilled workers.
- New technologies in building sustainability such as LEED and BIM (Building Information Modeling) require higher education, management and leadership in the industry.
- Retro-fitting older spaces and buildings to newer high performance standards and energy efficiency is a major construction demand.
- Infrastructure continues to require renovation (i.e. bridges, water and sewer, stormwater management, communications, etc.).
- Maryland does not offer many educational opportunities for developing a skilled construction workforce.[21]

**Program**

MCCEI then set out to work with the Maryland State Department of Education and industry representatives to develop a new four course Construction Design and Management program for high schools throughout the state. They have initiated the curriculum in 16 high schools and reached over 800 youth. The program is classified as a Completer Program, meeting the requirements for graduation. The high school program is designed to expose the students to all levels of construction and design management for building a project from the ground up. The high school program is in place in three Baltimore County Schools – Eastern Technical School, Milford Mill Academy and Newtown High School, where they collectively have approximately 112 students enrolled annually.

At the college level, the University of Maryland at College Park offers a civil engineering degree with a specialization in construction and Morgan State University and University of Maryland Eastern Shore offers construction management degree programs. New initiatives include a BIM Institute at Towson University.[22] The BIM Institute is designed for the incumbent professional tradesman. It is a three class program, entering

[20] MCCEI website, http://www.mccei.org/mccei/AboutMCCEI.aspx

[21] The Critical Path – Positioning Maryland as an Innovation Leader in the Global Construction Industry, Maryland Center for Construction Education & Innovation, 2012.

[22] BIM, Building Information Modeling, is a blend of architecture and Geographic Information System at a building or site-specific level. Every detail of a building or site is graphically represented in a computer software package that includes a reference database of the exact specifications of every component of the subject building, such as brand, make, model and size of windows, doors, plumbing fixtures, HVAC components, lighting, etc.

its fourth year of existence in 2016. The plan is to offer the same program at other institutions statewide. At University of Maryland College Park a minor program in construction management was launched in the Fall of 2015 with an enrollment of more than 60 students. It is a minor in the civil engineering and architecture programs and includes a summer work internship.

The Community College of Baltimore County (CCBC) is one of seven statewide that offers an associate degree program in construction management. But the recent trends suggest the average age of students entering the community college construction program is 26.[23] Some industry leaders would prefer a younger age based on the timing of company training and the time it takes to develop a consistent and profitable employee. The MCCEI is working with the community colleges and industry to bring industry leaders in as instructors and to craft programs that meet the current workplace demands, such as BIM and sustainable energy technologies.

Recognizing that the construction trades often hire right out of high school, the MCCEI has been working on marketing campaigns to expose the construction industry to high school students. Throughout the industry there is an agreement that the construction workforce opportunities are not marketed well and is not attracting the best students. MCCEI published a magazine, *Build Your Path – A Guidebook for Built Environment Careers*, that was distributed to all of the high school guidance counselors in Maryland. It offers a clear description of career pathways in the construction and design fields, as well as a description of many key vocations in the construction and design fields. This publication has been followed with monthly newsletters too. Although the guidance counselors are provided with resources, reaching the students is not guaranteed, so the current effort is to build the relationships of industry into the Career and Technical Education (CTE) programs in the high schools. These programs are required to have advisory boards that meet and evaluate the programs annually, but many are ineffective. The CTE programs are good opportunities for retired tradesmen to bring first-hand knowledge to the classroom.

The next report being developed from MCCEI is an analysis of how graduation from these programs is serving the marketplace demand for skilled workforce. This organization has been in place for six years and effectively probed, monitored and grown construction workforce opportunities throughout the state of Maryland. They have a comprehensive website with an interactive map for education and training opportunities, and career pathway information. Although Baltimore County may be in need of a stronger construction workforce, this statewide program is already serving Baltimore County. Rather than develop a parallel program, the County could align resources with MCCEI and offer more opportunities at the high school and community college level through their established network of resources.

**Operational**

The programs and resources offered by MCCEI are available to all residents of the state of Maryland who are seeking employment in construction and allied industries or already have employment in the industry and seek to advance. Although the program is statewide, it is based in Baltimore County and as the largest mass of population in the state, the workforce supply and demand is strong in this region. Many employers have opportunities outside the County as well and are free to assign the workforce where the need is located.

**Web Resources**

[23] Digging Deeper – Aligning Industry and Education, Maryland Center for Construction Education & Innovation, 2013

MCCEI has a comprehensive internet-based job board and education/training interactive map. The job board is available for employers and prospective employees to search for targeted construction related positions. There is a link to the Maryland Workforce Exchange website as well. The interactive map feature helps the workforce find opportunities for specific skills training. The input parameters include a base location and search criteria of distance from that location, for 15 categories of training, at nine specific facility types, from high school to 4-year college.

**Funding**

Originally grant funded by GWIB, the center now operates primarily by non-state revenues and contributions. However the 2017 State budget allows for restricted funding of MCCEI once again for 2017 and 2018. MCCEI operates on a budget of approximately $300,000 per annum. Additional funding is generated from industry sponsor partners, including: Whiting-Turner, Gilbane Development, Kinsley Construction, Chaney Enterprises, Ayers Saint Gross, Bozzuto, and Freestate Electric, in addition to others.

**Partnership**

The principal partner in this organization is the Governor's Workforce Investment Board. The Maryland State Department of Education has also been a complicit partner, supporting the programs introduced to the youth and guidance counselors statewide. The funding sponsors listed above are also partnered in the operations of this program.

**Contact**

Mr. Robert Aydukovic, President
7400 York Road, Suite 302
Towson, Maryland 21204
410-704-5981, Ext. 1
baydukovic@mccei.org

# Case Study IV: Advanced Manufacturing Workforce Development

Name: WorkSystems, Inc.
Location: Portland, Oregon

**Summary**

Portland is the largest metropolitan area in the State of Oregon, located approximately 40 miles north of the capital, Salem, on the Columbia River. The river is the geographic boundary of Oregon and Washington, and immediately on the north side of the river is the City of Vancouver, Washington, which is identified as an integral part of the Portland-Vancouver Metropolitan Statistical Area (MSA). Although the cities are located on the navigable Columbia River, they are approximately 100 miles upstream from the Pacific Ocean and the port is not the most significant economic force in this region. The largest employer in the area is Intel, where advanced manufacturing is a key driver.

WorkSystems Inc. is the entity formed in 1998 as the vehicle to enhance and invest in the regional workforce by the Workforce Investment Board. This is a private nonprofit partially funded through the US Department of Labor and a variety of competitive federal grants, local municipal funding and donations. A large part of their success is in that they are not competing with other workforce development groups in the area but instead continue to align resources across political geographies and develop programs to serve the entirety of the Portland-Vancouver MSA.

It is a common theme among economic development and workforce development strategies nationwide to collaborate regionally to avoid effectively reproducing the efforts of another agency nearby. Separation not only confuses job candidates and employers, it also reduces the effectiveness and economy of scale of programs. The WorkSystems model is a true regional or MSA approach that can also be applied in Baltimore.

**Objectives**

Like all workforce investment boards, WorkSystems Inc., has a mission to enhance the regional workforce and support business competitiveness from the perspective of a skilled workforce. They develop policies and workforce development programs delivered through local partners to help people get work or advance careers. WorkSystems is engaged in the sectors of Advanced Manufacturing, Healthcare, and High Tech.

**Regional Background**

WorkSystems is specifically targeted to the City of Portland, Multnomah County and Washington County, in Oregon. However the Metropolitan Statistical Area (MSA) is Portland-Vancouver and so they formed the Columbia-Willamette Regional Workforce Collaborative to address regional demand in advanced manufacturing. The Columbia-Willamette Collaborative includes participation by the Southwest Washington Workforce Development Council and the Workforce Investment Council of Clackamas County, encompassing Clackamas County, Clark County, Cowlitz County and Wahkiakum County.

They took a regional approach to provide a unified service to industry and guide workforce investments in the entire Portland-Vancouver metropolitan area. The Collaborative worked with local manufacturers through surveys, meetings, and focus groups to identify the skills gaps and improvement gaps. A three part

manufacturing workforce plan was developed to address building a pipeline of youth, finding work-ready candidates, and creating a continuous improvement training program for incumbent workers.

Local Portland-Vancouver metropolitan industries include Intel, Boeing, Oregon Iron Works, Leatherman Tool Group, American Precision Industries and many more. The Advanced Manufacturing sector is led regionally by Intel, the largest private employer in the state. The average firm size is greater than three times the average Metro company and the annual average wage is nearly one and half times that of all other industries.

**Program**

WorkSystems supports the region's workforce development system, WorkSource Portland Metro (WSPM) as its primary investment vehicle. This program is for adults and relies heavily on a partner network of community agencies to help train and guide job seekers into a career track, using the vast resources of those agencies. Partner agencies include community action agencies, Easter Seals, Oregon Department of Human Services, Washington County Corrections, housing services agencies, immigrant and refugee organizations, and Native American organizations, among others.

WSPM also has a program for On-The-Job Training (OJT), wherein WSPM helps to find the appropriate candidate for a position and then funds any additional training necessary. They first list the positon on the WSPM job board and an account representative will search for an appropriate candidate then a work plan is developed with the employer for a period of up to six months. Then WSPM will reimburse the employer for 50% of the wages during the training period.

The WSPM website has tracks for career planning, training and education, and job search skills. Each track links to a variety of tools to assist the job seeker with finding and getting prepared for the appropriate position. An applicant can register and log into the system to save a profile, resume and search criteria as well.

For youth, WorkSystems offers a series of programs involving school districts, local government, community organizations, and businesses to begin their work experience and develop career success for low income candidates:

- SummerWorks – A partnership with organizations and businesses to help place candidates with summer work opportunities.
- Work Experience for Youth (WEX-Y) – This is a continuum of work experiences for youth at four levels beginning with employment training, leading to entry-level internship, temp-to-hire and finally a career-pathway internship. All the training and career coaching is handled by WorkSystems.
- BizConnect – This is a regional program serving teens and adults by businesses that are engaged in sharing information, skills training, job shadows, interviews, career fairs, etc. to expose candidates to potential opportunities. This is particularly effective for high school aged youth, wherein the private-sector businesses can supplement the school systems with meaningful career related learning experiences.
- Career Connect Network (CNN) – This is a program that provides multiple points of access to career preparation services for low-income youth. These services are offered through a network of community service organizations, a variety of specialized public schools, and community colleges.

**Operational**

WorkSystems is a group of approximately 25-30 employees that primarily coordinates businesses and employment with training and career opportunities. They also are a conduit for funding programs and training through grant opportunities. For example, there is a 4-year employee training assistance fund grant wherein the staff identifies a specific business' need and connects an appropriate trainer to the business. The business then sponsors the training and is reimbursed by WorkSystems.

**Funding**

WorkSystems is partially funded through federal workforce investment dollars, supplemented with local government funding and grants and sponsorships. The annual operating budget is nearly $30 million. The 2015 fiscal budget included approximately $13.5 million in WIA funding, $22 million in federal grants and $7.5 million in non-federal funding from local and state jurisdictions and contributors.

**Partnership**

WorkSystems partners with an extensive list of business and institutions to deliver career coaching, internships, training and opportunity to the youth and adults of the greater Portland area. Key public partners include: Portland Community College, Mt. Hood Community College, Urban League of Portland, Clark College, Catholic Charities, Clackamas Community College, Oregon Institute of Technology, Portland Opportunities Industrialization Center and many more. Key private-sector partners include Boeing, Daimler, Marks Metals, Benchmade, Silver Eagle Manufacturing, Leatherman Tool Group, Oregon Iron Works and many others. WorkSystems states that the bulk of companies connected to their programs are under 250 employees.

**Metrics**

Published metrics for WorkSystems achievement in 2015 include the following:

- Job Seekers/Placement – Approximately 80,000 people engaged the workforce system and 26,042 people were placed in employment, of which 86% retained their employment 9 months later.

- Training – Approximately 45,000 people took part in skill development in workshop enrollments, career counseling, basic education (GED, ESL, Math, English), computer literacy, and occupational skills trainings including OJT.

- CCN for Youth – More than 1,200 youth received training and nearly 800 were placed with paid work or an internship. All of the served youth were low income and more than 80% were out of school. Of the served youth, two-thirds received a degree or certificate and achieved a two grade level gain in literacy or numeracy.

**Contact**

Mr. Jesse Aronson, Senior Project Manager
1618 SW 1st Avenue, suite 450
Portland, Oregon 97201
503-478-7324
jaronson@worksystems.org

# Case Study V:

# Innovation Districts: Place-Based Strategies to Promote Talent Attraction and Retention

Name: 16 Tech Innovation District
Location: Indianapolis, Indiana

**Summary**

The focus on Millennials in economic and workforce development is a relatively new phenomenon. As such it is too new an area to have established case studies on the attraction or retention of Millennials for analysis as part of this report. However, there is an emerging literature on the role of place-based strategies to promote the attraction and retention of talent in particular areas.

A great deal has been written on the movement of both jobs and people, especially younger Millennial workers, back into cities and reversing decades of urban decline. These trends were recently described in two reports by the City Observatory, a think tank with a long-term research agenda to develop detailed new information about city and metro economies. In the Young and Restless report, the City Observatory analyzed trends in what it terms the "Young and Restless" or 25 to 34 year-olds with a bachelor's degree or higher level of education who are increasingly moving back to the downtown areas of the nation's major cities and fueling economic growth and urban revitalization. The *Surging City Center Job Growth* report,[24] also produced by the City Observatory found that cities across the nation have reversed the trend over the past half century of decentralization, or suburbanization, of population and job growth. The movement of both people and jobs back into downtown areas is linked and the City Observatory reports that, "the strength of city centers appears to be driven by a combination of the growing attractiveness of urban living, and the relatively stronger performance of urban-centered industries (business and professional services, software) relative to decentralized industries (construction, manufacturing) in this economic cycle."[25]

Both workers and employers are increasingly favoring the live-work-play environments offered by downtown communities. The PWC-ULI report *Emerging Trends in Real Estate report*, found that "The Millennial and baby-boom generations have had a hand in a number of significant real estate changes over the decades. The baby-boom generation led the move to the suburbs during the 1960s, and the Millennial generation is driving the move back to the city." Jobs have increasingly followed these workers back to the cities. However, according to the PWC-ULI report, suburban jurisdictions are adapting to the increasingly urban preferences of people and jobs and developing the denser live-work-play environments increasingly in favor. According to the PWC-ULI report,

> More "suburban downtowns" are densifying, especially if they have a 20-minute transportation link to center-city jobs, Main Street shopping, and their own employment generators. These suburbs exhibit many of the attributes of an 18-hour city. These are typically in metro areas where close-in suburbs can both access center-city job growth and act as employment nodes in their own right. And they have the advantage of being less costly than the densest coastal markets. Three out of four Millennials preferred such close-in (within 20 minutes of the city) locations if they considered suburban choices.

[24] http://cityobservatory.org/city-center-jobs/.

[25] Ibid. p. 2.

**Trend Analysis**

Thus, the development of suburban, live-work-play environments is an emerging focus of real estate development that is consistent with the needs of Baltimore County.

A related real estate trend relevant to both urban development and live-work-play environments is the rise of Innovation Districts described by the Brooking Institution. Innovation Districts combine economic, physical, and networking assets in a concentrated geographic area to enhance and drive innovation activity and attract and retain talent. According to the Brookings Institution report, The Rise of Innovation Districts: A New Geography of Innovation in America:[26]

> For the past 50 years, the landscape of innovation has been dominated by places like Silicon Valley—suburban corridors of spatially isolated corporate campuses, accessible only by car, with little emphasis on the quality of life or on integrating work, housing, and recreation. A new complementary urban model is now emerging, giving rise to what we and others are calling "innovation districts." These districts, by our definition, are geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators, and accelerators. They are also physically compact, transit-accessible, and technically-wired and offer mixed-use housing, office, and retail.

Brookings identifies three major types of Innovation Districts:

1) The Anchor Plus model typically consists of a large scale mixed-use development centered around a major anchor institution such as a university or academic medical center and hosting related firms, entrepreneurs, and start-ups.
2) The Re-imagined Urban Area model is often found near or along historic waterfronts where industrial or warehouse districts are undergoing a physical and economic transformation to chart a new path of innovative growth.
3) The Urbanized Science Park model consists of efforts where traditional suburban research parks are revitalized through increased density and mixed-use development to create a denser, live-work-play environment.

Not all Innovation Districts are located in urban areas, Research Triangle Park, one of the nation's first and largest suburban research parks, is redeveloping in a way that promotes a denser, live-work-play environment.

One potential case study of the development of a live-work-play environment/Innovation District as a means of Millennial attraction and talent retention is the development of the 16 Tech Innovation District in Indianapolis, IN. While this proposed development is in a downtown area, and thus, not directly comparable to Baltimore County, it is an example of how place based strategies are being pursued by regions not only to promote innovation-based development, but as a Talent retention strategy. Based on data produced by the Battelle Memorial Institute, Indiana and the Indianapolis region are major exporters of talent, similar to Baltimore. One component of their regional economic and workforce development strategy is to promote talent retention through place based development, focusing on the creation of the 16 Tech project, a 50 acre, 6 million square foot, technology park and innovation community being developed in downtown Indianapolis. According to the *Activating Potential Communities keep coming up with creative ways to attract talent and industry* article in Site Selection Magazine, "16 Tech is a vehicle, a mechanism to draw talent, develop new talent and to retain the great talent we have here in Indianapolis and Indiana," says Betsy

[26] http://www.brookings.edu/events/2014/06/09-innovation-districts.

McCaw, president of the 16 Tech Community Corporation, and COO of the Central Indiana Corporate Partnership. "It is a mechanism to be able to continue to enhance that business climate in a talent-focused manner. This project is the key to growth and innovation, long-term sustainability and an enhanced economy, really for the prosperity of everyone." [27] Because 16 Tech is in the planning/early development stage, there is no data on results, impact or performance; however, it is an interesting example of place-based strategies for talent retention.

**Recommendation**

As described above, Baltimore County is a major exporter of talent, both in terms of graduates from its public and private higher education institutions and in the form of the many out-commuters working in neighboring jurisdictions. The development of a similar denser, live-work-play environment and/or Innovation District in Baltimore County is a potential strategy to promote talent retention in a way that integrates economic, real estate and workforce development.

[27] http://siteselection.com/issues/2016/mar/indiana.cfm.

# Case Study VI:
# Port Logistics/Distribution Workforce Development

Name: Center for International Trade Development (CITD)
Location: Riverside, California

**Summary**

International trade and the global economy is the backbone of both small and large business enterprises worldwide. Different regions of the world offer economies of scale in natural resources, manufacturing, distribution, education, consumer preferences, etc. Global trade has standards and must adapt to the climate of scale for imports and exports. For example, Far Eastern manufacturing plants may serve many businesses in North America with products, but not at volumes that will fill an overseas freighter, much less one sea container. Yet a single ship could be full of one product, such as automobiles, which is prevalent in Baltimore as a major East coast port.

CITD is a state community college coordinated program to address training and education in international trade. They recognize that very few educational institutions offer Customs training or assistance with the harmonized tariff system, yet there is more than $5 trillion in overseas commerce. The CITD operates through 10 offices statewide, offering training for businesses in international trade, global logistics and related programming. The key constituents of these programs are business management and frontline employees or specialists.

Baltimore County has a significant component of the overall Baltimore port, which is one of the largest ports in North America with a strong combination of deep water port with rail, highway and nearby air access. Johns Hopkins University offers graduate degrees in international business, but locally there are few opportunities for small business to capitalize on the presence of the port and global trade opportunities. It could be advantageous for Baltimore County to mirror the California model of educational support for international trade and logistics.

**Objectives**

The CITD is a statewide program designed to invest in the economic growth of the state globally through industry-specific education, training and producing a highly skilled workforce. This organization offers a broad range of opportunities at community college locations throughout the state to specifically address the demand for excellence in global trade and logistics. CITD has identified three key services:

- Deliver export and import programs to create jobs
- Inform career pathways and technical assistance
- Expand global trade curriculum and international marketing opportunities

**Regional Background**

The state of California makes up a large percentage of the United States Pacific coastline, with major ports in the San Francisco Bay area, Los Angeles area and San Diego. It is the western gateway to the continental United States, and thus an avenue for major overseas trade. The California Community Colleges program offers a unified approach to workforce development across the state, with 11 regional campus “districts” and

spearheaded by the California Community College Chancellor's Office in Sacramento. Additionally there are four major international border crossings to Mexico from San Diego and Calexico into Tijuana and Mexicali.

**Program**

The CITD offers nine programs oriented to global trade and logistics, but one is specifically set up for logistics and transportation – the Global Logistics Program. Offered at San Diego, this is a two-year grant from the US Department of Education, Business and International Education Program Title VIB, to assist Southwestern College with their new Logistics and Transportation Certificate and Associates of Sciences degree program. The program is also offered on-line.

This program is specifically geared to education, with curriculum development and exam preparation as key components. CITD works with businesses to do research and development on programs to fill holes in the business model – the "problem looking for a solution" model.

The administrators are working at a youth level with the International Baccalaureate (IB) programs in high schools, and also bridging a crosswalk to Information Technology and Manufacturing through the community college system. The linkages are important and fundamentally integrated in a global market. Key programs include:

- Automated Export System & PcLink Compliance Training – A seminar geared towards reporting of electronic export information and customs for exporting goods.
- California Agricultural Export Training – A series designed to help producers, processors and marketers of agricultural products with global trade, including assistance with international trade networks.
- Certified Global Business Professional Exam Prep – An on-line training course for international trade professionals to sit for the NASBITE CGBP exam. This certification is a benchmark for competency in global commerce.
- Export Readiness Assessment – An on-line business tool to assess a company's export readiness.
- Global Logistics Program – A 2-year grant from the US Department of Education, Business and International Education Program Title VIB. This is in support of certificates and AS degrees in international logistics and transportation.
- Student Internship Program – This is a program for students to become involved in the administration of CITD programs.
- Youth Entrepreneurship Program – A state-funded program to provide free business training and counseling in business start-up, marketing, finance and more for youth (ages 14-27).

**Operational**

The CITD program is part of the Chancellor's Office of the State of California, which oversees the community college system of the state. The program is divided up into ten different offices on college campuses throughout the state. Programs offered at the colleges and universities throughout the state are not uniform, but rather tailored to the needs of that region; although everything is available to everyone, either on-line or through other resources. The total direct staff is approximately 20-25 people.

**Funding**

Funding for CITD is primarily through the state of California education budget. Presently the budget is approximately $3,000,000 and supported with some federal grants and Small Business Administration support. Since much of the end programming is executed by the college system, the total budget is intermingled with the system's. Likewise, program office space is co-located on college campuses and absorbed into their facilities budgets.

**Contact**

Mr. Jeffrey Williamson, Statewide Director
Riverside Community College District
3801 Market Street
Riverside, California 92501
951-571-6458
jwilliamson@cccewd.net

# Chapter 5: High Level Summary and Recommendations

Because access to talent has become a core driver of economic and employment growth, there has been a broad national trend towards integrating economic development and workforce development. The increasingly important role of workforce development in meeting overall economic goals is made clear in the following quote from the International Economic Development Council's (IEDC) *Shifting Workforce Development into High Gear* report, which states,

> For economic developers, the nationwide mismatch between jobs and workers translates into a business attraction, retention and expansion issue. Communities without a talented workforce cannot compete when the most important factor in in company relocation or retention is human talent. This is a game-changer for economic developers; tools such as tax incentives and utility or land deals are no longer enough to entice businesses. [28]

The IEDC report goes on to recommend that sector driven strategies to link economic and workforce development are a "best practice" for communities to promote development. The report goes on to say that "as primary liaisons with the business community, economic development organizations (EDOs) have an essential role to play in linking business needs to workforce development efforts."[29] ***By integrating economic and workforce development into a single organization and commissioning this study to identify and develop strategies to establish the needed linkages between workforce supply and demand, Baltimore County is at the forefront of national "Best Practices" in linking economic and workforce development.***

## Summary of Core Findings

This labor market supply and demand analysis identifies the key strengths that Baltimore County can build on and challenges that it must address in implementing its integrated economic and workforce development strategy. The key findings and challenges are as follows:

Finding #1: The workforce demands of Baltimore County's employer community are changing, and employers are increasing requiring better educated workers in more skilled occupations.

Finding #2: There is a strong level of alignment between the County's existing workforce and the demands of its employer community.

Finding #3: The County is well positioned to meet the changing demands of its employer community. With its strong higher education and training system, the County is a source of talent for the larger State and regional economy.

Finding #4: Baltimore County is a net exporter of talent in terms of both skilled and educated out-commuters as well as graduates from the County's strong higher education/training system. As a result talent retention needs to be a core element of its economic and workforce development strategy.

Finding #5: While the County is well positioned to meet the needs of its employer community, gaps and challenges remain.

[28] Economic Development Research Partners, International Economic Development Council, Shifting Workforce Development into High Gear, 2015, p. 4.
[29] IBID, p. 5.

Finding #6: While Baltimore County has a strong resident workforce and K-16 educational pipeline that aligns with the needs of its employer community, areas of workforce development system need to better serve the educational and training needs of the County's workforce.

While the Valbridge-JFI Team's analysis finds that there is a strong degree of alignment between the County's existing workforce and workforce development system and the needs of its employer community, challenges and gaps remain. These include:

- While the overall post-recession population growth of the County is competitive to the State and nation, the rates of growth in Millennials and residents employed in Management, business, science, and arts occupations are well below national, state and regional rates and the growth in college educated residents is slightly below national, state and regional rates;

- In-County resident job creation has not matched the growth in the County's workforce. Much of the growth in resident employment since 2000 has occurred as a result of residents commuting outside of the County, with the number of employed residents working in the County in 2014 only slightly higher than 2000 levels;

- As a result of the County's strong public and private higher education sector, Baltimore County is a net exporter of talent in the form of community college and four year college and university graduates; however, the supply and demand issues related to the pipeline of Middle and Lower skilled occupations may need additional analysis and programmatic offerings. More specifically:

    - Formalized training programs for Construction and Extraction, Installation, Maintenance, and Repair, Production, and Transportation and Material Moving Occupations may represent an area of County need to support the development of the Manufacturing, Port Industries, Logistics and Distribution Centers, and Construction target industry clusters.

    - The development of Tradepoint Atlantic at the former Sparrows Point site creates an opportunity to reverse past and projected future employment declines in the County's Port Industries, Logistics and Distribution Centers cluster. Developing a targeted logistics and distribution training system to enhance the pipeline of talent for this industry presents an opportunity to enhance the integration of the County's economic development and workforce development system while promoting the success of this project.

Overall, the primary workforce opportunity and challenge facing Baltimore County is addressing and capitalizing on the County' position as a net exporter of talent. The County is a net exporter of talent in the form of the County's large base of out-commuters, in the form of graduates from the County's large higher education system, and in the form of out-migrants, with better educated residents moving out of the County. Tapping into this pool of workers by promoting the retention of talent and enhancing higher skilled local employment opportunities is a critical opportunity for the County.

## Workforce and Economic Development Strategy Recommendations

Based on this analysis of County workforce supply and demand conditions, the Valbridge-JFI Team suggests the following seven high level policy recommendations on how the County can better align the needs of its employer community with its resident workforce and workforce development system assets.

**Recommendation #1: Continue to pursue an integrated, sector-based economic and workforce development system**.

Increasingly, integrating economic and workforce development programs in a data driven strategy to link the demands of the employer community with the supply of talent from the local resident workforce and workforce development system is a prominent "Best Practice" in economic development. By integrating the County's economic and workforce development programs into one department, the County has formally integrated these two areas of effort. Best Practice economic development efforts are also based on identifying and meeting the needs of key industry clusters that drive regional economies. By commissioning this study, DEWD is developing a data driven, cluster-based integrated approach to promoting integrated economic and workforce development efforts. In implementing its integrated economic and workforce development strategy, DEWD needs to target and combine its various economic and workforce development programs to meet the needs of its core target industry clusters.

**Recommendation #2: Target its sector-based strategy on high-skilled sectors that can capitalize on the highly educated and skilled workers residing in the County and talent generation from the County's strong base of higher education.**

Access to talent is the key to economic development success and the County is well positioned in terms of both the education and skills of its resident workforce and generation of talent from its higher education and training system.

DEWD should create target industry working groups that bring together both the core employers and education/training providers serving each of the nine core target industry clusters in the County to both inventory existing interactions and develop new services and programs to promote enhanced industry-workforce development system interactions.

**Recommendation #3: Promote efforts to retain talent in the County.**

Baltimore County is a net exporter of talent. It primarily exports talent in two forms:

1) **Out-commuters**. Baltimore County is a net-exporter of labor from out-commuting with the third highest rate of out-commuting in the region and a net outflow of nearly 27,000 workers. Moreover, out-commuters, especially those commuting to Baltimore City and out of the Metropolitan area being more highly educated and often in more skilled occupations; and

2) **Higher Education Graduates**. While it is not possible to calculate the in-County employment of graduates from the County's public and private higher education institutions, in is clear when comparing the level of degrees granted to occupational openings that the County generates more talent than it can absorb, and is a major source of talent in the form of community and four-year college graduates to the larger regional and national economy.

In addition, recent patterns of out-migration show that the County is losing better educated and higher income residents who are moving outside of the County. Baltimore County should develop broad programs to support talent retention in the County. In terms of identifying in-County employment opportunities for out-commuters, DEWD should develop a talent bank where out-commuters interested in County employment opportunities could be matched with employers and job openings. In terms of retaining graduates from County higher education institutions, DEWD should promote enhanced interactions between the County's employer community and four-year colleges and employer community through vehicles such as internships, co-op programs, and business participation and support for academic programs can promote the hiring and retention of graduates in the County. Not only do these efforts have the potential to support talent retention, they can enhance the overall competitiveness of the County and attraction and retention of businesses by improving access to skilled labor.

**Recommendation #4: Promote Place-Based economic development strategies.**

As described above, there has been a change in both residential and employer real estate preferences that favors denser, live-work-play environments. This is especially true among both younger Millennial workers and the technology and creative industries that seek these workers. As described in the labor supply analysis in Chapter 2, younger Millennial workers are transforming Baltimore City and urban areas across the nation. Coinciding with this trend has been the development of Innovation Districts, or live-work-play environments oriented around research and development anchors such as universities or academic medical centers that focus on creating an environment to capture and facilitate the development of new technologies. Baltimore County should examine the development of denser, live-work-play/innovation district-style developments in the areas surrounding its two anchor universities, as a land-use strategy that promotes broader economic development and workforce development goals.

**Recommendation #5: Enhance opportunities for upgrading the skills of local residents.**

While there is a strong level of alignment between the County's resident workforce and education/training system and the needs of its employer community, the demand for workforce development services is likely to increase over time. As described in Chapter 3, the County's demand for workers in higher skilled occupations and in occupations required a higher level of education has expanded, but demand for lower skilled, less education intensive occupations has declined. County employers have also identified the need for more basic soft and basic skills training among the County's workforce. As a result, the County will need to provide services to provide the education and training required to support the transition of resident workers into more skill and education intensive occupations. In addition, the County must address the workforce needs of lesser skilled residents. As a result, the need for community college and related career education is likely to grow.

**Recommendation #6: Invest in meeting the needs of the County's diverse workforce.**

Baltimore County has a strong and diverse workforce made up of workers across the skills, occupation and educational spectrum. While the County's better educated and skilled workers are well integrated into the County and regional workforce system, the County's lesser educated and skilled workers may need more intensive workforce development services. A greater number of successful students in all County schools will result in a better prepared workforce. In particular, we recommend:

- Career and Technical Education - Expanding Career and Technical Education (CTE) in secondary and post-secondary schools has been demonstrated to be a successful method of improving both educational and labor market outcomes for students. Expanding CTE programs represents a strategy

to meet the needs of the County's targeted manufacturing and port industries, logistics and distribution centers, construction, healthcare and other core employment sectors in a way that also promotes employment opportunities among less skilled and educated residents.

- Pre-K Education - A large and growing body of research shows that investing in high-quality pre-kindergarten education yields short- and long-term benefits for children, schools, and communities. Strong evidence showing that young children who participate in high-quality pre-K programs enter school more ready to learn than their peers. Significant academic gains across all income and racial groups have been documented in numerous studies. Expanding Pre-K education beyond the current limited capacity, making it all-day (to support working families) and increasing/eliminating income eligibility criteria over time will improve the quality of the County's workforce.

**Recommendation #7: Invest in growing the County's entrepreneurial ecosystem.**

DEWD has recently prioritized its work to grow and support an entrepreneurial ecosystem in the County that enhances the chances for success of new businesses and helps retain existing businesses as they grow thereby creating new jobs. We recommend that DEWD continue this effort while moving beyond the high-tech realm into encouraging the formation/growth of small businesses in service, healthcare, construction and such industries which are more likely to provide employment for mid- and low-skills workers. Appropriate technical intervention by DEWD, CCBC and other partners combined with the low initial capital needs of such enterprises could make such strategies extremely cost-effective in encouraging entrepreneurship and employment for non-college educated citizens.

# Chapter 6: Industry and Occupational Analysis – Corporate Operations Centers/Shared Services

The Corporate Operations Centers/Shared Services Cluster is made up of corporate headquarters, non-information technology[30] professional services, and office and business services. The industries that make up this Cluster are defined in Table 6-1. With developments like Hunt Valley and Owings Mill, Baltimore County has traditionally served as a major location for corporate headquarters and corporate branch office operations and has a strong base of business and professional services companies. Selected key employers in the Cluster include[31]:

- ADP – Business Outsourcing Solutions -- 250-499 Employees;
- ADP White Marsh – Business Outsourcing Solutions -- 100-249 Employees;
- H&R Block – Accounting Services -- 1000+ Employees; and
- PHH Arval -- Other Scientific & Technical Consulting Services -- 1000+ Employees.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Growth in Corporate Operations Centers/Shared Services Employment outpaced overall employment growth in Baltimore County in 2001-15 and is expected to experience strong growth through 2024 (Chart 6-1);
- As presented in Table 6-1, Cluster employment increased by 29 percent since 2001 and is expected to grow by 12 percent through 2024. Within the Cluster, the Management of Companies and Enterprises sector experienced the most rapid growth accounting for more than half of all Cluster jobs created, with broad based growth across most industries in the Cluster (8 of the 10 industries experienced employment growth in 2001-15);
- Baltimore County is specialized[32] in three of the ten industries that make up the Cluster: Architectural, Engineering, and Related Services, with an LQ of 1.53 indicating a concentration of employment 53 percent above the national average; Office Administrative Services, LQ of 1.59; and Accounting, Tax Preparation, Bookkeeping, and Payroll Services, with LQ of 1.53;
- Baltimore County has a low level of industry specialization in Scientific Research and Development Services, with an LQ of .66 indicating a concentration of employment 34 percent lower than the national average. This is a key industry driver at the State and regional level.

**Employment by Occupation, Education and Skill Level**

- Employment in the Corporate Operations Centers/Shared Services Cluster is concentrated in a mix of high and low skill level occupations. The single largest occupational grouping in the Cluster is Office and administrative support occupations, which includes a mix of middle and lower skill levels jobs. The other major occupational groupings include Management occupations, Business and financial operations occupations, and Architecture and engineering occupations (Table 6-2);

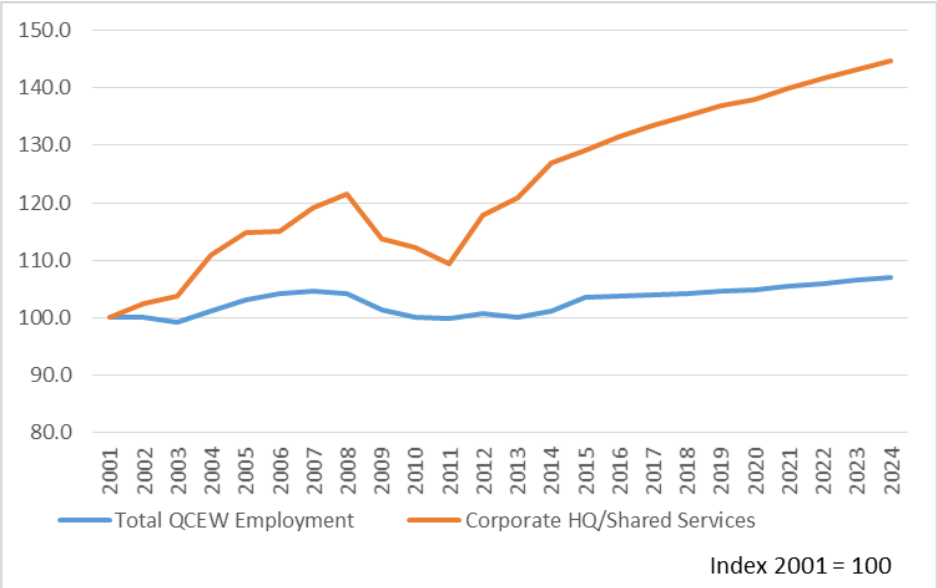
[30] Information technology companies were included in the Information Technology Services Cluster.
[31] Data on employment is from Maryland DLLR List of Employers by WIB area. DLLR gives employment by range.
[32] As measured by LQs, see footnote 9, with an LQ over 1.2 potentially indicating industry specialization. Specialization means that the County may have a comparative advantage in this industry.

- Occupational demand in the Cluster favors higher skilled occupations, where employment grew by 50 percent since 2001 and is projected to grow by 16 percent through 2024. In contrast, employment in lower skilled occupations increased by only 12 percent since 2001 and is projected to grow by 8 percent through 2024 (Table 6-3);
- The changing skills profile of the Cluster is a result of changes in technology and organizational structure, with technology and automation replacing lesser skilled workers;
- The leading occupations within the Cluster are presented in Table 6-4, led by high skilled Accountants and Auditors followed by lower skilled Customer Service Representatives and Secretaries and Administrative Assistants, Except Legal, Medical, and Executive;

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan identifies the importance of workforce for this Cluster and reports that "Quality workforce is key – training programs, college curricula and workforce development training initiatives must serve corporate needs" and that identifying and working with Cluster businesses to interact with local higher education assets as core goals for the County;[33]
- There is a strong level of alignment between the County's workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the Business and financial operations, Computer and mathematical, and Office and administrative support occupations that are critical to the Cluster. The County education and training system also generates a large number of graduates in the Management, Business and financial operations and Computer and mathematical occupations demanded by the Cluster; and
- Consistent with the County's 2012 Economic Development Strategic Plan expanding linkages between this Cluster and the substantial public and private higher education assets in the County should be a core workforce development priority.

**Chart 6-1: Corporate Operations Centers/Shared Services Employment - 2001-2015 and Projections Through 2024**




[33] Page 35-36.

**Table 6-1: Corporate Operations Centers/Shared Services, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 1: Corporate Operations Centers/Shared Services** | | | 19,763 | 25,528 | 28,604 | **5,765** | 29.2% | **3,076** | 12.1% |
| 5412 | Accounting, Tax Preparation, Bookkeeping, and Payroll Services | 1.53 | 3,339 | 4,152 | 4,548 | 814 | 24.4% | 396 | 9.5% |
| 5413 | Architectural, Engineering, and Related Services | 1.64 | 4,312 | 6,190 | 7,663 | 1,879 | 43.6% | 1,472 | 23.8% |
| 5414 | Specialized Design Services | 0.81 | 442 | 285 | 205 | (157) | (35.6%) | (80) | (27.9%) |
| 5416 | Management, Scientific, and Technical Consulting Services | 0.92 | 2,303 | 3,181 | 3,750 | 878 | 38.1% | 569 | 17.9% |
| 5417 | Scientific Research and Development Services | 0.66 | 932 | 1,145 | 1,270 | 213 | 22.8% | 125 | 10.9% |
| 5418 | Advertising, Public Relations, and Related Services | 0.94 | 801 | 1,233 | 1,106 | 431 | 53.8% | (127) | (10.3%) |
| 5419 | Other Professional, Scientific, and Technical Services | 0.85 | 1,398 | 1,491 | 1,443 | 93 | 6.7% | (49) | (3.3%) |
| 5511 | Management of Companies and Enterprises | 0.70 | 1,282 | 4,168 | 4,867 | 2,886 | 225.2% | 699 | 16.8% |
| 5611 | Office Administrative Services | 1.59 | 1,353 | 2,021 | 2,300 | 668 | 49.4% | 279 | 13.8% |
| 5614 | Business Support Services | 0.69 | 3,601 | 1,661 | 1,451 | (1,941) | (53.9%) | (210) | (12.6%) |

Source: JFI analysis of EMSI Data

**Table 6-2: Corporate Operations Centers/Shared Services Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **19,763** | **25,528** | **28,604** | **5,765** | 29.2% | **3,076** | 12.1% |
| Management Occupations | 1,714 | 2,664 | 3,064 | 950 | 55.4% | 400 | 15.0% |
| Business and Financial Operations Occupations | 3,489 | 5,271 | 6,086 | 1,781 | 51.1% | 816 | 15.5% |
| Computer and Mathematical Occupations | 1,384 | 2,231 | 2,522 | 847 | 61.2% | 291 | 13.1% |
| Architecture and Engineering Occupations | 2,273 | 3,167 | 3,946 | 895 | 39.4% | 779 | 24.6% |
| Life, Physical, and Social Science Occupations | 558 | 769 | 892 | 212 | 38.0% | 123 | 15.9% |
| Community and Social Service Occupations | 23 | 49 | 59 | 26 | 112.7% | 11 | 21.8% |
| Legal Occupations | 165 | 161 | 152 | (4) | (2.5%) | (8) | (5.2%) |
| Education, Training, and Library Occupations | 20 | 33 | 40 | 14 | 68.7% | 7 | 21.2% |
| Arts, Design, Entertainment, Sports, and Media Occupations | 817 | 921 | 863 | 104 | 12.8% | (58) | (6.3%) |
| Healthcare Practitioners and Technical Occupations | 573 | 646 | 683 | 74 | 12.8% | 37 | 5.7% |
| Healthcare Support Occupations | 262 | 220 | 208 | (42) | (16.0%) | (13) | (5.7%) |
| Protective Service Occupations | 57 | 97 | 110 | 41 | 71.8% | 12 | 12.4% |
| Food Preparation and Serving Related Occupations | 34 | 55 | 65 | 21 | 61.5% | 10 | 18.0% |
| Building and Grounds Cleaning and Maintenance Occupations | 70 | 89 | 99 | 19 | 27.7% | 10 | 11.0% |
| Personal Care and Service Occupations | 81 | 89 | 91 | 8 | 9.8% | 2 | 2.1% |
| Sales and Related Occupations | 1,218 | 1,214 | 1,264 | (4) | (0.4%) | 51 | 4.2% |
| Office and Administrative Support Occupations | 6,132 | 6,609 | 7,049 | 477 | 7.8% | 440 | 6.7% |
| Farming, Fishing, and Forestry Occupations | 5 | 6 | 7 | 1 | 20.0% | 1 | 16.7% |
| Construction and Extraction Occupations | 218 | 320 | 378 | 102 | 47.0% | 58 | 18.2% |
| Installation, Maintenance, and Repair Occupations | 171 | 264 | 312 | 93 | 54.4% | 48 | 18.1% |
| Production Occupations | 267 | 333 | 364 | 66 | 24.9% | 31 | 9.2% |
| Transportation and Material Moving Occupations | 235 | 319 | 350 | 84 | 36.0% | 31 | 9.7% |

Source: JFI analysis of EMSI Data

**Table 6-3: Corporate Operations Centers/Shared Services Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **18,994** | **24,675** | **27,735** | **5,681** | **29.9%** | **3,060** | **12.4%** |
| High Skilled Jobs[2] | 8,427 | 12,622 | 14,667 | 4,196 | 49.8% | 2,044 | 16.2% |
| Middle Skilled Jobs[3] | 1,560 | 1,960 | 2,188 | 400 | 25.7% | 228 | 11.6% |
| Low Skilled Jobs[4] | 9,008 | 10,093 | 10,880 | 1,085 | 12.0% | 787 | 7.8% |
| | | | | | | | |
| Total | **19,763** | **25,528** | **28,604** | **5,765** | **29.2%** | **3,076** | **12.1%** |
| Less than high school | 763 | 649 | 701 | (115) | (15.0%) | 53 | 8.1% |
| High school diploma or equivalent | 8,244 | 9,444 | 10,179 | 1,200 | 14.6% | 735 | 7.8% |
| Postsecondary non-degree award | 268 | 247 | 234 | (21) | (7.9%) | (13) | (5.4%) |
| Some college, no degree | 207 | 270 | 303 | 63 | 30.5% | 33 | 12.4% |
| Associate's degree | 1,085 | 1,443 | 1,651 | 358 | 33.0% | 208 | 14.4% |
| Bachelor's degree | 8,020 | 12,094 | 14,062 | 4,074 | 50.8% | 1,968 | 16.3% |
| Master's degree | 46 | 96 | 140 | 50 | 108.9% | 44 | 45.9% |
| Doctoral or professional degree | 361 | 432 | 465 | 72 | 19.8% | 33 | 7.6% |
| Unallocated | 769 | 853 | 870 | 84 | 10.9% | 17 | 1.9% |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 6-4: Corporate Operations Centers/Shared Services, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Accountants and Auditors | 13-2011 | 2,150 | $32.41 | Bachelor's degree |
| General and Operations Managers | 11-1021 | 820 | $52.97 | Bachelor's degree |
| Management Analysts | 13-1111 | 767 | $41.25 | Bachelor's degree |
| Civil Engineers | 17-2051 | 645 | $34.54 | Bachelor's degree |
| Market Research Analysts and Marketing Specialists | 13-1161 | 416 | $25.43 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Veterinary Technologists and Technicians | 29-2056 | 275 | $13.27 | Associate's degree |
| Computer User Support Specialists | 15-1151 | 228 | $21.07 | Some college, no degree |
| Electrical and Electronics Engineering Technicians | 17-3023 | 169 | $27.39 | Associate's degree |
| Computer Network Support Specialists | 15-1152 | 124 | $28.61 | Associate's degree |
| Mechanical Drafters | 17-3013 | 111 | $23.28 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Customer Service Representatives | 43-4051 | 1,185 | $15.91 | High school diploma or equivalent |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 43-6014 | 1,040 | $16.84 | High school diploma or equivalent |
| Bookkeeping, Accounting, and Auditing Clerks | 43-3031 | 750 | $19.75 | High school diploma or equivalent |
| Office Clerks, General | 43-9061 | 663 | $13.92 | High school diploma or equivalent |
| First-Line Supervisors of Office and Administrative Support Workers | 43-1011 | 563 | $25.82 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 7: Industry and Occupational Analysis – Federal Agencies

Baltimore County is home to two major federal agencies, the U.S. Social Security Administration with 12,751 employees and the Centers for Medicare and Medicaid Services with 3,224 employees.[34] The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Based on the EMSI data analyzed, Federal Agency employment in Baltimore County contracted in 2006 through 2008 then grew through 2010 and ended the historical 2001-15 period analyzed below 2001 levels. Federal Agency employment is expected to decline through 2024 (Chart 7-1);
- As presented in Table 7-1, Baltimore County is highly specialized in Federal Employment, with an LQ of 2.48, signifying a concentration of employment nearly two and one half times above the national average. As a result, this Cluster is a key economic driver for the County. However, employment in the Cluster fell by 623 jobs since 2001, after growing substantially between 2008 and 2010, and is expected to decline by 305 jobs through 2024.

**Employment by Occupation, Education and Skill Level**

- Federal Agency employment in Baltimore County is highly divided between high and low skilled jobs; with high skilled occupations accounting for 48 percent of all jobs and low skill occupations accounting for 43 percent (Table 7-3);
- The core occupational groupings in the Federal Agencies Cluster is a mix of low skilled occupations, most importantly Office and administrative support occupations with 10 percent of employment, as well as higher skilled Business and financial operations occupations (28 percent), Computer and mathematical occupations (9 percent), Management occupations (9 percent) and Healthcare practitioners and technical occupations (9 percent) (Table 7-2);
- The business of government is becoming more technologically driven and as a result, job losses have been greatest in middle skill occupations, which declined by 9 percent since 2001, and low skilled occupations, which declined by 5 percent, where technology can replace workers. Indeed, Computer and mathematical occupations is the only occupational grouping that experienced job growth since 2001;
- This trend is expected to continue as the Cluster continues to lose middle and low skilled jobs, especially in Office and administrative support occupations, where job losses of 6 percent are projected through 2024. This indicates both the need for career services to assist transitioning workers as well as enhanced technology based training to upgrade the skills of the incumbent and entering workforce to meet the changing needs of the Cluster;
- The leading occupations within the Cluster are presented in Table 7-4, led by low skilled Business Operations Specialists, All Other, followed by high skilled Computer Occupations, All Other;

[34] Employment data are from the Maryland Department of Commerce. Brief Economic Facts, Baltimore County. Please note this employment is larger than the EMSI estimate of federal employment used in this analysis. This may be due to the inclusion of embedded contractors working on site.

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan identifies the importance of workforce for this Cluster and identifies: 1) Build Workforce Development's relationships with SSA & CMS to understand skill set needed; 2) "Develop training cohorts at the Workforce Development Centers specific to the identified needs to create a pipeline of highly skilled and credentialed workers; 3) Partner with colleges to customize training for federal employees and contractor workforce; and 4) Pursue expanding Project SCOPE (Security Clearance Overview and Preparation Education) to Baltimore County Schools and college; as core strategic goals for the industry;
- There is a strong level of alignment between the County's existing workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the: Business and financial operations; Computer and mathematical; Life, Physical, and Social Science; Healthcare; and Office and administrative support occupations that are critical to the Cluster. The County education and training system also generates a large number of graduates in the Management, Business and financial operations, Computer and mathematical, and Healthcare occupations demanded by the Cluster; and
- Consistent with the County's 2012 Economic Development Strategic Plan expanding linkages between this Cluster and the substantial public and private higher education assets in the County should be a core workforce development priority.

**Chart 7-1: Baltimore County Federal Agencies Employment - 2001-2015 and Projections Through 2024**

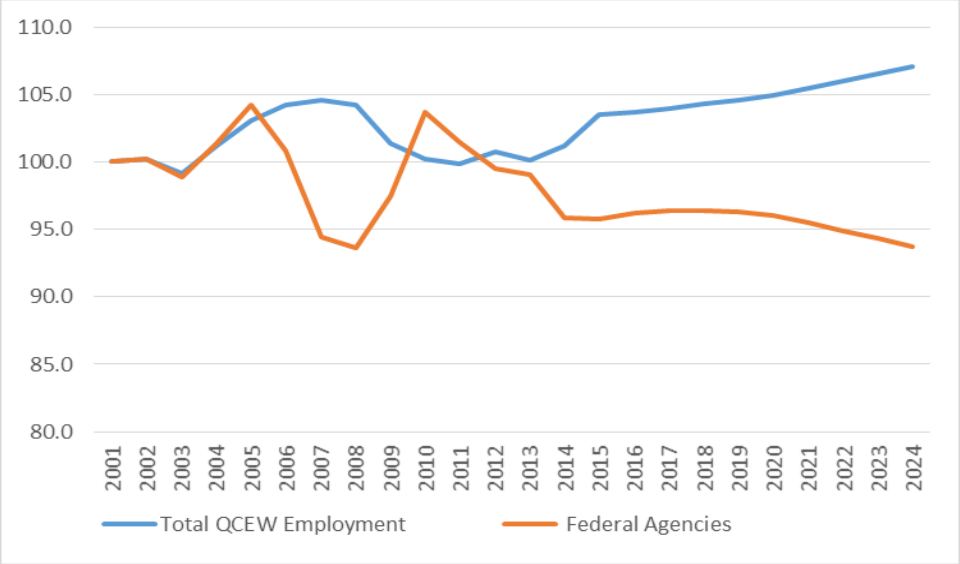



**Table 7-1: Federal Agencies Employment, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| Industry 2: Federal Agencies | | | | | | | | | |
| 901199 | Federal Government, Civilian, Excluding Postal Service | 2.48 | 14,853 | 14,230 | 13,925 | (623) | (4.2%) | (305) | (2.1%) |

Source: JFI analysis of EMSI Data

**Table 7-2: Federal Agencies Employment, by Occupation - 2001, 2015 and 2024**

| Occupation | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total | **14,853** | **14,230** | **13,925** | **(623)** | (4.2%) | **(305)** | (2.1%) |
| Management Occupations | 1,308 | 1,249 | 1,213 | (60) | (4.6%) | (36) | (2.9%) |
| Business and Financial Operations Occupations | 4,102 | 3,996 | 3,917 | (106) | (2.6%) | (78) | (2.0%) |
| Computer and Mathematical Occupations | 1,220 | 1,263 | 1,250 | 43 | 3.5% | (12) | (1.0%) |
| Architecture and Engineering Occupations | 984 | 958 | 941 | (26) | (2.7%) | (17) | (1.8%) |
| Life, Physical, and Social Science Occupations | 921 | 871 | 858 | (50) | (5.4%) | (13) | (1.5%) |
| Community and Social Service Occupations | 119 | 109 | 106 | (10) | (8.3%) | (3) | (2.6%) |
| Legal Occupations | 480 | 465 | 465 | (15) | (3.2%) | 0 | 0.0% |
| Education, Training, and Library Occupations | 203 | 187 | 180 | (16) | (7.9%) | (7) | (3.5%) |
| Arts, Design, Entertainment, Sports, and Media Occupations | 163 | 157 | 153 | (6) | (3.4%) | (4) | (2.7%) |
| Healthcare Practitioners and Technical Occupations | 1,327 | 1,239 | 1,206 | (88) | (6.6%) | (32) | (2.6%) |
| Healthcare Support Occupations | 279 | 273 | 265 | (7) | (2.4%) | (8) | (2.8%) |
| Protective Service Occupations | 775 | 730 | 746 | (46) | (5.9%) | 16 | 2.2% |
| Food Preparation and Serving Related Occupations | 60 | 52 | 50 | (8) | (13.5%) | (1) | (2.6%) |
| Building and Grounds Cleaning and Maintenance Occupations | 100 | 94 | 91 | (6) | (5.8%) | (3) | (2.8%) |
| Personal Care and Service Occupations | 22 | 19 | 19 | (3) | (11.6%) | (1) | (3.0%) |
| Sales and Related Occupations | 45 | 42 | 40 | (4) | (8.1%) | (2) | (4.2%) |
| Office and Administrative Support Occupations | 1,567 | 1,436 | 1,350 | (131) | (8.3%) | (87) | (6.0%) |
| Farming, Fishing, and Forestry Occupations | 23 | 18 | 17 | (5) | (21.9%) | (0) | (1.4%) |
| Construction and Extraction Occupations | 226 | 216 | 210 | (10) | (4.5%) | (6) | (2.7%) |
| Installation, Maintenance, and Repair Occupations | 532 | 498 | 489 | (34) | (6.4%) | (9) | (1.9%) |
| Production Occupations | 170 | 160 | 157 | (10) | (6.1%) | (3) | (1.9%) |
| Transportation and Material Moving Occupations | 228 | 201 | 202 | (27) | (11.8%) | 1 | 0.5% |

Source: JFI analysis of EMSI Data

**Table 7-3: Federal Agencies Employment, by Degree Requirements and Skill Level - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| | | | | # | % | # | % |
| Education/Skill Level | 2001 | 2015 | 2024 | Change | Change | Change | Change |
| Total[1] | **14,256** | **13,620** | **13,294** | **(636)** | **(4.5%)** | **(325)** | **(2.4%)** |
| High Skilled Jobs[2] | 6,696 | 6,515 | 6,407 | (181) | (2.7%) | (108) | (1.7%) |
| Middle Skilled Jobs[3] | 1,431 | 1,301 | 1,259 | (130) | (9.1%) | (42) | (3.2%) |
| Low Skilled Jobs[4] | 6,130 | 5,804 | 5,628 | (326) | (5.3%) | (175) | (3.0%) |
| | | | | | | | |
| Total | **14,853** | **14,230** | **13,925** | **(623)** | **(4.2%)** | **(305)** | **(2.1%)** |
| Less than high school | 261 | 230 | 221 | (31) | (11.9%) | (9) | (3.9%) |
| High school diploma or equivalent | 5,868 | 5,574 | 5,407 | (295) | (5.0%) | (167) | (3.0%) |
| Postsecondary non-degree award | 430 | 384 | 362 | (46) | (10.8%) | (22) | (5.7%) |
| Some college, no degree | 17 | 16 | 16 | (1) | (3.0%) | (0) | (1.4%) |
| Associate's degree | 983 | 901 | 881 | (83) | (8.4%) | (20) | (2.2%) |
| Bachelor's degree | 5,774 | 5,625 | 5,512 | (149) | (2.6%) | (114) | (2.0%) |
| Master's degree | 215 | 196 | 193 | (19) | (8.7%) | (3) | (1.7%) |
| Doctoral or professional degree | 707 | 693 | 702 | (14) | (1.9%) | 9 | 1.3% |
| Unallocated | 597 | 610 | 631 | 13 | 2.2% | 21 | 3.4% |

(1) Does not sum to total jobs because of unallocated employment.
(2) Occupations requiring a Bachelor's or Above.
(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.
(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 7-4: Federal Agencies Employment, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Computer Occupations, All Other | 15-1199 | 1,010 | $47.72 | Bachelor's degree |
| Compliance Officers | 13-1041 | 462 | $30.57 | Bachelor's degree |
| Management Analysts | 13-1111 | 459 | $41.25 | Bachelor's degree |
| Logisticians | 13-1081 | 288 | $38.71 | Bachelor's degree |
| General and Operations Managers | 11-1021 | 230 | $52.97 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Registered Nurses | 29-1141 | 435 | $33.69 | Associate's degree |
| Paralegals and Legal Assistants | 23-2011 | 111 | $22.91 | Associate's degree |
| Engineering Technicians, Except Drafters, All Other | 17-3029 | 106 | $35.93 | Associate's degree |
| Licensed Practical and Licensed Vocational Nurses | 29-2061 | 83 | $23.63 | Postsecondary non-degree award |
| Electrical and Electronics Engineering Technicians | 17-3023 | 66 | $27.39 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Business Operations Specialists, All Other | 13-1199 | 1,144 | $36.36 | High school diploma or equivalent |
| Claims Adjusters, Examiners, and Investigators | 13-1031 | 569 | $33.24 | High school diploma or equivalent |
| Managers, All Other | 11-9199 | 453 | $52.60 | High school diploma or equivalent |
| Information and Record Clerks, All Other | 43-4199 | 409 | $21.55 | High school diploma or equivalent |
| Purchasing Agents, Except Wholesale, Retail, and Farm Products | 13-1023 | 230 | $33.86 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 8: Industry and Occupational Analysis – Health Care

The Healthcare sector is a core economic driver in Baltimore County. The County is home to major medical institutions as well as a large share of the region's healthcare workforce. Selected key employers in the Cluster include[35]:

- GBMC HealthCare – Hospital – 3,900 Employees;
- MedStar Franklin Square – Hospital – 3,600 Employees;
- University of Maryland St. Joseph Medical Center – Hospital – 2,250 Employees;
- Sheppard Pratt Health System, Hospital- Medical Center– Hospital – 1,913 Employees; and
- LifeBridge Health – Hospital – 1,878 Employees.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Healthcare Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Growth in Healthcare Cluster Employment significantly outpaced overall employment growth in the County in 2001-15 and is expected to experience strong growth through 2024 (Chart 8-1);
- As presented in Table 8-1, overall Cluster employment increased by 39 percent since 2001 and is expected to grow by 7 percent through 2024. All three main industries within the Cluster gained jobs in 2001-15, led Ambulatory Health Care Services (outpatient treatment), which grew by 47 percent, Nursing and Residential Care Facilities, which grew by 45 percent; and Hospitals, where employment grew by 20 percent;
- Baltimore County is specialized in Ambulatory Health Care Services and Nursing and Residential Care Facilities, but has a slightly below average concentration of employment in (an LQ of .92 indicating a concentration of employment 8 percent below the national average) Hospitals. Given the large size of the Hospital Sector in neighboring Baltimore City a slightly lower than national concentration of Hospital employment can be expected because of the size, role and importance of Baltimore City's hospitals, many of which are part of larger healthcare systems that include hospitals in the City, County and across the region;

**Employment by Occupation, Education and Skill Level**

- Not surprisingly, the majority of jobs in the Healthcare Cluster are in Healthcare practitioners and technical occupations (33 percent of jobs) and Healthcare support occupations (20 percent). Outside of these two occupational grouping, employment is spread across a wide variety of occupations ranging from lower skilled Office and administrative support occupations to higher skilled Community and social service occupations (Table 8-2);
- While employment in the Healthcare Cluster is divided across a wide range of occupations, it is highly concentrated in middle skill occupations, with 38 percent of employment (Table 8-3);
- While employment increased across all skills levels, the Healthcare Cluster's employment of low skilled workers increased the most rapidly between 2001 and 2015 and low skilled job opportunities in the Cluster are projected to continue to grow rapidly through 2024; and
- The leading occupations within the Cluster are presented in Table 8-4, led by middle skilled jobs, such as Registered Nurses and Nursing Assistants, followed by lower skilled Personal Care Aides and Home Health Aides;

[35] Employment data are from the Maryland Department of Commerce. Brief Economic Facts, Baltimore County.

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan identifies efforts to *Recruit, Train and Retain Skilled Talent* as key elements of the County's Strategy, including efforts to enhance the local workforce development pipeline, encourage linkages between employers and local students/education and training providers, and develop healthcare IT training programs; [36]
- There is a very strong level of alignment between the County's workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the Healthcare practitioners and technical and healthcare support occupations that account for more than half of all jobs in the Cluster. The County education and training system also generates a large number of graduates in these critical occupations; and
- Consistent with the County's 2012 Economic Development Strategic Plan expanding linkages between this Cluster and the substantial public and private higher education assets in the County should be a core workforce development priority. Expanding cooperation among the many Healthcare providers operating in the County to identify, develop and implement shared training programs is also a potential workforce opportunity to support this vital and growing sector.

**Chart 8-1: Baltimore County Healthcare Employment - 2001-2015 and Projections Through 2024**

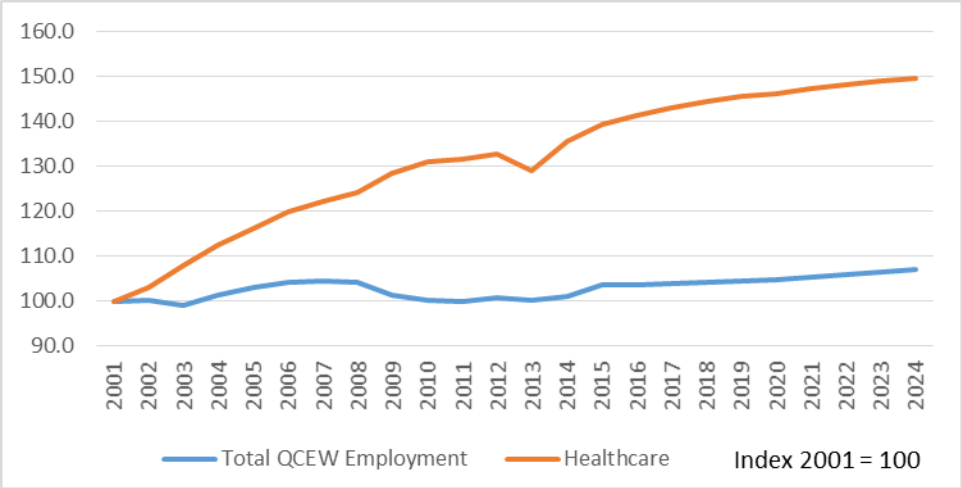



**Table 8-1: Health Care, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 3: Healthcare** | | | 37,995 | 52,923 | 56,850 | **14,928** | 39.3% | **3,926** | 7.4% |
| 621 | Ambulatory Health Care Services | 1.26 | 15,809 | 23,248 | 25,566 | 7,440 | 47.1% | 2,318 | 10.0% |
| 622 | Hospitals | 0.92 | 10,016 | 12,056 | 11,746 | 2,040 | 20.4% | (310) | (2.6%) |
| 623 | Nursing and Residential Care Facilities | 1.99 | 12,170 | 17,619 | 19,538 | 5,449 | 44.8% | 1,919 | 10.9% |

Source: JFI analysis of EMSI Data

[36] Page 35-36.

**Table 8-2: Healthcare Employment, by Occupation - 2001, 2015 and 2024**

| Occupation | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total | **37,980** | **52,916** | **56,842** | **14,936** | 39.3% | **3,926** | 7.4% |
| Management Occupations | 1,362 | 1,994 | 2,146 | 631 | 46.3% | 153 | 7.7% |
| Business and Financial Operations Occupations | 665 | 961 | 1,020 | 296 | 44.6% | 59 | 6.1% |
| Computer and Mathematical Occupations | 287 | 435 | 473 | 148 | 51.8% | 38 | 8.6% |
| Architecture and Engineering Occupations | <10 | 12 | 12 | n.a. | n.a. | 0 | 0.8% |
| Life, Physical, and Social Science Occupations | 306 | 357 | 331 | 51 | 16.6% | (26) | (7.3%) |
| Community and Social Service Occupations | 1,677 | 2,567 | 2,872 | 890 | 53.1% | 305 | 11.9% |
| Legal Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Education, Training, and Library Occupations | 109 | 149 | 164 | 40 | 36.3% | 14 | 9.7% |
| Arts, Design, Entertainment, Sports, and Media Occupations | 49 | 70 | 75 | 21 | 42.1% | 6 | 8.0% |
| Healthcare Practitioners and Technical Occupations | 12,997 | 17,540 | 18,346 | 4,543 | 35.0% | 806 | 4.6% |
| Healthcare Support Occupations | 7,635 | 10,757 | 11,944 | 3,122 | 40.9% | 1,186 | 11.0% |
| Protective Service Occupations | 242 | 339 | 349 | 96 | 39.7% | 10 | 3.0% |
| Food Preparation and Serving Related Occupations | 1,512 | 2,120 | 2,309 | 608 | 40.2% | 189 | 8.9% |
| Building and Grounds Cleaning and Maintenance Occupations | 962 | 1,291 | 1,386 | 330 | 34.3% | 95 | 7.3% |
| Personal Care and Service Occupations | 2,303 | 4,182 | 5,061 | 1,879 | 81.6% | 880 | 21.0% |
| Sales and Related Occupations | 159 | 256 | 273 | 97 | 60.7% | 17 | 6.8% |
| Office and Administrative Support Occupations | 6,957 | 8,740 | 8,819 | 1,783 | 25.6% | 79 | 0.9% |
| Farming, Fishing, and Forestry Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Construction and Extraction Occupations | 22 | 28 | 28 | 6 | 25.4% | 0 | 1.3% |
| Installation, Maintenance, and Repair Occupations | 345 | 499 | 545 | 153 | 44.4% | 46 | 9.3% |
| Production Occupations | 204 | 279 | 297 | 75 | 36.7% | 18 | 6.3% |
| Transportation and Material Moving Occupations | 185 | 341 | 393 | 156 | 84.4% | 52 | 15.1% |

Source: JFI analysis of EMSI Data

**Table 8-3: Healthcare Employment, by Degree Requirements and Skill Level - 2001, 2015 and 2024**

| Education/Skill Level | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total[1] | **37,454** | **52,389** | **56,316** | **14,935** | **39.9%** | **3,927** | **7.5%** |
| High Skilled Jobs[2] | 7,550 | 10,150 | 10,678 | 2,600 | 34.4% | 528 | 5.2% |
| Middle Skilled Jobs[3] | 14,478 | 19,724 | 20,918 | 5,247 | 36.2% | 1,194 | 6.1% |
| Low Skilled Jobs[4] | 15,427 | 22,515 | 24,720 | 7,088 | 45.9% | 2,205 | 9.8% |
| | | | | | | | |
| Total | **37,980** | **52,916** | **56,842** | **14,936** | **39.3%** | **3,926** | **7.4%** |
| Less than high school | 4,883 | 8,447 | 10,134 | 3,564 | 73.0% | 1,687 | 20.0% |
| High school diploma or equivalent | 10,543 | 14,068 | 14,586 | 3,525 | 33.4% | 518 | 3.7% |
| Postsecondary non-degree award | 7,901 | 10,945 | 11,697 | 3,044 | 38.5% | 752 | 6.9% |
| Some college, no degree | 79 | 115 | 127 | 36 | 45.8% | 13 | 11.2% |
| Associate's degree | 6,498 | 8,665 | 9,094 | 2,167 | 33.4% | 429 | 5.0% |
| Bachelor's degree | 3,218 | 4,630 | 4,961 | 1,412 | 43.9% | 331 | 7.1% |
| Master's degree | 1,670 | 2,379 | 2,587 | 709 | 42.5% | 208 | 8.7% |
| Doctoral or professional degree | 2,662 | 3,141 | 3,130 | 478 | 18.0% | (10) | (0.3%) |
| Unallocated | 526 | 527 | 526 | 1 | 0.2% | (1) | (0.1%) |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 8-4: Healthcare Employment, Leading High, Middle and Low Skilled Occupations**

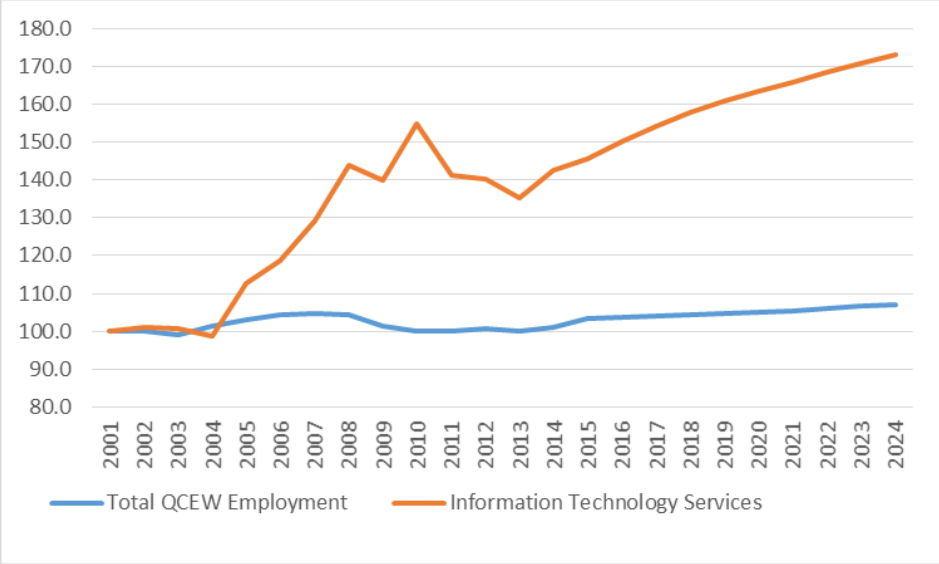
| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Medical and Health Services Managers | 11-9111 | 934 | $44.47 | Bachelor's degree |
| Physicians and Surgeons, All Other | 29-1069 | 675 | $83.28 | Doctoral or professional degree |
| Physical Therapists | 29-1123 | 575 | $37.70 | Doctoral or professional degree |
| Medical and Clinical Laboratory Technologists | 29-2011 | 463 | $25.56 | Bachelor's degree |
| Healthcare Social Workers | 21-1022 | 462 | $26.93 | Master's degree |
| **Middle Skilled Occupations** | | | | |
| Registered Nurses | 29-1141 | 5,826 | $33.69 | Associate's degree |
| Nursing Assistants | 31-1014 | 4,572 | $12.98 | Postsecondary non-degree award |
| Licensed Practical and Licensed Vocational Nurses | 29-2061 | 1,838 | $23.63 | Postsecondary non-degree award |
| Medical Assistants | 31-9092 | 1,437 | $15.35 | Postsecondary non-degree award |
| Emergency Medical Technicians and Paramedics | 29-2041 | 924 | $18.77 | Postsecondary non-degree award |
| **Low Skilled Occupations** | | | | |
| Personal Care Aides | 39-9021 | 2,602 | $10.95 | Less than high school |
| Home Health Aides | 31-1011 | 2,148 | $10.42 | Less than high school |
| Medical Secretaries | 43-6013 | 1,809 | $16.63 | High school diploma or equivalent |
| Receptionists and Information Clerks | 43-4171 | 1,536 | $12.74 | High school diploma or equivalent |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 43-6014 | 950 | $16.84 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 9: Industry and Occupational Analysis – Information Technology Services

The Information Technology Cluster is the fastest growing of Baltimore County's nine target industry clusters, with overall Cluster employment increasing by 46 percent between 2001 and 2015 and projected to increase by 19 percent through 2024; far outpacing historical and projected employment growth in the County (Chart 9-1). Key employers in the Cluster include: Computer Sciences Corp -- 250-499 Employees;[37] Edaptive Systems; and Zenimax.

**Chart 9-1: Information Technology Services Employment - 2001-2015 and Projections Through 2024**




The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Both employment and growth in the Information Technology Cluster is dominated by the Computer Systems Design and Related Services sector: which accounts for 87 percent of Cluster jobs; is the only specialized industry in the Cluster, with an LQ of 1.33 signifying an employment concentration 33 percent above the national average; and grew by 52 percent, or 2,287 jobs in 2001-15.

**Table 9-1: Information Technology Services Employment, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 4: Information Technology Services** | | | **5,045** | **7,347** | **8,724** | **2,302** | 45.60% | **1,377** | 18.70% |
| 5112 | Software Publishers | | 54 | 190 | 239 | 136 | 251.60% | 50 | 26.10% |
| 5182 | Data Processing, Hosting, and Related Services | | 580 | 459 | 343 | -121 | -20.90% | -116 | -25.20% |
| 5415 | Computer Systems Design and Related Services | | 4,411 | 6,698 | 8,141 | 2,287 | 51.80% | 1,443 | 21.50% |

[37] Where available, data on employment is from Maryland DLLR List of Employers by WIB area. DLLR gives employment by range.

Source: JFI analysis of EMSI Data

**Employment by Occupation, Education and Skill Level**

- The Information Technology Services is the most high skilled of Baltimore County's Nine Target Industry Clusters. Seventy-two percent of all jobs in the Cluster can be classified as high skilled jobs (Table 9-3) and 59 percent of Cluster employment is in the highly skilled Computer and mathematical occupations occupational grouping (Table 9-2). Other major areas of occupational employment include, Office and administrative support occupations (10 percent of employment), Management, and Business and Financial Operations occupations, each with 9 percent of total employment;
- While employment growth has occurred across the Cluster, the most rapid growth occurred in middle skill jobs over the 2001-15 period, and middle skill jobs are projected to increase most rapidly through 2024. This growth in middle skill job openings may indicate the need for expanded, non-traditional degree oriented training programs such as certificate programs offered by community colleges and private career schools/training providers;
- Within the Cluster, employment of high skilled occupations increased by 50 percent in 2001-15 and is projected to grow by 20 percent through 2024; indicating the importance of the County's public and private higher education system and the many computer programs it offers to the Cluster; and
- The leading occupations within the Cluster are presented in Table 9-4, led by high skilled: Software Developers, Applications; Software Developers, Systems Software; and Computer Systems Analysts. The largest middle skill occupation is Computer User Support Specialists.

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan targets meeting the workforce development needs of the Information Technology Cluster and specifically calls for efforts to "Partner with UMBC, CCBC, Towson University and Stevenson University to create programs that match the skills identified by IT companies that they are seeking recent graduates" as well as for specific efforts to identify and address workforce gaps for the important computer gaming sector of the Cluster;[38]
- There is a strong level of alignment between the County's workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the Computer and mathematical, Business and financial operations, and Office and administrative support occupations that account for more than three-quarters of Cluster employment. The County education and training system also generates a large number of graduates in the Computer and mathematical, Management, and Business and financial operations occupations demanded by the Cluster; and
- Consistent with the County's 2012 Economic Development Strategic Plan expanding linkages between this Cluster and the substantial public and private higher education assets in the County should be a core workforce development priority.

[38] Page 35-36.

**Table 9-2: Information Technology Services Employment, by Occupation - 2001, 2015 and 2024**

| Occupation | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total | **5,021** | **7,325** | **8,699** | **2,304** | 45.9% | **1,373** | 18.7% |
| Management Occupations | 479 | 668 | 793 | 189 | 39.5% | 125 | 18.7% |
| Business and Financial Operations Occupations | 438 | 637 | 772 | 198 | 45.2% | 135 | 21.3% |
| Computer and Mathematical Occupations | 2,849 | 4,330 | 5,210 | 1,481 | 52.0% | 880 | 20.3% |
| Architecture and Engineering Occupations | 170 | 272 | 309 | 102 | 60.1% | 36 | 13.4% |
| Life, Physical, and Social Science Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Community and Social Service Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Legal Occupations | 10 | 14 | 17 | 3 | 33.3% | 3 | 20.0% |
| Education, Training, and Library Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Arts, Design, Entertainment, Sports, and Media Occupations | 88 | 133 | 155 | 45 | 51.7% | 22 | 16.4% |
| Healthcare Practitioners and Technical Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Healthcare Support Occupations | 0 | 0 | 0 | n.a | n.a | n.a | n.a |
| Protective Service Occupations | 15 | 25 | 29 | 9 | 59.5% | 4 | 15.9% |
| Food Preparation and Serving Related Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Building and Grounds Cleaning and Maintenance Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Personal Care and Service Occupations | 0 | 0 | 0 | n.a | n.a | n.a | n.a |
| Sales and Related Occupations | 301 | 418 | 495 | 117 | 38.7% | 77 | 18.4% |
| Office and Administrative Support Occupations | 605 | 733 | 810 | 129 | 21.3% | 76 | 10.4% |
| Farming, Fishing, and Forestry Occupations | 5 | 6 | 7 | 1 | 20.0% | 1 | 16.7% |
| Construction and Extraction Occupations | <10 | <10 | <10 | n.a | n.a | n.a | n.a |
| Installation, Maintenance, and Repair Occupations | 46 | 61 | 71 | 16 | 33.9% | 9 | 15.4% |
| Production Occupations | 14 | 17 | 20 | 3 | 20.8% | 3 | 15.2% |
| Transportation and Material Moving Occupations | <10 | 10 | 12 | n.a | n.a | 2 | 17.9% |

Source: JFI analysis of EMSI Data

**Table 9-3: Information Technology Services Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| | | | | # | % | # | % |
| Education/Skill Level | 2001 | 2015 | 2024 | Change | Change | Change | Change |
| Total[1] | **4,740** | **6,992** | **8,369** | **2,251** | **47.5%** | **1,378** | **19.7%** |
| High Skilled Jobs[2] | 3,341 | 5,004 | 6,019 | 1,663 | 49.8% | 1,016 | 20.3% |
| Middle Skilled Jobs[3] | 587 | 929 | 1,126 | 342 | 58.3% | 197 | 21.2% |
| Low Skilled Jobs[4] | 813 | 1,059 | 1,224 | 246 | 30.3% | 165 | 15.6% |
| | | | | | | | |
| Total | **5,021** | **7,325** | **8,699** | **2,304** | **45.9%** | **1,373** | **18.7%** |
| Less than high school | 0 | 0 | 0 | 0 | n.a | n.a | n.a |
| High school diploma or equivalent | 813 | 1,059 | 1,224 | 246 | 30.3% | 165 | 15.6% |
| Postsecondary non-degree award | 0 | 0 | 0 | n.a | n.a | n.a | n.a |
| Some college, no degree | 306 | 490 | 629 | 184 | 60.3% | 139 | 28.4% |
| Associate's degree | 281 | 439 | 497 | 158 | 56.3% | 58 | 13.2% |
| Bachelor's degree | 3,315 | 4,947 | 5,956 | 1,632 | 49.2% | 1,009 | 20.4% |
| Master's degree | 0 | 0 | 0 | n.a | n.a | n.a | n.a |
| Doctoral or professional degree | 26 | 57 | 63 | 31 | 118.3% | 6 | 10.7% |
| Unallocated | 281 | 334 | 329 | 53 | 18.8% | (5) | (1.4%) |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 9-4: Information Technology Services, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Software Developers, Applications | 15-1132 | 783 | $47.31 | Bachelor's degree |
| Software Developers, Systems Software | 15-1133 | 715 | $53.31 | Bachelor's degree |
| Computer Systems Analysts | 15-1121 | 560 | $37.40 | Bachelor's degree |
| Computer Programmers | 15-1131 | 345 | $37.13 | Bachelor's degree |
| Network and Computer Systems Administrators | 15-1142 | 332 | $39.52 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Computer User Support Specialists | 15-1151 | 455 | $21.07 | Some college, no degree |
| Computer Network Support Specialists | 15-1152 | 241 | $28.61 | Associate's degree |
| Web Developers | 15-1134 | 181 | $26.18 | Associate's degree |
| Computer, Automated Teller, and Office Machine Repairers | 49-2011 | 35 | $17.47 | Some college, no degree |
| Electrical and Electronics Engineering Technicians | 17-3023 | 18 | $27.39 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Sales Representatives, Services, All Other | 41-3099 | 235 | $26.96 | High school diploma or equivalent |
| Customer Service Representatives | 43-4051 | 201 | $15.91 | High school diploma or equivalent |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 43-6014 | 108 | $16.84 | High school diploma or equivalent |
| Office Clerks, General | 43-9061 | 85 | $13.92 | High school diploma or equivalent |
| Business Operations Specialists, All Other | 13-1199 | 81 | $36.36 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 10: Industry and Occupational Analysis – Manufacturing

Baltimore County has traditionally served as the center of Maryland's manufacturing sector and home to some of Maryland largest and best known manufacturers. Baltimore County is home to 14 percent of all manufacturing employment in Maryland; however the sector has been hard hit by both the recent recession and declines in manufacturing activity in Maryland. Since 2001, Maryland manufacturing employment has fallen by 38 percent and Baltimore County manufacturing employment has fallen by more than fifty percent.[39] Despite these reductions in employment, the manufacturing sector remains a key component of the County's economy, is the fourth largest of the nine County target industry clusters and accounts for 4 percent of all jobs in the County. Selected key employers in the Cluster include[40]:

- AAI Corp – 1000+ Employees;
- B D Diagnostic Systems – 1,180 jobs
- Cristal USA – 1000+ Employees;
- McCormick & Company – 2,000 jobs;
- Stanley Black & Decker – 1000+ Employees;
- United Industrial Corp. – 1000+ Employees;

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- The Manufacturing Cluster experienced significant jobs losses, with employment falling by 54 percent or 17,246 jobs since 2001. EMSI projects continued declines in Cluster employment through 2024, with Cluster employment projected to fall by another 15 percent; (Chart 10-1);
- As presented in Table 10-1, Baltimore County has experienced broad-based declines in Manufacturing Cluster employment across nearly all component industries;
- Baltimore County Manufacturing Cluster employment is only specialized in one manufacturing industry,[41] Chemical Manufacturing, which includes the Pharmaceutical and Medicine Manufacturing industry in which the County has both a high level of employment and a high degree of specialization;
- Separate employment analyses were prepared for four manufacturing industries where the County has a high degree of specialization and large number of jobs (Other Food Manufacturing and Pharmaceutical and Medicine Manufacturing); a large number of jobs (Bakeries and Tortilla Manufacturing); or strong historical focus (Navigational, Measuring, Electromedical, and Control Instruments Manufacturing). As presented in Table 10-2, the employment performance of these fur industries is mixed, with two gaining jobs, and two losing jobs since 2001, and three of the four industries projected to lose employment through 2024.

[39] Based on an analysis of U.S. Bureau of Labor Statistics data.
[40] Data on employment is from the Maryland Department of Commerce. Brief Economic Facts, Baltimore County and from the Maryland DLLR List of Employers by WIB area. DLLR gives employment by range.
[41] At the three-digit NAICs level

**Employment by Occupation, Education and Skill Level**

- Employment in the Manufacturing Cluster is highly concentrated in: Production occupations, which accounts for 41 percent of employment; Office and administrative support occupations, which account for 11 percent of employment; and Transportation and material moving occupations, which account for 9 percent of employment. (Table 10-3);
- Occupational demand in the Cluster is highly concentrated in lower skilled occupations, which account for 68 percent of employment. (Table 10-4);
- The leading occupations within the entire Manufacturing Cluster are presented in Table 10-5, and are spread across the high, middle and low skill spectrum of occupations. Leading occupations include low skill level Packaging and Filling Machine Operators and Tenders; Inspectors, Testers, Sorters, Samplers, and Weighers; Laborers and Freight, Stock, and Material Movers, Hand; and machinists; as well as high skill General and Operations Managers and middle skill Heavy and Tractor-Trailer Truck Drivers; and
- The five leading occupations for each of the four Manufacturing Cluster industries analyzed separately are presented in Tale 10-6. The top occupations for the Pharmaceutical and Medicine Manufacturing and Navigational, Measuring, Electromedical, and Control Instruments Manufacturing are a mix of high and low skilled occupations, while the top occupations for the Other Food Manufacturing and Bakeries and Tortilla Manufacturing industries tend to be lower skilled production occupations.

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan specifically targets meeting the workforce development needs of the Manufacturing Cluster, specifically identifying efforts to address the shortage of skilled labor in the County, preparing a workforce pipeline of candidates for entry-level positions requiring short-term occupational training; and expanding training opportunities as part of the County's economic development strategy;[42]
- Compared to the other clusters, there is a weaker level of alignment between the County's workforce and education and training system and the occupational needs of the Manufacturing Cluster. The share of County residents employed in manufacturing related occupations is lower than the national average. It is important to note that the low concentration of employment does not necessarily indicate a workforce gap for the Cluster; simply a lower level of resident employment in its core occupations. Workers may commute to jobs in the County from other jurisdictions;
- The County's formal community college and college and university education and training system also generates a lower number of graduates than projected occupational demands. Again, because of the nature of these jobs, where on the job training is often the norm, this may not indicate a gap in the County's workforce development system; and
- While the Manufacturing Cluster has lost and is projected by EMSI to continue to lose employment, this does not mean that meeting the employment demands of the Cluster has no role in the County's workforce strategy. The Manufacturing Cluster tends to offer higher paying jobs, open to residents with lower skill and educational levels. The County has also identified the Food Manufacturing, Pharmaceutical and Medicine Manufacturing), Bakeries and Tortilla Manufacturing, and Navigational, Measuring, Electromedical, and Control Instruments Manufacturing sectors as important industries to support in its economic and workforce development strategy. Targeted

[42] Page 35-36.

efforts to identify and meet the needs of the County's Manufacturing Cluster in general, and high value-added industries like Pharmaceutical and Medicine Manufacturing and Navigational, Measuring, Electromedical, and Control Instruments Manufacturing sectors can play a potentially important role in the County's strategy.

**Chart 10-1: Manufacturing Employment - 2001-2015 and Projections Through 2024**

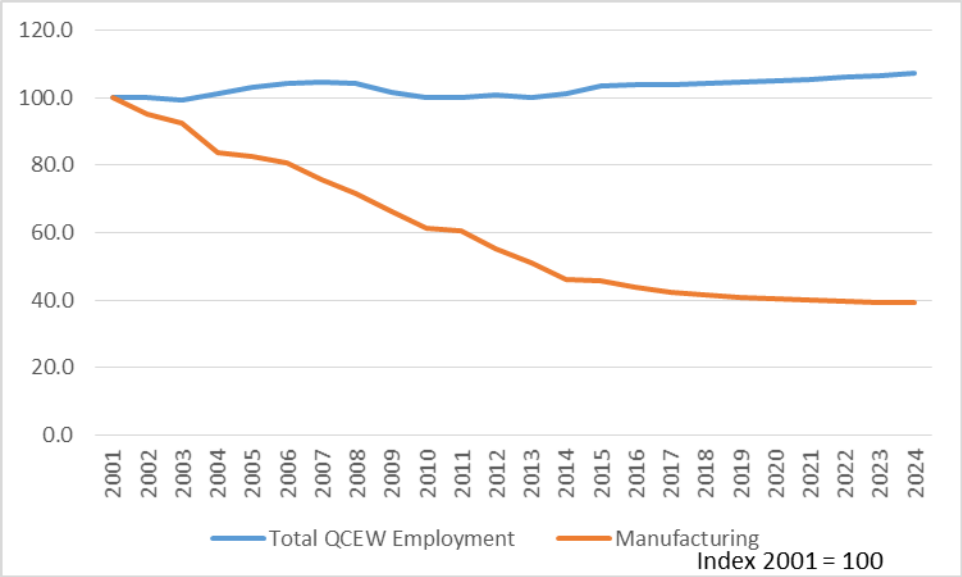


**Table 10-1: Manufacturing, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 5: Manufacturing** | | | **31,835** | **14,589** | **12,454** | **(17,246)** | (54.2%) | **(2,135)** | (14.6%) |
| 311 | Food Manufacturing | 0.62 | 3,124 | 2,497 | 2,667 | (628) | (20.1%) | 170 | 6.8% |
| 312 | Beverage and Tobacco Product Manufacturing | 0.46 | 998 | 274 | 239 | (724) | (72.6%) | (35) | (12.8%) |
| 313 | Textile Mills | 0.21 | 250 | 64 | <10 | (185) | (74.3%) | n.a. | n.a. |
| 314 | Textile Product Mills | 0.26 | 143 | 78 | 139 | (65) | (45.3%) | 61 | 77.3% |
| 315 | Apparel Manufacturing | 0.25 | 162 | 92 | 87 | (70) | (43.2%) | (5) | (5.3%) |
| 316 | Leather and Allied Product Manufacturing | 0.03 | 0 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| 321 | Wood Product Manufacturing | 0.10 | 244 | 99 | 72 | (145) | (59.5%) | (26) | (26.6%) |
| 322 | Paper Manufacturing | 0.23 | 1,875 | 225 | 152 | (1,651) | (88.0%) | (73) | (32.6%) |
| 323 | Printing and Related Support Activities | 1.06 | 2,875 | 1,267 | 870 | (1,608) | (55.9%) | (396) | (31.3%) |
| 324 | Petroleum and Coal Products Manufacturing | 0.18 | 145 | 54 | 15 | (92) | (63.1%) | (38) | (71.8%) |
| 325 | Chemical Manufacturing | 1.48 | 4,676 | 3,187 | 2,480 | (1,490) | (31.9%) | (707) | (22.2%) |
| 326 | Plastics and Rubber Products Manufacturing | 0.18 | 485 | 325 | 253 | (160) | (33.0%) | (72) | (22.3%) |
| 327 | Nonmetallic Mineral Product Manufacturing | 0.67 | 787 | 707 | 852 | (80) | (10.2%) | 145 | 20.5% |
| 331 | Primary Metal Manufacturing | 0.08 | 4,260 | 86 | 28 | (4,175) | (98.0%) | (58) | (67.6%) |
| 332 | Fabricated Metal Product Manufacturing | 0.28 | 2,303 | 1,064 | 896 | (1,239) | (53.8%) | (168) | (15.8%) |
| 333 | Machinery Manufacturing | 0.40 | 3,467 | 1,189 | 603 | (2,278) | (65.7%) | (586) | (49.3%) |
| 334 | Computer and Electronic Product Manufacturing | 0.37 | 3,653 | 1,025 | 1,000 | (2,627) | (71.9%) | (26) | (2.5%) |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | 0.38 | 266 | 382 | 277 | 116 | 43.7% | (104) | (27.4%) |
| 336 | Transportation Equipment Manufacturing | 0.27 | 1,060 | 1,151 | 1,042 | 92 | 8.6% | (109) | (9.5%) |
| 337 | Furniture and Related Product Manufacturing | 0.25 | 554 | 255 | 193 | (299) | (53.9%) | (62) | (24.3%) |
| 339 | Miscellaneous Manufacturing | 0.36 | 508 | 570 | 590 | 63 | 12.4% | 19 | 3.4% |

Source: JFI analysis of EMSI Data

**Table 10-2: Manufacturing Employment, by Selected Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| | Manufacturing | | 31,835 | 14,592 | 12,461 | **(17,243)** | (54.2%) | **(2,131)** | (14.6%) |
| 3119 | Other Food Manufacturing | 2.95 | 344 | 1,517 | 1,469 | 1,173 | 340.5% | (48) | (3.2%) |
| 3254 | Pharmaceutical and Medicine Manufacturing | 2.57 | 2,666 | 1,949 | 1,633 | (717) | (26.9%) | (316) | (16.2%) |
| 3118 | Bakeries and Tortilla Manufacturing | 1.06 | 758 | 833 | 1,079 | 75 | 10.0% | 246 | 29.6% |
| 3345 | Navigational, Measuring, Electromedical, and Control Instruments Manufacturing | 0.75 | 1,790 | 789 | 728 | (1,001) | (55.9%) | (60) | (7.6%) |

Source: JFI analysis of EMSI Data

**Table 10-3: Manufacturing Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **31,827** | **14,580** | **12,441** | **(17,248)** | (54.2%) | **(2,139)** | (14.7%) |
| Management Occupations | 2,052 | 1,022 | 842 | (1,029) | (50.2%) | (180) | (17.6%) |
| Business and Financial Operations Occupations | 1,456 | 812 | 671 | (644) | (44.2%) | (141) | (17.4%) |
| Computer and Mathematical Occupations | 980 | 516 | 432 | (465) | (47.4%) | (84) | (16.3%) |
| Architecture and Engineering Occupations | 2,159 | 968 | 804 | (1,191) | (55.2%) | (164) | (17.0%) |
| Life, Physical, and Social Science Occupations | 646 | 448 | 374 | (198) | (30.7%) | (74) | (16.5%) |
| Community and Social Service Occupations | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Legal Occupations | 21 | 12 | <10 | (9) | (43.9%) | n.a. | n.a. |
| Education, Training, and Library Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Arts, Design, Entertainment, Sports, and Media Occupations | 299 | 150 | 117 | (149) | (49.9%) | (32) | (21.5%) |
| Healthcare Practitioners and Technical Occupations | 63 | 33 | 29 | (31) | (48.8%) | (4) | (12.0%) |
| Healthcare Support Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Protective Service Occupations | 72 | 29 | 24 | (42) | (58.8%) | (5) | (17.6%) |
| Food Preparation and Serving Related Occupations | 127 | 121 | 135 | (6) | (4.7%) | 14 | 11.2% |
| Building and Grounds Cleaning and Maintenance Occupations | 168 | 106 | 99 | (62) | (36.8%) | (8) | (7.2%) |
| Personal Care and Service Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Sales and Related Occupations | 1,275 | 572 | 505 | (703) | (55.2%) | (67) | (11.7%) |
| Office and Administrative Support Occupations | 3,468 | 1,660 | 1,324 | (1,808) | (52.1%) | (336) | (20.3%) |
| Farming, Fishing, and Forestry Occupations | 32 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Construction and Extraction Occupations | 459 | 133 | 125 | (326) | (71.0%) | (8) | (6.2%) |
| Installation, Maintenance, and Repair Occupations | 1,957 | 707 | 622 | (1,250) | (63.9%) | (85) | (12.1%) |
| Production Occupations | 13,938 | 5,928 | 5,047 | (8,010) | (57.5%) | (881) | (14.9%) |
| Transportation and Material Moving Occupations | 2,655 | 1,363 | 1,292 | (1,292) | (48.7%) | (71) | (5.2%) |

Source: JFI analysis of EMSI Data

**Table 10-4: Manufacturing Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| Education/Skill Level | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|
| Total[1] | **31,228** | **13,976** | **11,875** | **(17,252)** | **(55.2%)** | **(2,101)** | **(15.0%)** |
| High Skilled Jobs[2] | 6,130 | 3,126 | 2,590 | (3,003) | (49.0%) | (536) | (17.2%) |
| Middle Skilled Jobs[3] | 2,841 | 1,324 | 1,169 | (1,517) | (53.4%) | (155) | (11.7%) |
| Low Skilled Jobs[4] | 22,258 | 9,525 | 8,116 | (12,732) | (57.2%) | (1,409) | (14.8%) |
| | | | | | | | |
| Total | **31,832** | **14,575** | **12,441** | **(17,257)** | **(54.2%)** | **(2,135)** | **(14.6%)** |
| Less than high school | 3,946 | 2,024 | 1,924 | (1,923) | (48.7%) | (99) | (4.9%) |
| High school diploma or equivalent | 18,311 | 7,502 | 6,192 | (10,810) | (59.0%) | (1,310) | (17.5%) |
| Postsecondary non-degree award | 1,766 | 901 | 838 | (865) | (49.0%) | (62) | (6.9%) |
| Some college, no degree | 96 | 41 | 32 | (55) | (56.9%) | (9) | (21.8%) |
| Associate's degree | 979 | 382 | 299 | (597) | (61.0%) | (84) | (21.9%) |
| Bachelor's degree | 5,933 | 2,996 | 2,477 | (2,937) | (49.5%) | (519) | (17.3%) |
| Master's degree | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Doctoral or professional degree | 197 | 131 | 113 | (66) | (33.6%) | (17) | (13.4%) |
| Unallocated | 604 | 599 | 565 | (5) | (0.7%) | (34) | (5.7%) |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelors or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 10-5: Manufacturing, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| General and Operations Managers | 11-1021 | 349 | $52.97 | Bachelor's degree |
| Industrial Engineers | 17-2112 | 166 | $38.52 | Bachelor's degree |
| Industrial Production Managers | 11-3051 | 152 | $43.51 | Bachelor's degree |
| Mechanical Engineers | 17-2141 | 147 | $37.00 | Bachelor's degree |
| Accountants and Auditors | 13-2011 | 137 | $32.41 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Heavy and Tractor-Trailer Truck Drivers | 53-3032 | 267 | $20.00 | Postsecondary non-degree award |
| Industrial Engineering Technicians | 17-3026 | 128 | $23.04 | Associate's degree |
| Prepress Technicians and Workers | 51-5111 | 69 | $20.03 | Postsecondary non-degree award |
| Electrical and Electronics Engineering Technicians | 17-3023 | 69 | $27.39 | Associate's degree |
| Chemical Technicians | 19-4031 | 60 | $20.30 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Packaging and Filling Machine Operators and Tenders | 51-9111 | 415 | $12.37 | High school diploma or equivalent |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 51-9061 | 336 | $19.31 | High school diploma or equivalent |
| Laborers and Freight, Stock, and Material Movers, Hand | 53-7062 | 310 | $10.99 | Less than high school |
| Machinists | 51-4041 | 309 | $21.80 | High school diploma or equivalent |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 41-4012 | 281 | $27.71 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

**Table 10-6: Top Five Occupations for the Four Selected Manufacturing Industries**

| Industry | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **Other Food Manufacturing** | | | | |
| Packaging and Filling Machine Operators and Tenders | 51-9111 | 118 | $12.37 | High school diploma or equivalent |
| Food Cooking Machine Operators and Tenders | 51-3093 | 96 | $12.42 | High school diploma or equivalent |
| Food Processing Workers, All Other | 51-3099 | 82 | $11.65 | Less than high school |
| Industrial Truck and Tractor Operators | 53-7051 | 76 | $15.44 | Less than high school |
| Food Batchmakers | 51-3092 | 73 | $16.58 | High school diploma or equivalent |
| **Pharmaceutical and Medicine Manufacturing** | | | | |
| Chemical Equipment Operators and Tenders | 51-9011 | 119 | $19.66 | High school diploma or equivalent |
| Packaging and Filling Machine Operators and Tenders | 51-9111 | 113 | $12.37 | High school diploma or equivalent |
| Medical Scientists, Except Epidemiologists | 19-1042 | 89 | $29.79 | Doctoral or professional degree |
| Chemists | 19-2031 | 86 | $40.03 | Bachelor's degree |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 51-9061 | 70 | $19.31 | High school diploma or equivalent |
| **Bakeries and Tortilla Manufacturing** | | | | |
| Bakers | 51-3011 | 178 | $12.01 | Less than high school |
| Cashiers | 41-2011 | 56 | $8.97 | Less than high school |
| Food Batchmakers | 51-3092 | 42 | $16.58 | High school diploma or equivalent |
| Packaging and Filling Machine Operators and Tenders | 51-9111 | 36 | $12.37 | High school diploma or equivalent |
| Helpers--Production Workers | 51-9198 | 31 | $12.89 | Less than high school |
| **Navigational, Measuring, Electromedical, and Control Instruments Manufacturing** | | | | |
| Electrical and Electronic Equipment Assemblers | 51-2022 | 59 | $15.12 | High school diploma or equivalent |
| Software Developers, Systems Software | 15-1133 | 54 | $53.31 | Bachelor's degree |
| Electrical Engineers | 17-2071 | 27 | $39.56 | Bachelor's degree |
| Electrical and Electronics Engineering Technicians | 17-3023 | 24 | $27.39 | Associate's degree |
| Software Developers, Applications | 15-1132 | 23 | $47.31 | Bachelor's degree |

Source: JFI analysis of EMSI Data

# Chapter 11: Industry and Occupational Analysis – Port Industries, Logistics and Distribution Centers

The Port Industries, Logistics and Distribution Centers Cluster is one of Baltimore County's traditionally dominant industries; however, the Cluster has experienced a long-term decline in employment. Baltimore County offers a strong combination of locational assets to support the development of the Cluster, including access to one of the nation's leading ports, a combination of rail and highway access, and a central east coast location. The County has several large scale Port Industries, Logistics and Distribution Center employers including: Cowan Systems LLC; Evergreen Shipping Agency (America) Corporation; Wallenius Wilhelmsen Logistics; and Weyerhaeuser Company. Moreover, the development of the Tradepoint Atlantic project in the County has the significant potential to support the renewed growth of the Cluster.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- The Port Industries, Logistics and Distribution Centers Cluster lagged the overall County in terms of employment growth, with employment falling by 17 percent since 2001 and is projected by EMSI to continue to decline by an additional 7 percent through 2024. It is important to note here that EMSI bases its projections on national and historical trends. The development of the Tradepoint project has the potential to stabilize, if not support future growth in this Cluster. (Chart 11-1 and Table 11-1);

**Employment by Occupation, Education and Skill Level**

- Employment in the Port Industries, Logistics and Distribution Centers Cluster is divided among several major occupational groupings, including: Transportation and material moving occupations , with 29 percent of employment; Office and administrative support occupations, with 22 percent of employment; and Sales and related occupations, with 19 percent of employment; (Table 11-2);
- Occupational demand in the Cluster is highly concentrated in lower skilled occupations, which account for 68 percent of employment. (Table 11-3); and
- The leading occupations within the Cluster are presented in Table 11-4, led by middle skilled Heavy and Tractor-Trailer Truck Drivers and then by lower skilled Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products and Laborers and Freight, Stock, and Material Movers, Hand occupations.

**Alignment of Cluster with County Workforce Development System**

- The County's 2012 Economic Development Strategic Plan specifically targets meeting the workforce development needs of the Port Industries, Logistics and Distribution Centers Cluster, specifically identifying efforts to prepare a workforce pipeline of candidates for entry-level positions requiring short-term occupational training and expanding training opportunities as part of the County's economic development strategy;[43]

[43] Page 35-36.

- Compared to the other clusters, there is a weaker level of alignment between the County's workforce and education and training system and the occupational needs of the Port Industries, Logistics and Distribution Centers Cluster. The share of County residents employed in Transportation and material moving occupations is lower than the national average. It is important to note that the low concentration of employment does not necessarily indicate a workforce gap for the Cluster; simply a lower level of resident employment in its core occupations. Workers may commute to jobs in the County from other jurisdictions;
- The County's formal community college and college and university education and training system also generates a lower number of graduates than projected occupational demands in key occupational areas such as Transportation and material moving occupations. Again, because of the nature of these jobs, where on the job training is often the norm, and private career schools often play the leading role in training, this may not indicate a gap in the County's workforce development system; and
- The development of Tradepoint Atlantic at the former Sparrows Point site creates an opportunity reverse past and projected future employment declines in the County's Port Industries, Logistics and Distribution Centers Cluster. Developing a targeted logistics and distribution training system to enhance the pipeline of talent for this industry presents an opportunity to enhance the integration of the County's economic development and workforce development system in a way that facilitates the success of this important development project.

**Chart 11-1: Port Industries, Logistics and Distribution Centers Employment - 2001-2015 and Projections Through 2024**

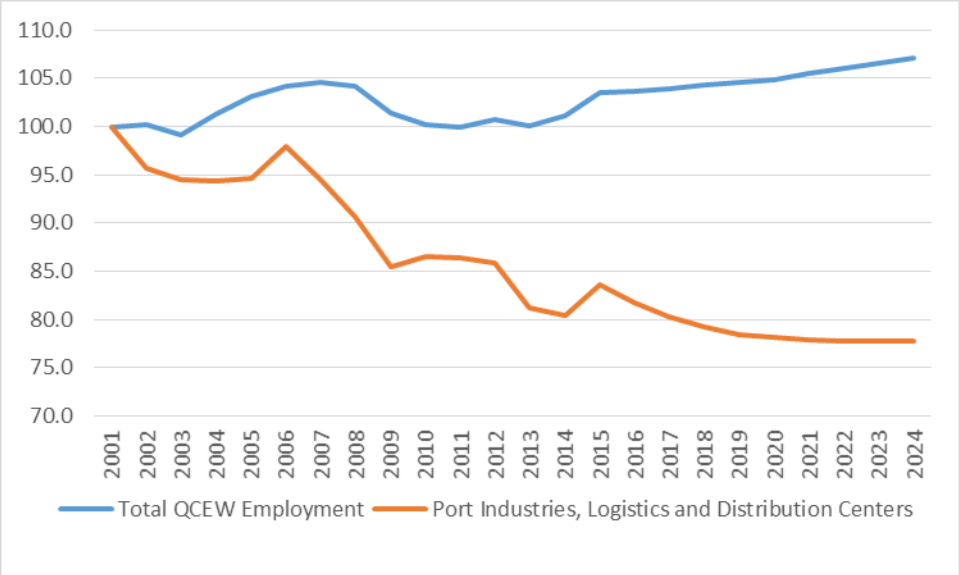


**Table 11-1: Port Industries, Logistics and Distribution Centers, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| | Total | | **16,512** | **13,787** | **12,823** | **(2,725)** | (16.5%) | **(964)** | (7.0%) |
| 423 | Merchant Wholesalers, Durable Goods | 0.90 | 8,879 | 7,063 | 6,681 | (1,816) | (20.5%) | (382) | (5.4%) |
| 424 | Merchant Wholesalers, Nondurable Goods | 0.49 | 3,338 | 2,659 | 2,590 | (679) | (20.3%) | (69) | (2.6%) |
| 425 | Wholesale Electronic Markets and Agents and Brokers | 0.36 | 694 | 871 | 834 | 177 | 25.4% | (37) | (4.2%) |
| 481 | Air Transportation | 0.01 | 39 | 14 | <10 | (24) | (62.8%) | n.a. | n.a. |
| 482 | Rail Transportation | 3.51 | 0 | <10 | 15 | n.a. | n.a. | n.a. | n.a. |
| 483 | Water Transportation | 0.05 | 127 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| 484 | Truck Transportation | 0.53 | 2,119 | 2,037 | 1,787 | (82) | (3.8%) | (250) | (12.3%) |
| 488 | Support Activities for Transportation | 0.67 | 1,316 | 1,143 | 917 | (173) | (13.1%) | (226) | (19.8%) |

Source: JFI analysis of EMSI Data

**Table 11-2: Port Industries, Logistics and Distribution Centers Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| **Total** | **16,497** | **13,778** | **12,822** | **(2,718)** | (16.5%) | **(957)** | (6.9%) |
| Management Occupations | 1,107 | 940 | 891 | (166) | (15.0%) | (49) | (5.2%) |
| Business and Financial Operations Occupations | 793 | 675 | 643 | (118) | (14.9%) | (33) | (4.8%) |
| Computer and Mathematical Occupations | 712 | 505 | 417 | (207) | (29.1%) | (88) | (17.4%) |
| Architecture and Engineering Occupations | 239 | 203 | 179 | (35) | (14.9%) | (24) | (12.0%) |
| Life, Physical, and Social Science Occupations | 27 | 27 | 30 | 1 | 2.0% | 3 | 10.4% |
| Community and Social Service Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Legal Occupations | 10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Education, Training, and Library Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Arts, Design, Entertainment, Sports, and Media Occupations | 156 | 136 | 130 | (20) | (13.1%) | (6) | (4.2%) |
| Healthcare Practitioners and Technical Occupations | 45 | 44 | 48 | (1) | (1.1%) | 4 | 8.6% |
| Healthcare Support Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Protective Service Occupations | 25 | 20 | 17 | (5) | (18.1%) | (3) | (14.6%) |
| Food Preparation and Serving Related Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Building and Grounds Cleaning and Maintenance Occupations | 64 | 49 | 44 | (15) | (23.7%) | (5) | (9.3%) |
| Personal Care and Service Occupations | 12 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Sales and Related Occupations | 2,999 | 2,621 | 2,591 | (378) | (12.6%) | (30) | (1.1%) |
| Office and Administrative Support Occupations | 3,740 | 3,097 | 2,849 | (643) | (17.2%) | (247) | (8.0%) |
| Farming, Fishing, and Forestry Occupations | 52 | 21 | 15 | (30) | (58.6%) | (7) | (30.9%) |
| Construction and Extraction Occupations | 67 | 66 | 68 | (0) | (0.7%) | 2 | 2.5% |
| Installation, Maintenance, and Repair Occupations | 1,158 | 960 | 925 | (198) | (17.1%) | (35) | (3.6%) |
| Production Occupations | 566 | 440 | 420 | (126) | (22.3%) | (19) | (4.4%) |
| Transportation and Material Moving Occupations | 4,726 | 3,974 | 3,553 | (752) | (15.9%) | (421) | (10.6%) |

Source: JFI analysis of EMSI Data

**Table 11-3: Port Industries, Logistics and Distribution Centers Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **15,807** | **13,109** | **12,217** | **(2,698)** | **(17.1%)** | **(892)** | **(6.8%)** |
| High Skilled Jobs[2] | 2,784 | 2,232 | 2,067 | (552) | (19.8%) | (166) | (7.4%) |
| Middle Skilled Jobs[3] | 2,266 | 1,993 | 1,796 | (273) | (12.0%) | (197) | (9.9%) |
| Low Skilled Jobs[4] | 10,756 | 8,883 | 8,354 | (1,873) | (17.4%) | (529) | (6.0%) |
| | | | | | | | |
| Total | **16,497** | **13,778** | **12,822** | **(2,718)** | **(16.5%)** | **(957)** | **(6.9%)** |
| Less than high school | 2,668 | 2,021 | 1,766 | (647) | (24.2%) | (255) | (12.6%) |
| High school diploma or equivalent | 8,088 | 6,862 | 6,588 | (1,226) | (15.2%) | (274) | (4.0%) |
| Postsecondary non-degree award | 1,836 | 1,723 | 1,580 | (114) | (6.2%) | (143) | (8.3%) |
| Some college, no degree | 262 | 152 | 119 | (110) | (41.8%) | (33) | (21.8%) |
| Associate's degree | 168 | 118 | 97 | (50) | (29.7%) | (21) | (17.6%) |
| Bachelor's degree | 2,773 | 2,219 | 2,041 | (555) | (20.0%) | (178) | (8.0%) |
| Master's degree | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Doctoral or professional degree | 11 | 13 | 26 | 3 | 28.0% | 13 | 94.4% |
| Unallocated | 690 | 670 | 605 | (21) | (3.0%) | (65) | (9.7%) |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 11-4: Port Industries, Logistics and Distribution Centers, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| General and Operations Managers | 11-1021 | 494 | $52.97 | Bachelor's degree |
| Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products | 41-4011 | 359 | $35.71 | Bachelor's degree |
| Accountants and Auditors | 13-2011 | 138 | $32.41 | Bachelor's degree |
| Sales Managers | 11-2022 | 137 | $58.66 | Bachelor's degree |
| Software Developers, Systems Software | 15-1133 | 106 | $53.31 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Heavy and Tractor-Trailer Truck Drivers | 53-3032 | 1,586 | $20.00 | Postsecondary non-degree award |
| Computer User Support Specialists | 15-1151 | 87 | $21.07 | Some college, no degree |
| Computer, Automated Teller, and Office Machine Repairers | 49-2011 | 65 | $17.47 | Some college, no degree |
| First-Line Supervisors of Production and Operating Workers | 51-1011 | 50 | $29.20 | Postsecondary non-degree award |
| Computer Network Support Specialists | 15-1152 | 43 | $28.61 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 41-4012 | 1,550 | $27.71 | High school diploma or equivalent |
| Laborers and Freight, Stock, and Material Movers, Hand | 53-7062 | 884 | $10.99 | Less than high school |
| Light Truck or Delivery Services Drivers | 53-3033 | 546 | $15.78 | High school diploma or equivalent |
| Customer Service Representatives | 43-4051 | 538 | $15.91 | High school diploma or equivalent |
| Stock Clerks and Order Fillers | 43-5081 | 382 | $10.38 | Less than high school |

Source: JFI analysis of EMSI Data

# Chapter 12: Industry and Occupational Analysis – Construction

The Construction Cluster is one of Baltimore County's leading industries. Baltimore County is highly specialized in the construction industry, with an LQ of 1.21, signifying that the concentration of construction employment in the County is 21 percent above the national average, and it is the second largest of the County's nine target industry clusters, accounting for 6 percent of total County employment. Selected key employers in the Cluster include[44]:

- Whiting-Turner Contracting Co – 1000+ Employees;
- Gray & Sons -- 500-749 Employees; and
- H Fidelity Engineering Inc. – 250-499 1000+ Employees.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- The Construction Cluster experienced rapid employment growth in the housing boom from 2001 to 2008, but employment declined significantly with the recession, falling to pre-2001 levels. Construction Cluster employment has not yet regained pre-recession levels, and is projected to increase only slowly through 2024; (Chart 12-1); and
- As presented in Table 6-1, 2015 Construction Cluster employment is only slightly above 2001 levels. The decline in Construction Cluster employment has been concentrated in industries related to residential growth, most importantly Residential Building Construction and Land Subdivision. Employment in Nonresidential Building Construction; however, increased rapidly since 2001. Construction Cluster employment is projected to continue to recover with continued economic growth, with employment growth projected across most of the industries that make up the Cluster through 2024 (Table 12-1).

**Employment by Occupation, Education and Skill Level**

- Employment in the Construction Cluster is highly concentrated in: Construction and extraction occupations, which accounts for 62 percent of employment; Office and administrative support occupations, which account for 10 percent of employment; and Installation, maintenance, and repair occupations, which account for 8 percent of employment. (Table 12-2);
- Occupational demand in the Cluster is highly concentrated in lower skilled occupations, which account for 83 percent of employment. (Table 12-3);
- As described in this report, there is a transition in the economy that favors higher skilled occupations resulting from changes in technology and organizational structure, with technology and automation replacing lesser skilled workers. Despite the high concentration of employment in lower skilled construction related trade, the Construction Cluster experienced much stronger growth in employment in middle and high skill occupations since 2001; and
- The leading occupations within the Cluster are presented in Table 12-4, led by lower skilled: Construction Laborers; Plumbers, Pipefitters, and Steamfitters; First-Line Supervisors of Construction Trades and Extraction Workers; Carpenters; and Electricians.

[44] Data on employment is from Maryland DLLR List of Employers by WIB area. DLLR gives employment by range.

**Alignment of Cluster with County Workforce Development System**

- Compared to the other clusters, there is a weaker level of alignment between the County's workforce and education and training system and the occupational needs of the Construction Cluster. Despite the high concentration of Construction Cluster employment in the County, the share of County residents employed in construction related occupations is lower than the national average. It is important to note that the low concentration of employment does not necessarily indicate a workforce gap for the Cluster; simply a lower level of resident employment in its core occupations. Workers may commute to jobs in the County from other jurisdictions;
- The County's formal community college and college and university education and training system also generates a lower number of graduates than projected occupational demands. Again, because of the nature of these jobs, where on the job training is often the norm, this may not indicate a gap in the County's workforce development system; and
- Given the size and importance of the Construction Cluster, the County should consider assessing the need for more focused construction sector and construction trades training and employment programs.

**Chart 12-1: Construction Employment - 2001-2015 and Projections Through 2024**

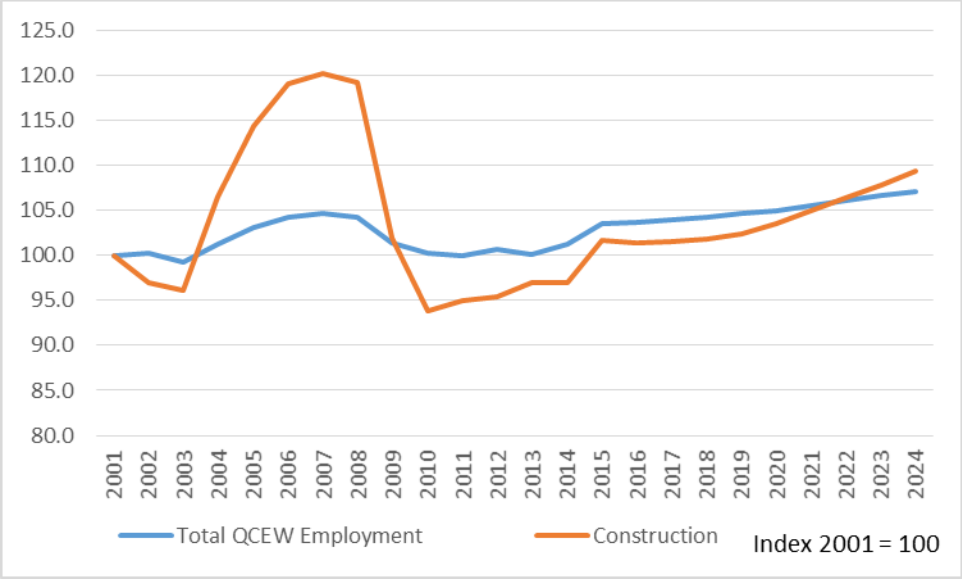


**Table 12-1 Construction, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 7: Construction** | | | **22,857** | **23,248** | **24,990** | **391** | 1.7% | **1,742** | 7.5% |
| 2361 | Residential Building Construction | 1.11 | 2,522 | 2,004 | 2,026 | (518) | (20.5%) | 22 | 1.1% |
| 2362 | Nonresidential Building Construction | 1.65 | 1,794 | 3,118 | 3,588 | 1,324 | 73.8% | 470 | 15.1% |
| 2371 | Utility System Construction | 0.70 | 916 | 881 | 929 | (36) | (3.9%) | 49 | 5.5% |
| 2372 | Land Subdivision | 0.48 | 416 | 54 | <10 | (362) | (87.1%) | n.a. | n.a. |
| 2373 | Highway, Street, and Bridge Construction | 0.62 | 895 | 506 | 363 | (389) | (43.4%) | (143) | (28.3%) |
| 2379 | Other Heavy and Civil Engineering Construction | 1.00 | 380 | 284 | 330 | (96) | (25.3%) | 46 | 16.1% |
| 2381 | Foundation, Structure, and Building Exterior Contractors | 1.76 | 3,202 | 3,720 | 4,342 | 518 | 16.2% | 622 | 16.7% |
| 2382 | Building Equipment Contractors | 1.66 | 9,010 | 8,462 | 8,651 | (548) | (6.1%) | 189 | 2.2% |
| 2383 | Building Finishing Contractors | 1.34 | 2,551 | 2,621 | 2,802 | 70 | 2.7% | 181 | 6.9% |
| 2389 | Other Specialty Trade Contractors | 1.00 | 1,173 | 1,599 | 1,960 | 426 | 36.4% | 361 | 22.6% |

Source: JFI analysis of EMSI Data

**Table 12-2: Construction Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **22,843** | **23,240** | **24,974** | **397** | 1.7% | **1,734** | 7.5% |
| Management Occupations | 1,506 | 1,534 | 1,627 | 28 | 1.9% | 93 | 6.0% |
| Business and Financial Operations Occupations | 894 | 937 | 1,013 | 42 | 4.7% | 76 | 8.1% |
| Computer and Mathematical Occupations | 80 | 68 | 65 | (12) | (14.5%) | (3) | (5.1%) |
| Architecture and Engineering Occupations | 247 | 250 | 262 | 4 | 1.6% | 12 | 4.8% |
| Life, Physical, and Social Science Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Community and Social Service Occupations | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Legal Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Education, Training, and Library Occupations | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Arts, Design, Entertainment, Sports, and Media Occupations | 38 | 32 | 31 | (6) | (15.8%) | (1) | (2.2%) |
| Healthcare Practitioners and Technical Occupations | 16 | 19 | 21 | 3 | 17.8% | 2 | 11.7% |
| Healthcare Support Occupations | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Protective Service Occupations | 20 | 10 | <10 | (9) | (47.6%) | n.a. | n.a. |
| Food Preparation and Serving Related Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Building and Grounds Cleaning and Maintenance Occupations | 122 | 111 | 122 | (11) | (8.8%) | 11 | 9.6% |
| Personal Care and Service Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Sales and Related Occupations | 571 | 539 | 558 | (33) | (5.7%) | 19 | 3.6% |
| Office and Administrative Support Occupations | 2,393 | 2,385 | 2,531 | (8) | (0.3%) | 147 | 6.1% |
| Farming, Fishing, and Forestry Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Construction and Extraction Occupations | 14,245 | 14,465 | 15,618 | 220 | 1.5% | 1,153 | 8.0% |
| Installation, Maintenance, and Repair Occupations | 1,832 | 1,970 | 2,128 | 137 | 7.5% | 158 | 8.0% |
| Production Occupations | 265 | 283 | 304 | 17 | 6.5% | 21 | 7.5% |
| Transportation and Material Moving Occupations | 614 | 638 | 695 | 24 | 3.9% | 57 | 8.9% |

Source: JFI analysis of EMSI Data

**Table 12-3: Construction Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **22,397** | **22,787** | **24,533** | **389** | **1.7%** | **1,746** | **7.7%** |
| High Skilled Jobs[2] | 2,363 | 2,480 | 2,659 | 117 | 5.0% | 179 | 7.2% |
| Middle Skilled Jobs[3] | 1,097 | 1,274 | 1,460 | 176 | 16.1% | 186 | 14.6% |
| Low Skilled Jobs[4] | 18,937 | 19,033 | 20,415 | 95 | 0.5% | 1,382 | 7.3% |
| | | | | | | | |
| Total | **22,843** | **23,240** | **24,974** | **397** | **1.7%** | **1,734** | **7.5%** |
| Less than high school | 5,098 | 5,492 | 6,134 | 395 | 7.7% | 641 | 11.7% |
| High school diploma or equivalent | 13,840 | 13,540 | 14,281 | (300) | (2.2%) | 741 | 5.5% |
| Postsecondary non-degree award | 1,011 | 1,207 | 1,393 | 196 | 19.4% | 185 | 15.3% |
| Some college, no degree | 12 | 11 | 11 | (2) | (12.9%) | 0 | 0.9% |
| Associate's degree | 74 | 56 | 56 | (18) | (24.7%) | 0 | 0.9% |
| Bachelor's degree | 2,363 | 2,480 | 2,659 | 117 | 5.0% | 179 | 7.2% |
| Master's degree | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Doctoral or professional degree | 0 | 0 | 0 | n.a. | n.a. | n.a. | n.a. |
| Unallocated | 446 | 454 | 441 | 8 | 1.8% | (12) | (2.7%) |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 12-4: Construction, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Construction Managers | 11-9021 | 751 | $43.82 | Bachelor's degree |
| General and Operations Managers | 11-1021 | 611 | $52.97 | Bachelor's degree |
| Cost Estimators | 13-1051 | 602 | $32.55 | Bachelor's degree |
| Accountants and Auditors | 13-2011 | 145 | $32.41 | Bachelor's degree |
| Civil Engineers | 17-2051 | 77 | $34.54 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 49-9021 | 774 | $25.04 | Postsecondary non-degree award |
| Heavy and Tractor-Trailer Truck Drivers | 53-3032 | 277 | $20.00 | Postsecondary non-degree award |
| Telecommunications Equipment Installers and Repairers, Except Line Installers | 49-2022 | 65 | $23.48 | Postsecondary non-degree award |
| Electronic Home Entertainment Equipment Installers and Repairers | 49-2097 | 52 | $19.13 | Postsecondary non-degree award |
| Electrical and Electronics Drafters | 17-3012 | 28 | $30.16 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Construction Laborers | 47-2061 | 2,622 | $14.68 | Less than high school |
| Plumbers, Pipefitters, and Steamfitters | 47-2152 | 2,093 | $26.29 | High school diploma or equivalent |
| First-Line Supervisors of Construction Trades and Extraction Workers | 47-1011 | 1,772 | $30.85 | High school diploma or equivalent |
| Carpenters | 47-2031 | 1,557 | $20.86 | High school diploma or equivalent |
| Electricians | 47-2111 | 1,376 | $23.76 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 13: Industry and Occupational Analysis – Financial Services

The Financial Services Custer is one of Baltimore County's most important Industry Clusters. It is the third largest of the nine target industry clusters and accounts for 6 percent of all jobs in the County. The industries that make up this Cluster are defined in Table 13-1. Selected key employers in the Cluster include[45]:

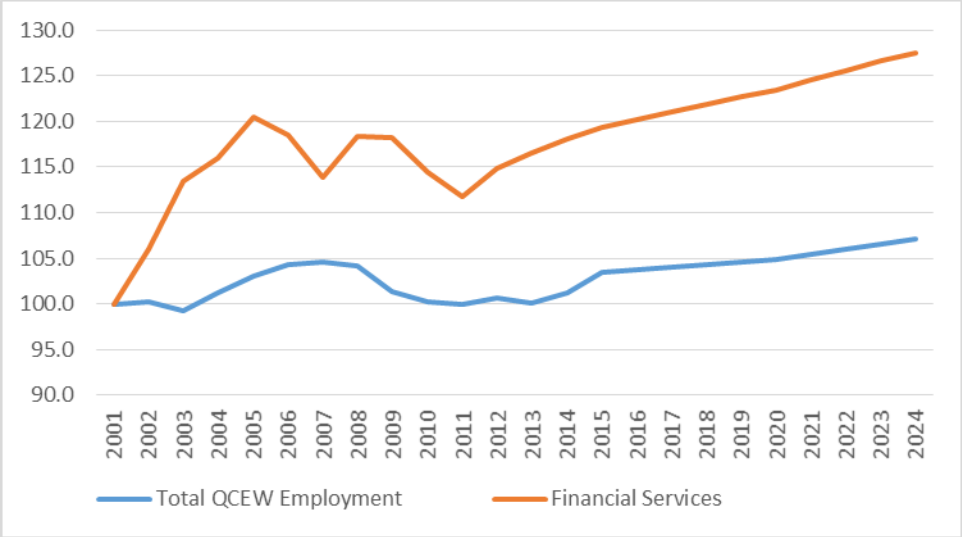
- T. Rowe Price Group – Financial Services – 4,200 Employees
- Carefirst Blue Cross Blue Shield – Health Insurance -- 1,800 Employees;
- Zurich – Insurance – 250-499 Employees; and
- The Injured Workers' Insurance Fund – Insurance -- 250-499 Employees.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Despite being negatively impacted by the recent Great Recession, employment growth in Financial Services Custer Employment outpaced overall employment growth in Baltimore County in 2001-15 and is expected to experience strong growth through 2024 (Chart 13-1);

**Chart 13-1: Financial Services Employment - 2001-2015 and Projections Through 2024**




- As presented in Table 13-1, the employment performance of the industries that make up Financial Services Custer has been mixed, with the rapid growth of employment in the Insurance Carriers and Other Financial Investment Activities industries offsetting slow growth or employment declines in other sectors; and
- Baltimore County is specialized in four of the ten industries that make up the Cluster, including Other Financial Investment Activities; Insurance Carriers; Agencies, Brokerages, and Other Insurance Related Activities; and Insurance and Employee Benefit Funds.

[45] Data on employment is from the Maryland Department of Commerce. Brief Economic Facts, Baltimore County and from the Maryland DLLR List of Employers by WIB area. DLLR gives employment by range.

**Table 13-1: Financial Services, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| **Industry 8: Financial Services** | | | **19,088** | **22,771** | **24,334** | **3,683** | 19.3% | **1,563** | 6.9% |
| 5221 | Depository Credit Intermediation | 0.85 | 3,761 | 3,827 | 4,447 | 67 | 1.8% | 620 | 16.2% |
| 5222 | Nondepository Credit Intermediation | 1.03 | 3,208 | 1,630 | 762 | (1,578) | (49.2%) | (868) | (53.3%) |
| 5223 | Activities Related to Credit Intermediation | 0.98 | 1,131 | 760 | 638 | (371) | (32.8%) | (122) | (16.1%) |
| 5231 | Securities and Commodity Contracts Intermediation and Brokerage | 0.56 | 723 | 673 | 475 | (49) | (6.8%) | (198) | (29.5%) |
| 5232 | Securities and Commodity Exchanges | 0.24 | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| 5239 | Other Financial Investment Activities | 3.89 | 698 | 4,636 | 6,830 | 3,938 | 564.4% | 2,194 | 47.3% |
| 5241 | Insurance Carriers | 1.91 | 4,774 | 6,109 | 5,717 | 1,335 | 28.0% | (392) | (6.4%) |
| 5242 | Agencies, Brokerages, and Other Insurance Related Activities | 1.82 | 4,395 | 5,085 | 5,465 | 691 | 15.7% | 380 | 7.5% |
| 5251 | Insurance and Employee Benefit Funds | 8.42 | 377 | 50 | <10 | (326) | (86.6%) | n.a. | n.a. |
| 5259 | Other Investment Pools and Funds | 0.83 | 23 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |

Source: JFI analysis of EMSI Data

**Employment by Occupation, Education and Skill Level**

- Employment in the Financial Services Cluster spread across a wide variety of occupations. The Cluster's largest occupational grouping is Office and administrative support occupations, which accounts for 38 percent of employment and contains a mix of middle and lower skilled occupations. The second largest grouping of occupations is the Business and financial operations occupations grouping, which accounts for 30 percent of employment, followed by Sales and Related Occupations, with 14 percent of employment (Table 13-2);
- The Financial Services Cluster has been significantly impacted by changes in technology, with increased use of information technology reducing demand for lower skilled office support occupations. While the Financial Services Cluster experienced growth across all major occupational groupings, changes in occupational demand significantly favor high and middle skill occupations; with 2001-15 employment growth of 38 percent in high skilled occupations and 32 percent for middle skill occupations. Most of the employment gains in this Cluster is projected to occur in high skilled occupations, where employment growth of 14 percent is projected through 2024. In contrast, employment in lower skilled occupations increased by only 9 percent since 2001 and is projected to grow by only 2 percent through 2024 (Table 13-3); and
- As presented in Table 13-4, the leading occupations within the Cluster are highly concentrated in lower skill sales, Customer Service Representatives and Insurance Sales Agents, and financial occupations, Claims Adjusters, Examiners, and Investigators, Tellers, and First-Line Supervisors of Office and Administrative Support Workers. The leading middle skill occupations are concentrated in computer occupations, and the leading high skilled occupations are concentrated in Business and financial operations occupations, such as financial advisors, financial analysts, Loan officers, and Accountants and Auditors.

**Alignment of Cluster with County Workforce Development System**

- There is a strong level of alignment between the County's resident workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the Business and financial operations, Computer and mathematical, and Office and administrative support occupations that are critical to the Cluster. The County education and training system also generates a large number of graduates in the Management, Business and financial operations and Computer and mathematical occupations demanded by the Cluster;
- Baltimore County's education and training system produces offers a large number of programs in the core occupations demanded by this Cluster; and
- DEWD should work with the County's community college system, colleges and universities to inventory existing business, finance and management educational programs and their interactions with key Financial Services Cluster employers to expand and better link these programs to the needs of the employer community.

**Table 13-2: Financial Services Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **19,064** | **22,743** | **24,313** | **3,680** | 19.3% | **1,570** | 6.9% |
| Management Occupations | 1,405 | 1,724 | 1,875 | 319 | 22.7% | 151 | 8.7% |
| Business and Financial Operations Occupations | 4,525 | 6,723 | 7,620 | 2,198 | 48.6% | 897 | 13.3% |
| Computer and Mathematical Occupations | 1,490 | 1,893 | 2,047 | 403 | 27.1% | 154 | 8.1% |
| Architecture and Engineering Occupations | <10 | 17 | 21 | n.a. | n.a. | 4 | 25.9% |
| Life, Physical, and Social Science Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Community and Social Service Occupations | 27 | 31 | 33 | 4 | 16.5% | 1 | 3.7% |
| Legal Occupations | 166 | 287 | 280 | 121 | 73.0% | (8) | (2.6%) |
| Education, Training, and Library Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Arts, Design, Entertainment, Sports, and Media Occupations | 52 | 63 | 66 | 11 | 20.2% | 3 | 5.2% |
| Healthcare Practitioners and Technical Occupations | 130 | 138 | 140 | 8 | 6.0% | 2 | 1.2% |
| Healthcare Support Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Protective Service Occupations | 30 | 37 | 38 | 6 | 20.3% | 1 | 2.9% |
| Food Preparation and Serving Related Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Building and Grounds Cleaning and Maintenance Occupations | 25 | 36 | 42 | 11 | 43.0% | 6 | 15.9% |
| Personal Care and Service Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Sales and Related Occupations | 2,915 | 3,124 | 3,214 | 209 | 7.2% | 90 | 2.9% |
| Office and Administrative Support Occupations | 8,275 | 8,638 | 8,891 | 363 | 4.4% | 253 | 2.9% |
| Farming, Fishing, and Forestry Occupations | 0 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Construction and Extraction Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Installation, Maintenance, and Repair Occupations | 23 | 33 | 36 | 9 | 40.5% | 4 | 11.5% |
| Production Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Transportation and Material Moving Occupations | <10 | <10 | 11 | n.a. | n.a. | n.a. | n.a. |

Source: JFI analysis of EMSI Data

**Table 13-3: Financial Services Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **18,828** | **22,529** | **24,084** | **3,701** | **19.7%** | **1,555** | **6.9%** |
| High Skilled Jobs[2] | 6,532 | 8,998 | 10,287 | 2,466 | 37.8% | 1,289 | 14.3% |
| Middle Skilled Jobs[3] | 408 | 537 | 544 | 129 | 31.5% | 8 | 1.4% |
| Low Skilled Jobs[4] | 11,888 | 12,994 | 13,252 | 1,106 | 9.3% | 258 | 2.0% |
| | | | | | | | |
| Total | **19,088** | **22,771** | **24,334** | **3,683** | **19.3%** | **1,563** | **6.9%** |
| Less than high school | 154 | 135 | 120 | (19) | (12.0%) | (15) | (10.9%) |
| High school diploma or equivalent | 11,734 | 12,859 | 13,132 | 1,125 | 9.6% | 273 | 2.1% |
| Postsecondary non-degree award | 42 | 92 | 82 | 50 | 117.5% | (10) | (10.9%) |
| Some college, no degree | 111 | 145 | 160 | 34 | 31.1% | 14 | 9.9% |
| Associate's degree | 255 | 300 | 303 | 45 | 17.5% | 3 | 1.1% |
| Bachelor's degree | 6,449 | 8,872 | 10,154 | 2,423 | 37.6% | 1,282 | 14.5% |
| Master's degree | 11 | 27 | 31 | 16 | 140.7% | 4 | 16.3% |
| Doctoral or professional degree | 72 | 100 | 102 | 28 | 38.9% | 3 | 2.7% |
| Unallocated | 260 | 242 | 251 | (18) | (6.8%) | 8 | 3.5% |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI Data

**Table 13-4: Financial Services, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Personal Financial Advisors | 13-2052 | 1,399 | $34.51 | Bachelor's degree |
| Financial Analysts | 13-2051 | 759 | $32.34 | Bachelor's degree |
| Loan Officers | 13-2072 | 657 | $27.68 | Bachelor's degree |
| Securities, Commodities, and Financial Services Sales Agents | 41-3031 | 578 | $27.65 | Bachelor's degree |
| Accountants and Auditors | 13-2011 | 520 | $32.41 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Computer User Support Specialists | 15-1151 | 145 | $21.07 | Some college, no degree |
| Computer Network Support Specialists | 15-1152 | 107 | $28.61 | Associate's degree |
| Registered Nurses | 29-1141 | 100 | $33.69 | Associate's degree |
| Insurance Appraisers, Auto Damage | 13-1032 | 81 | $32.40 | Postsecondary non-degree award |
| Web Developers | 15-1134 | 47 | $26.18 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Customer Service Representatives | 43-4051 | 2,237 | $15.91 | High school diploma or equivalent |
| Insurance Sales Agents | 41-3021 | 2,062 | $26.34 | High school diploma or equivalent |
| Claims Adjusters, Examiners, and Investigators | 13-1031 | 1,245 | $33.24 | High school diploma or equivalent |
| Tellers | 43-3071 | 1,250 | $12.68 | High school diploma or equivalent |
| First-Line Supervisors of Office and Administrative Support Workers | 43-1011 | 940 | $25.82 | High school diploma or equivalent |

Source: JFI analysis of EMSI Data

# Chapter 14: Industry and Occupational Analysis – Public and Private Higher Education

The Public and Private Higher Education Cluster is both a major industry in the County and a critical part of its workforce development system. As a result, the Cluster has dual importance to the Baltimore County workforce development system – both as a source of employment growth for the County in addition to being the key supplier of as skilled and educated workforce in the County.

The Cluster is comprised of three main sub-industries: Private Colleges, Universities, and Professional Schools; Public Community Colleges; and Public Colleges, Universities, and Professional Schools. Because public higher education is part of State and Local Government, the EMSI data for this sector are estimated and were found to undercount the actual level of employment. As a result, the Valbridge-JFI Team used actual employment data from the Maryland Association of Community Colleges and University System of Maryland to analyze these two sectors. Data on employment growth projections and occupational employment from EMSI were applied to these actual employment figures. The leading employers in the Public and Private Higher Education are: Towson University with 3,456 jobs; UMBC, with 2,948 jobs, and CCBC with 2,709 jobs.

The Valbridge-JFI Team analyzed current and projected future employment trends for the Cluster at both the industry and occupational level using EMSI data. The key findings of this analysis are as follows:

**Employment**

- Baltimore County's Public and Private Higher Education Cluster is vibrant and growing and far outpaced overall employment growth in Baltimore County in 2001-15 and is expected to experience strong growth through 2024 (Chart 14-1);
- As presented in Table 14-1, all three industry sectors within the Cluster experienced strong employment growth since 2001, with employment growth led by the substantial growth of the County's private colleges and universities, whose employment more than doubled since 2001. Cluster employment increased by 34 percent since 2001 and is expected to grow by 12 percent through 2024; and
- Baltimore County is specialized[46] in public community colleges, with an LQ of 1.39, and public colleges, universities and professional schools, with an LQ of 1.99, but the County has a below average concentration of employment in private colleges, universities and professional schools, with an LQ of 0.74.

**Employment by Occupation, Education and Skill Level**

- Employment in the Public and Private Higher Education Cluster is highly concentrated in high skill level occupations. The single largest occupational grouping in the Cluster is Education, training, and library occupations, which accounts for 44 percent of all employment. The second largest occupational grouping is Office and administrative support occupations, which accounts for 17 percent of employment and includes a mix of middle and low skilled occupations. The Public and

[46] As measured by LQs, see footnote 9, with an LQ over 1.2 potentially indicating industry specialization. Specialization means that the County may have a comparative advantage in this industry.

Private Higher Education Cluster also has high concentrations of employment in: Management; Business and Financial operations; and Computer and mathematical occupations (Table 14-2);

- The Public and Private Higher Education Cluster experienced job growth across all skill levels. Occupational demand in the Cluster favors higher skilled occupations, where employment grew by 38 percent since 2001 and is projected to grow by 14 percent through 2024. In contrast, employment in lower skilled occupations increased by 30 percent since 2001 and is projected to grow by 9 percent through 2024 (Table 14-3); and
- The leading occupations within the Cluster are presented in Table 14-4, led by high skilled Postsecondary Teachers. The leading middle skill occupations are concentrated in computer occupations, technicians, and nurses. The leading lower skilled occupations are Secretaries and Administrative Assistants, Except Legal, Medical, and Executive and Office Clerks, General.

**Alignment of Cluster with County Workforce Development System**

- There is a strong level of alignment between the County's workforce and education and training system and the occupational needs of the Cluster. The County has a strong concentration of resident workers in the: Education, training, and library occupations; Management; Business and financial operations; Computer and mathematical; and Office and administrative support occupations that are critical to the Cluster. The County's education and training system also generates a large number of graduates in the: Management, Business and financial operations; Computer and mathematical; and Education, Training, and Library occupations demanded by the Cluster; and
- Because the Public and Private Higher Education Cluster is both a major employer in the County and the core supplier of the skilled and educated workforce demanded by the County's employer community, engaging this sector in the County's workforce development strategy will be critical. Building on the existing linkages between this Cluster and the other eight target industry clusters should be a central goal of the County's workforce strategy. The DEWD should work with the County's community college system, colleges and universities to inventory existing educational programs and their interactions with key employers and industries and work to expand and link these programs to the needs of the employer community.

**Chart 14-1: Public and Private Higher Education Employment - 2001-2015 and Projections Through 2024**

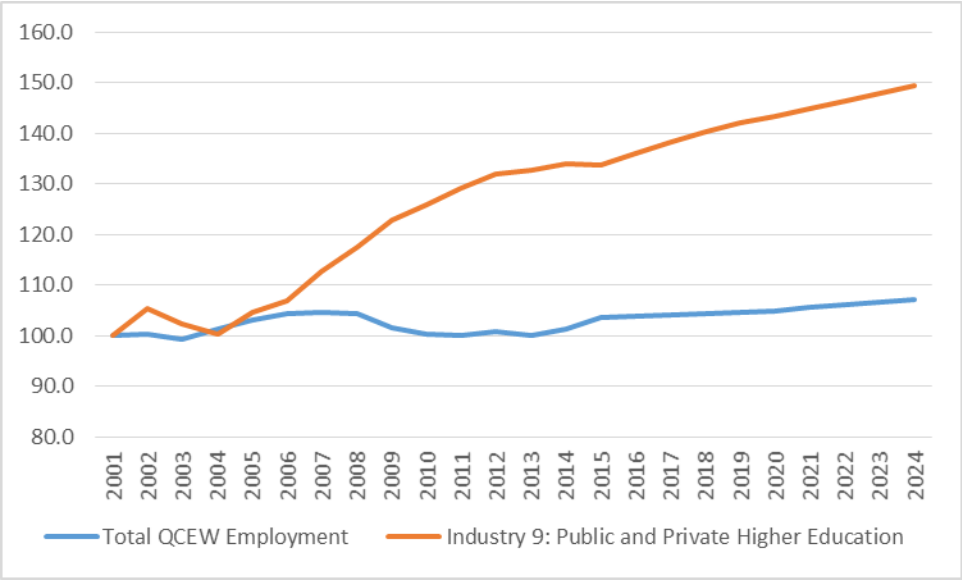


**Table 14-1: Public and Private Higher Education, by Key Industry - 2001, 2015 and 2024**

| Industry | | Current LQ | 2001 | 2015 | 2024 | 2001-2015 # Change | 2001-2015 % Change | 2015-2024 # Change | 2015-2024 % Change |
|---|---|---|---|---|---|---|---|---|---|
| | Total | | 8,610 | 11,502 | 12,852 | **2,892** | 33.60% | **1,349** | 11.70% |
| 6113 | Colleges, Universities, and Professional Schools | 0.74 | 956 | 2,389 | 3,528 | 1,433 | 149.90% | 1,138 | 47.60% |
| 902612 | Colleges, Universities, and Professional Schools (State Government)[1] | 1.39 | 5,823 | 6,404 | 6,554 | 581 | 10.00% | 150 | 2.30% |
| 903612 | Colleges, Universities, and Professional Schools (Local Government)[1] | 1.99 | 1,831 | 2,709 | 2,770 | 878 | 48.00% | 61 | 2.20% |

(1) The JFI used the actual community college and public university employment for historical numbers and the EMSI industry growth projections.

Source: JFI analysis of EMSI, MHEC and MACC Data

**Table 14-2: Public and Private Higher Education Employment, by Occupation - 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Occupation | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total | **8,601** | **11,482** | **12,835** | **2,881** | 33.5% | **1,353** | 11.8% |
| Management Occupations | 457 | 630 | 729 | 173 | 37.9% | 99 | 15.7% |
| Business and Financial Operations Occupations | 440 | 592 | 664 | 152 | 34.6% | 73 | 12.3% |
| Computer and Mathematical Occupations | 446 | 598 | 654 | 151 | 33.9% | 56 | 9.4% |
| Architecture and Engineering Occupations | 42 | 49 | 56 | 7 | 17.3% | 6 | 13.1% |
| Life, Physical, and Social Science Occupations | 372 | 480 | 530 | 108 | 29.0% | 50 | 10.4% |
| Community and Social Service Occupations | 200 | 271 | 305 | 71 | 35.6% | 33 | 12.3% |
| Legal Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Education, Training, and Library Occupations | 3,756 | 5,074 | 5,732 | 1,317 | 35.1% | 658 | 13.0% |
| Arts, Design, Entertainment, Sports, and Media Occupations | 176 | 251 | 299 | 75 | 42.9% | 48 | 19.1% |
| Healthcare Practitioners and Technical Occupations | 200 | 261 | 294 | 61 | 30.6% | 33 | 12.7% |
| Healthcare Support Occupations | 36 | 48 | 55 | 12 | 33.8% | 7 | 14.1% |
| Protective Service Occupations | 180 | 255 | 285 | 75 | 41.7% | 30 | 11.6% |
| Food Preparation and Serving Related Occupations | 62 | 85 | 100 | 23 | 37.2% | 15 | 18.1% |
| Building and Grounds Cleaning and Maintenance Occupations | 273 | 363 | 408 | 90 | 33.1% | 45 | 12.4% |
| Personal Care and Service Occupations | 112 | 157 | 180 | 45 | 40.5% | 23 | 14.7% |
| Sales and Related Occupations | 47 | 66 | 73 | 18 | 39.2% | 8 | 11.7% |
| Office and Administrative Support Occupations | 1,555 | 1,984 | 2,112 | 429 | 27.6% | 128 | 6.4% |
| Farming, Fishing, and Forestry Occupations | <10 | <10 | <10 | n.a. | n.a. | n.a. | n.a. |
| Construction and Extraction Occupations | 51 | 66 | 74 | 15 | 29.7% | 8 | 11.6% |
| Installation, Maintenance, and Repair Occupations | 137 | 178 | 198 | 41 | 30.2% | 20 | 11.1% |
| Production Occupations | 21 | 27 | 32 | 6 | 27.9% | 5 | 16.9% |
| Transportation and Material Moving Occupations | 40 | 48 | 57 | 9 | 21.5% | 9 | 18.3% |

Source: JFI analysis of EMSI, MHEC and MACC Data

**Table 14-3: Public and Private Higher Education Employment, by Degree Requirements and Skill Level- 2001, 2015 and 2024**

| | | | | 2001-2015 | | 2015-2024 | |
|---|---|---|---|---|---|---|---|
| Education/Skill Level | 2001 | 2015 | 2024 | # Change | % Change | # Change | % Change |
| Total[1] | **7,431** | **10,092** | **11,387** | **2,661** | **35.8%** | **1,295** | **12.8%** |
| High Skilled Jobs[2] | 4,793 | 6,633 | 7,582 | 1,840 | 38.4% | 949 | 14.3% |
| Middle Skilled Jobs[3] | 378 | 513 | 590 | 134 | 35.5% | 77 | 15.0% |
| Low Skilled Jobs[4] | 2,260 | 2,946 | 3,215 | 687 | 30.4% | 268 | 9.1% |
| | | | | | | | |
| Total | **8,601** | **11,482** | **12,835** | **2,881** | **33.5%** | **1,353** | **11.8%** |
| Less than high school | 329 | 414 | 460 | 86 | 26.1% | 46 | 11.1% |
| High school diploma or equivalent | 1,931 | 2,532 | 2,754 | 601 | 31.1% | 222 | 8.8% |
| Postsecondary non-degree award | 55 | 65 | 81 | 11 | 20.1% | 16 | 24.2% |
| Some college, no degree | 160 | 226 | 246 | 66 | 41.0% | 20 | 8.9% |
| Associate's degree | 164 | 221 | 262 | 58 | 35.3% | 41 | 18.6% |
| Bachelor's degree | 978 | 1,430 | 1,684 | 451 | 46.2% | 254 | 17.8% |
| Master's degree | 462 | 649 | 738 | 187 | 40.4% | 89 | 13.7% |
| Doctoral or professional degree | 3,353 | 4,555 | 5,160 | 1,202 | 35.9% | 606 | 13.3% |
| Unallocated | 1,171 | 1,390 | 1,448 | 219 | 18.7% | 58 | 4.2% |

(1) Does not sum to total jobs because of unallocated employment.

(2) Occupations requiring a Bachelor's or Above.

(3) Occupations requiring more than a High School Diploma but less than a Bachelor's Degree.

(4) Occupations requiring a High School Diploma or Less.

Source: JFI analysis of EMSI, MHEC and MACC Data

**Table 14-4: Public and Private Higher Education, Leading High, Middle and Low Skilled Occupations**

| Education/Skill Level | SOC CODE | Employment 2015 | Median Wage | Typical Entry Level Education |
|---|---|---|---|---|
| **High Skilled Occupations** | | | | |
| Postsecondary Teachers | 25-1099 | 4,340 | $65.89 | Doctoral or professional degree |
| Education Administrators, Postsecondary | 11-9033 | 239 | $87.10 | Master's degree |
| Educational, Guidance, School, and Vocational Counselors | 21-1012 | 216 | $48.89 | Master's degree |
| Medical Scientists, Except Epidemiologists | 19-1042 | 155 | $59.58 | Doctoral or professional degree |
| Education, Training, and Library Workers, All Other | 25-9099 | 153 | $65.03 | Bachelor's degree |
| **Middle Skilled Occupations** | | | | |
| Computer User Support Specialists | 15-1151 | 126 | $42.14 | Some college, no degree |
| Teacher Assistants | 25-9041 | 99 | $23.28 | Some college, no degree |
| Life, Physical, and Social Science Technicians, All Other | 19-4099 | 51 | $45.59 | Associate's degree |
| Registered Nurses | 29-1141 | 50 | $67.37 | Associate's degree |
| Computer Network Support Specialists | 15-1152 | 43 | $57.22 | Associate's degree |
| **Low Skilled Occupations** | | | | |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 43-6014 | 575 | $33.69 | High school diploma or equivalent |
| Office Clerks, General | 43-9061 | 452 | $27.84 | High school diploma or equivalent |
| Janitors and Cleaners, Except Maids and Housekeeping Cleaners | 37-2011 | 279 | $21.71 | Less than high school |
| Office and Administrative Support Workers, All Other | 43-9199 | 184 | $31.83 | High school diploma or equivalent |
| Business Operations Specialists, All Other | 13-1199 | 182 | $72.72 | High school diploma or equivalent |

Source: JFI analysis of EMSI, MHEC and MACC Data