

PROLOGUE



San Bernardino County ranks among the fastest-growing population and job creation centers in the United States. Its impressive employment growth exceeds that of Southern California's Orange, Los Angeles and San Diego counties.

A creative and productive workforce greatly contributes to the long-term economic success of a region. Intelligent investment in the County's labor force propels our region and business community forward. We must apply enhanced understanding of the needs of our dynamic economy to the education of our existing and future talent base. We must instill the skills essential to success.

This Labor Market Intelligence and Analytics Report is the first of a collection of Workforce Roadmap studies. It serves as a baseline to better understand where the region's workforce and economic opportunities exist. The report provides valuable information to our partners across the educational and workforce system including K-12, community colleges and universities, all service providers, County departments, and the business community at large. We now have a greater understanding of our region with respect to labor markets, our capacity to provide services to address needs, as well as vital economic trends.

With this first report, we embark on something unique. Traditionally, these studies tell us where we've been rather than looking forward to what lies ahead. However, this report integrates predictive analytics. It applies real-time intelligence through business engagement and enhanced labor market data. As a result, the report serves as a greatly improved tool to predict and guide future skills development. It highlights essential insight into emerging skills demand within the County.

We must plan for the skills that will be in demand tomorrow by educating people with those skills today. Once education and workforce systems become predictive in nature, we have the means to proactively close our skills gap.

Vision2Succeed, a county-wide campaign launched this year, underscores this commitment. It strengthens the career skills of our local workforce. It connects residents to opportunities that enhance their qualifications to support existing employers while attracting new employers to San Bernardino County.

When we anticipate the skills of tomorrow and enhance existing skills, we strengthen the County's greatest economic resource, our workforce.

Tony Myrell

Chair, San Bernardino County Workforce Development Board

PREFACE



The overarching goal of the report is to identify key trends in the region's core industries in order to inform the Board's investments in workforce programs.

The San Bernardino County
Workforce Development Board
(WDB) engaged UC Riverside
School of Business Center for
Economic Forecasting and
Development to undertake a Labor
Market Intelligence analysis with a
focus on San Bernardino County's

industries and workforce. The overarching goal of the report is to identify key trends in the region's core industries in order to inform the Board's investments in workforce programs. Using the UCR Labor Market Intelligence report, the San Bernardino County

Workforce Development Board will continue its work of allocating funds to prepare the County's workers for a dynamic economy and the evolving set of skills it demands.

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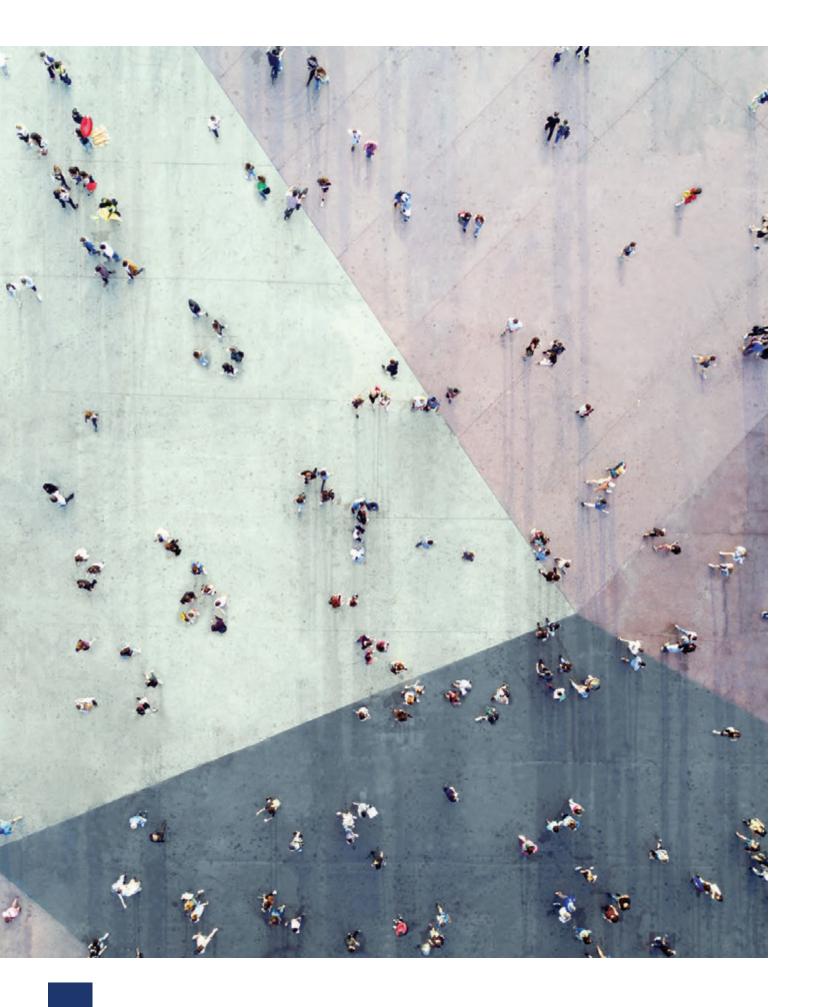
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SAN BERNARDINO COUNTY **OVERVIEW**

County employment grew 3.6% year-to-year as of Q1 2018 (CA, 2.4%). The County's average annual wage increased 2.7% year-to-year.

The economy is expected to grow at a slower rate over the near term compared to previous years. Since 2010, the County's economy has added over 130,000 jobs, a growth rate of 27% (CA, 19%). From 2010-2017, San Bernardino County wages grew by 16% compared to 25% for the entire state. In 2017, the average wage paid by the County's employers stood at \$43,033 per year compared to \$65,492 at the state level.

KEY INDICATOR 1 MIGRATION

In 2017, the County on net saw roughly 25,000 new residents settle in the region through domestic migration.

KEY INDICATOR 2 COST OF LIVING

Home prices in San Bernardino County are 60% less than in neighboring Orange County and 50% less than in neighboring Los Angeles County. In 2017, median contract rent in San Bernardino County accounted for roughly 30% of median household income, below the 33% in Los Angeles and Orange Counties.

KEY INDICATOR 3 LABOR FORCE PARTICIPATION RATE (LFPR)

While San Bernardino County's youths (ages 16 to 24) have a higher Labor Force Participation Rate (LFPR) than their coastal counterparts, among the County's prime working age population (ages 25 to 64), LFPR has been trending down for workers of all educational attainment levels.



INTEGRATED INDUSTRY ANALYSIS

Logistics (Transportation and Warehousing)

Logistics employment is up by 13.8% year-to-year as of the first quarter of 2018. Since mid 2009, the Logistics sector has nearly doubled in size in San Bernardino County. Together, Warehousing and Transportation account for 16% of the County's total employment (1 in 6 jobs). The sector's growth is expected to continue over the near term but double-digit growth is not considered sustainable.

INDUSTRY 1 TRANSPORTATION

In 2017, the Transportation sector accounted for around 6% of County employment. Since 2010, employment in Transportation has grown by approximately 27% (around 9,000 jobs), which is in line with the sector's growth at the state level. Transportation wages have been growing since 2010 and have increased by 13% since then (compared to 16% for overall wages in the County). The Transportation sector has created more jobs than the locally available talent pool can accommodate.

INDUSTRY 2 WAREHOUSING

In 2017, the Warehousing sector accounted for around 9% of County employment. From 2010-2017, the number of warehousing jobs in the County has nearly doubled, growing from roughly 35,000 to nearly 69,000. Wages in the Warehousing industry have grown by 5% since 2010 and on an annualized basis, accounting for inflation, real wages in Warehousing have declined since 2010. Trends in Warehousing wages have acted as a drag on the capacity for wages to increase in the County's broader economy. While the share of temporary help services workers has come down from its peak in 2015, temporary workers have represented a greater share of the County's employment than they have in the state since 1998.



INDUSTRY 3 MANUFACTURING

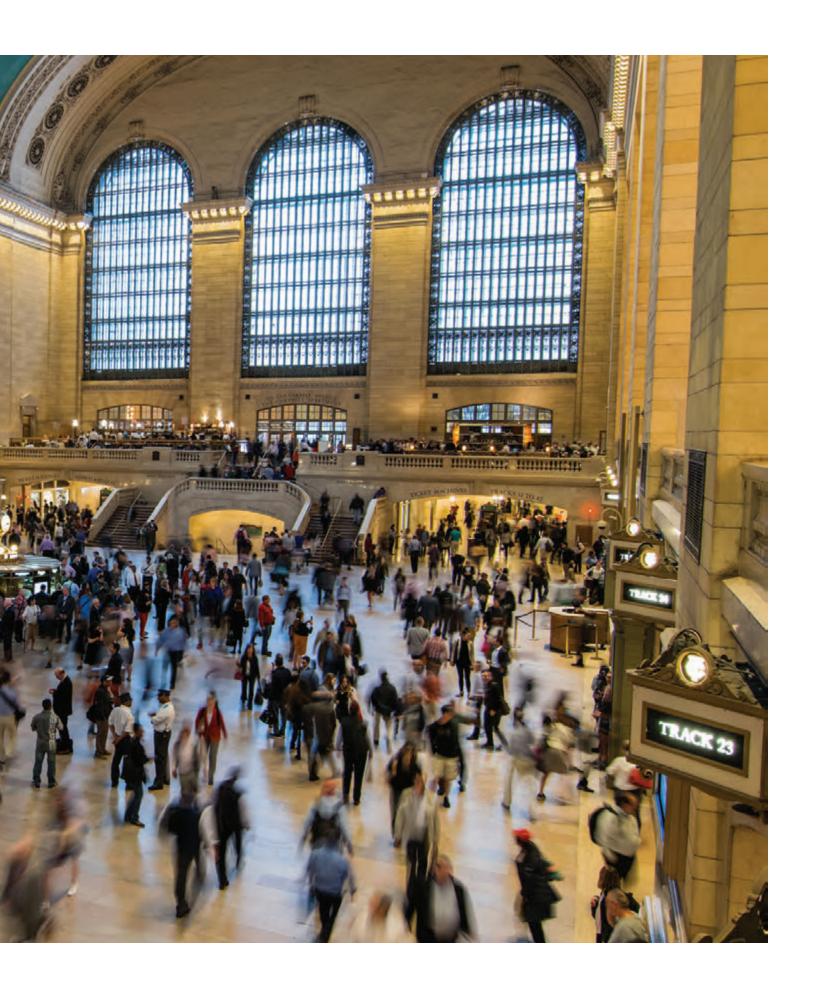
In 2017, the Manufacturing sector accounted for around 9% of all jobs in both San Bernardino County and the State of California. Although historically declining, Manufacturing employment has grown 22.5% since 2010 in the County (CA, 6% and U.S., 8%). The industry in the County has been growing at three times the pace of the industry's growth in the rest of the state. In 2017, the average Manufacturing job in San Bernardino County paid an annual wage of \$55,670. From 2012-2017, the number of Manufacturing workers commuting from Los Angeles County to San Bernardino County doubled. Among Manufacturing workers in San Bernardino County who have less than a high school diploma, 59% earned less than \$30,000 in 2017, whereas 70% of those with at least a bachelor's degree made at least \$50,000.

INDUSTRY 4 **HEALTHCARE**

In 2017, the Healthcare sector represented 14.3% of County employment. The Center expects the Healthcare industry to make the largest contributions to job gains in San Bernardino County over the period from 2018 to 2028. From 2010-2017, the Healthcare sector grew by an impressive 59%, adding around 38,000 jobs. Over that same period, wages in the Healthcare industry have been flat, at around \$47,000 per year. The number of County residents working in Healthcare with a bachelor's degree or above increased by 38% over the last five years.

All four industry clusters profiled grew faster in terms of employment in San Bernardino County since 2010 than they did at the state or national levels. Together, these sectors account for around 40% of the County's total employment, but they have accounted for 55% of all job growth in the County since 2010.





NATIONAL OUTLOOK

The Center's economic outlook for the U.S. economy hasn't changed much over the course of 2018, despite the fact that we are on the edge of the longest economic expansion in the nation's history.

Growth has progressed at a steady, sustainable pace since the 2015 commodity bust and mild economic slowdown that occurred that year. Growth in the last quarter of 2018 is expected to come in at slightly less than 3%, with growth for the entire year reaching 3.2%. This modest jump is being driven by the fiscal

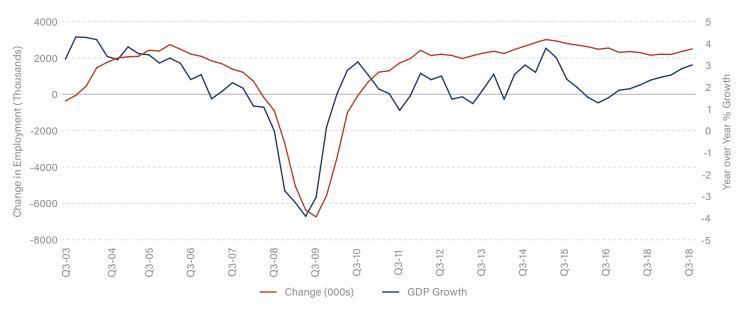
stimulus plan passed by congress at the end of 2017. Outside of the rapidly growing Federal budget deficit, the U.S. economy looks to be well-balanced in terms of the structure of growth with solid fundamentals including private sector debt levels, consumer savings rates, rising wages, the overall pace of homebuilding,

and business investment.
Unemployment is low—but job
growth remains steady.

The Center's economic forecast remains boringly positive, and yes, that outlook is expected to stay in place through 2020. This isn't optimism. Rather, we don't have any real reason to think otherwise.

GDP AND TOTAL NONFARM GROWTH

Q3-03 TO Q3-18



Source: U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics; Analysis by UCR Forecast Center



SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

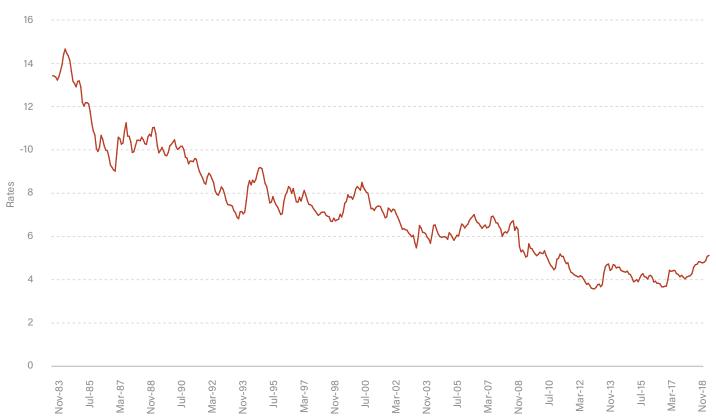
The only major short-term worry has been wrapped around the direction of U.S. trade policy, but the worst scenarios have not materialized. Rather than unilaterally pull out of NAFTA as threatened, the United States instead negotiated a new trade agreement with our two neighbors and largest trading partners that, thankfully, looks almost exactly like the old trade agreement. A brewing trade fight with the European Union that began with steel tariffs has also settled down. and there are now discussions about renewing talks and working towards a new trade agreement.

Yes, the China trade dispute is still brewing. But even a major trade war with China would not be sufficient to end the current economic expansion. The United States exports fairly little to China-only 8% of all the nation's exports. And what does get shipped out typically doesn't have a long supply chain. The greater threat comes from the fact that the United States sources 20% of its manufactured imports from China. But the tariff-increased costs to U.S. importers have been largely offset by a 13% depreciation in the Yuan relative to the U.S. dollar.

From a technical standpoint there is not much change in the Center's forecast for the U.S. economy. The framing of the outlook is another story. While little has changed in the actual economy, much of the public discourse surrounding the economy has taken a sharp turn for the worse. This new wave of pessimism has likely been driven by the sell-off in the stock market, slowing home sales, and rising interest rates. Yet, as we see it, these short run trends do not amount to anything that could truly threaten the current expansion.

FIXED RATES: MORTGAGE RATES





Source: Freddie Mac; Analysis by UCR Forecast Center

PCE AND M2 GROWTH

OCT-98 TO OCT-18



Source: U.S. Bureau of Economic Analysis, Federal Reserve; Analysis by UCR Forecast Center

Consider rising interest rates. Mortgages are now hovering just below 5%, up one percentage point from where they were two years ago. But while this is a recent high, it is hardly a historic one. In fact, it is still lower than any time between 1968 and 2008. Rates are higher but they certainly aren't high. And it isn't surprising that rates have drifted up given that the economy has been growing well and there has been a sharp increase in Federal borrowing.

One wrongly assumed reason for rising rates is inflation. After years of inflation tracking below the Fed-targeted pace, price growth finally increased above the 2% mark. This should have made investors more confident as deflation is less of a risk. Instead, it created a panic about the potential for further increases. They need not have worried: the most recent numbers now show inflation back below the 2% range.

The Center expects inflation to remain weak over the next few years. Oil prices

are once again down based on high levels of U.S. output. Money supply growth is also very constrained at the moment. And yes, unemployment sits at an extremely low 3.7%—but if this were going to have an effect, we would already feel inflationary pressures on the economy. Add it up and we don't see much chance for rates to continue their upward drift. Moreover, the Federal Reserve seems to be taking the hint from the flattening yield curve and has been signaling a gentler future path on short run rates.

The U.S. housing market has slowed as a result of the bump in mortgage rates, which has created considerable consternation. However, there is a big difference between a housing pause and a housing bust. The U.S. housing market is not overpriced, nor has there been much risky lending – or lending in general – occurring. The pace of building has been reasonable, so there is no excess supply to worry about. That the market is responding to changes in interest rates is a good thing. Prices need to adjust to a

higher carrying cost; once that happens, the market should get back on track. The slowing pace of sales is part of that process.

As for the stock market sell off, it's quite amazing that the recent dip has created such a wave of concern as it is no less than the sixth major sell off since the Great Recession ended. And this says more about the stock market than the economy. Excessive growth in equity prices followed by excessive sell-offs is the new normal in today's high-speed electronic trading environment. There has also been a lot of good news for corporate America recently. Corporate taxes were cut sharply a year ago and gross profits are growing again after being flat last year.

So, for now, the Center is forecasting the expansion to continue and, barring some unexpected external impact, does not anticipate any major change in economic growth between now and 2020.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT



CALIFORNIA OUTLOOK

As 2018 progressed it became evident that the California economy would continue to prosper despite the challenge of a tight labor market and concerns about the state's housing situation.

Indeed, California's economic performance was remarkably steady in 2018, fueled by expansion in the state's industries, increases in incomes and wages, and in response to Federal tax cuts enacted early in the year. The Center expects a continuation of these trends in 2019 and possibly into 2020.

As of October 2018, the state is on track to add approximately 337,000 jobs in 2018, slightly less than the 340,000 added in all of 2017. Between February and October 2018, California has consistently added jobs at an average yearly rate of 2.0%, virtually identical rate to that of the same period one year ago. The state's

unemployment rate has been in historically low territory for most of the year, dropping to 4.1% in the last two months, marginally higher than the U.S. rate of 3.7%. All in all, the headline numbers look good as we move from 2018 into 2019.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

For the month of October 2018, California's 308,700 year-to-year job gain was the second largest among the 50 states. One-fifth of the increase occurred in Healthcare (63,100), followed by Professional, Scientific and Technical Services, Leisure and Hospitality, Administrative Services, Government, Construction, and Transportation. These seven industries accounted for 96% of the jobs added in October, and have consistently contributed the lion's share of job gains throughout the year. Over the same period, three industries saw losses totaling 8,000 jobs, small relative to the total, but evidence of recent weakness in job growth in these areas.

JOB GROWTH ACROSS CALIFORNIA INDUSTRIES

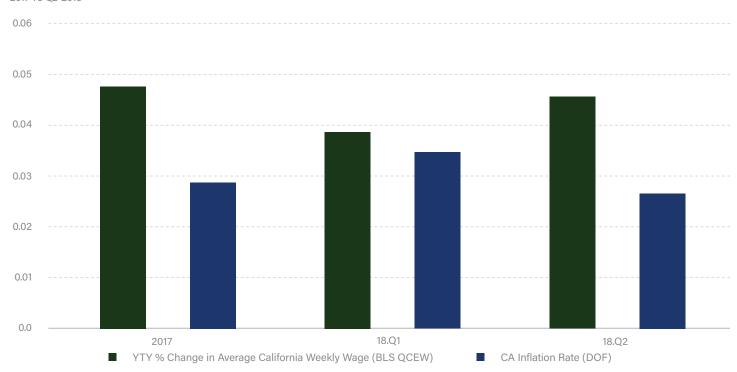
Industry	October-18	YTY	YTY %
Total Nonfarm	17,236,600	308,700	1.8%
Healthcare & Social Assistance	2,357,200	63,100	2.8%
Prof., Scientific & Technical Services	1,287,000	52,000	4.2%
Leisure & Hospitality	2,009,500	46,900	2.4%
Administrative Support Waste Services	1,150,000	46,000	4.2%
Government	2,607,000	36,500	1.4%
Construction	858,200	30,000	3.6%
Transportation, Warehousing & Utilities	655,000	21,400	3.4%
Manufacturing-Durable	840,900	13,400	1.6%
Information	544,300	5,800	1.1%
Educational Services	372,800	5,500	1.5%
Real Estate & Rental & Leasing	287,200	3,100	1.1%
Mgmt. of Companies & Enterprises	235,000	1,400	0.6%
Finance & Insurance	548,700	1,000	0.2%
Mining and Logging	22,300	0	0.0%
Retail Trade	1,698,000	-1,500	-0.1%
Wholesale Trade	724,900	-2,000	-0.3%
Other Services	561,600	-4,600	-0.8%

Source: California Employment Development Department; Analysis by UCR Forecast Center

With California industries expanding in a tightening labor market, workers have experienced wage growth for several quarters running. In the second quarter of 2018, the average weekly wage for private sector workers was \$1,265, up 4.6% over the prior year. Over the same period, prices in California increased 2.6%, implying a 2% inflation-adjusted gain in the average wage. This continues a recent trend of wage increases generally outpacing inflation, giving workers more purchasing power to drive spending and economic activity.

CALIFORNIA AVERAGE WEEKLY WAGE OUTPACING INFLATION





Source: Quarterly Census of Employment and Wages, BLS; California Department of Finance; Analysis by UCR Forecast Center

Most headline economic numbers for the state show that California maintained an edge over the nation throughout the year. Its 1.8% yearly growth rate in jobs surpassed the 1.6% gain for the United States in October 2018. California's gross state product growth outpaced U.S. GDP in the second quarter, with a 3.3%

year-to-year gain compared to 2.9% nationally. Over the same period, the average weekly wage in California increased more rapidly at 4.6% compared to 3.4% for the nation. However, the U.S. labor force grew by 1.0% over the first ten months of this year, well ahead of California's 0.4% growth rate. The scant increase in the

state's work force is cause for concern in 2019, although there is evidence that metro area labor force dynamics are such that rapidly growing regions continue to attract workers, most notably in the San Francisco Bay Area and the Inland Empire.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

Looking ahead to 2019, the question is, where will growth occur in California? The answer depends on the type of growth. Over the past three years, half of the job gains among the state's industries have occurred in its population serving sectors. This trend was led by Healthcare, which accounted for 22% of California's job gains over the three-year period from 2015 through 2018, followed by Leisure and Hospitality, and Government, and will continue through 2019. Smaller but noteworthy contributions also came from the state's leading external facing industries such as Professional Scientific and Technical Services (9%) and Transportation Services (9%).

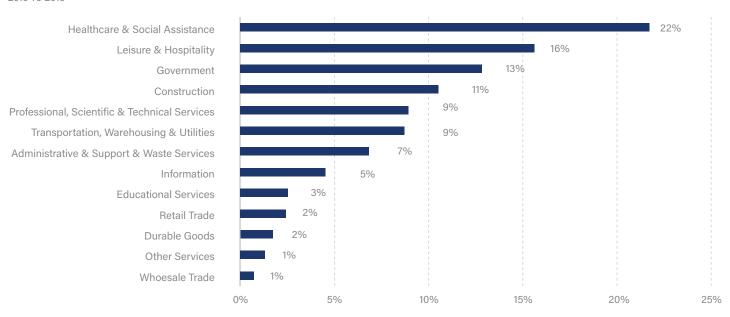
The picture is considerably different when looking at the composition of growth in terms of output. Over 40% of the output generated during this three-year period emanated from just one industry, Information, with the gains mainly attributed to the tech-related segments of the sector. Combine this with the 11% contribution from Professional, Scientific and Technical Services, and about half of all output generated in California came from techrelated activities over the past three years. Other external industries that weighed in with sizable contributions included Manufacturing at 7% and Transportation at 5%. Among those industries that contributed the largest

job gains, only Healthcare made a sizable contribution to output at 9% of the total.

These findings provide insight into the future direction of the state economy. California can count on increases in employment among its population serving industries in the coming quarters, but if the state wants to increase the size of the economic pie, it must look to its external industries to fuel that growth. That is the challenge that lies ahead for California's policymakers.

% CONTRIBUTION TO JOBS

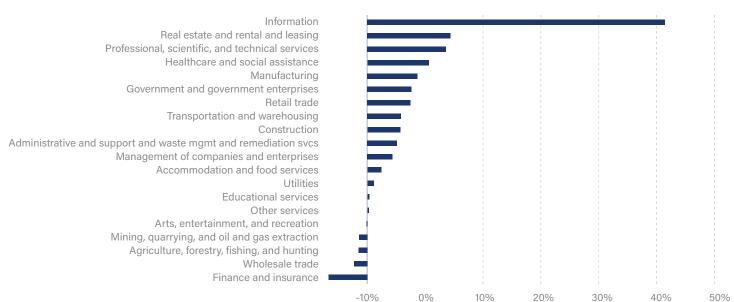
2015 TO 2018



Source: California Employment Development Department; Analysis by UCR Forecast Center

% CONTRIBUTION TO OUTPUT

2015 TO 2018



Source: U.S. Bureau of Economic Analysis; Analysis by UCR Forecast Center





STATE OF THE ECONOMY IN SAN BERNARDINO COUNTY:

San Bernardino County's economy has performed well leading into early 2018. Almost every industry in the County continues to add jobs to the County's employment base and, according to data compiled by the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW), the total job count in the County is now 12.0% above its pre-recession peak.

At 3.6% year-to-year in the first quarter of 2018 (the latest data available), the overall rate of job growth in San Bernardino County has cooled from its break-neck pace in early 2014 but is still considerably higher than the state's 2.4% increase. While the 3.6% rate of growth represents a slowdown relative to prior years following the Great Recession, the County of San Bernardino remains one of

the fastest growing economies in California in terms of overall job growth. Among California's ten largest counties, San Bernardino County was the second-fastest growing, following its contiguous neighbor Riverside County, which experienced a 4.2% increase in total payroll jobs year-to-year in the first quarter of 2018.

THE LABOR MARKET:

The County's unemployment rate reached 3.9% in October 2018 on a seasonally adjusted basis, a drastic improvement from 13.9% at the height of the Great Recession. To place the 3.9% figure in historical context, the current unemployment rate is at its lowest level since 1990 (unemployment rates for the County before 1990 are not compatible with the current series). While the current, remarkably low unemployment rate bodes well for local residents, it also represents a

recent and broader tightening of labor supply that places the County's growth trajectory potentially back in line with long-run trends.

An increasingly tight labor market has also given rise to wage gains for local workers, as the County's average annual wage increased 2.7% year-to-year. While workers in San Bernardino County do earn less relative to workers throughout Southern California's coastal counties, renter households in the County are less burdened

compared to Riverside, Orange, San Diego, and Los Angeles Counties. Moreover, the cost of home ownership as a percentage of the County's average annual wage is also lower (this will be covered in more depth in the Cost of Living section of this report). San Bernardino County residents have benefited from other improvements in the local economy as well, as household employment among the County's residents now stands 13.2% above its pre-recession peak.

AFFORDABILITY **ADVANTAGE:**

Household income statistics compiled by the American Community Survey also show that household finances among local residents continue to improve at a steady clip. According to the latest estimates, the median household income in the County of San Bernardino increased 19.0% from 2012 to 2017. Demand for housing has been strengthened by the improved state of local household finances in recent years, while supply constraints are not nearly as severe as they are elsewhere in California. Local residents have also begun to migrate from renting to home ownership, as

reflected in the increase in ownerhouseholds in recent years. As a result, there has been a 4.9% decline in renter-households from 2015 to 2017.

The affordability of the region, in terms of both residential and commercial real estate, has been a major driver of growth in the last few years and is expected to contribute to the region's continued success over the near-term. "The affordability advantage" coupled with an abundance of developable land has also translated into increased population growth, which is expected to tick up between 0.9 and 1.2% each year for the next couple of years.

Similarly, lower commercial rates should entice more businesses to move to the region, fueling spending growth. The migration of both residents and businesses will have a positive effect on the region's economy and will continue to drive employment growth, particularly for locally-serving industries such as Healthcare. However, the capacity of the economy remains a potential challenge in terms of continued overall job growth as the supply of labor has dwindled to historic lows as reflected by the County's record-low unemployment rate.



ONT, A REGIONAL **ECONOMIC ASSET:**

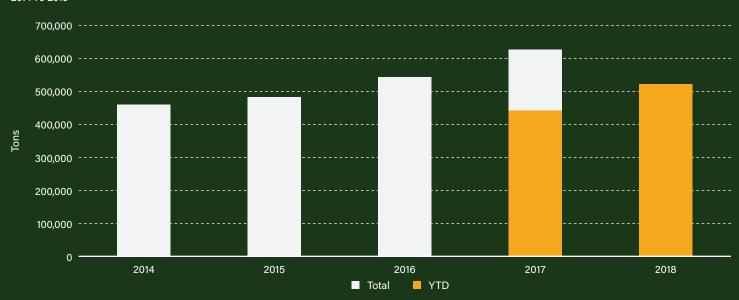
Ontario International Airport (ONT) is a regional asset, supporting economic activity not only in San Bernardino County but in Southern California more broadly. While passenger traffic is still moderate at Ontario International Airport, the airport serves as a povwerhouse for the region's local Logistics industry, with Amazon, FedEx, and UPS all having a significant footprint. The airport's role as an industry-oriented hub translates into support not only for jobs at the airport itself, but also for jobs down the supply chain and in the broader economy, as workers spend their wages in other sectors.

Cargo volume at Ontario International Airport is poised for a record year in 2018. After posting a sizable 15.3% increase in freight volume from 2016 to 2017, 2018 numbers are coming in 18.1% higher than 2017 through the first nine months of the year. This increase in freight traffic supports a matrix of jobs across San Bernardino County's economy, particularly in the Logistics and, specifically, Warehousing industries.

While Ontario International Airport has not traditionally been a significant source of exports and imports for the region, 2018 is shaping up to be a banner year in this regard. Through the first ten months of 2018, the value of exports moving through Ontario International Airport was over three times the level seen during the same period in 2017. Further, with only two months of data outstanding, export volumes are at their highest level on record for the airport. The value of imports moving through ONT has also come in at a record level, dwarfing previous records.

CARGO VOLUME AT ONT AIRPORT

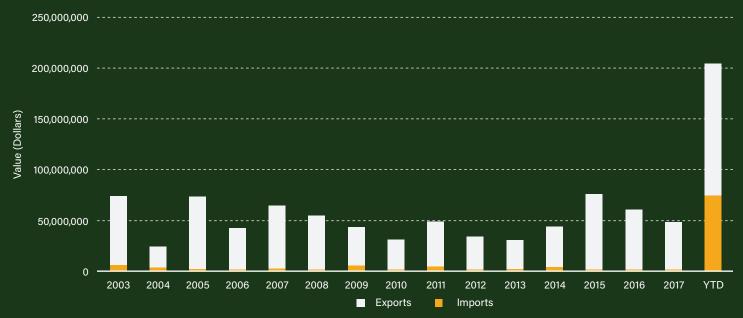
2014 TO 2018



Source: Ontario International Airport; Analysis by UCR Center

ONT EXPORT & IMPORT ACTIVITY

2013 TO 2018 YTD



Source: WISERTrade; Analysis by UCR Center

THE FORECAST

Overall, the regional economy continues to grow at a solid pace. Real gross metropolitan product, the region's equivalent of the nation's real gross domestic product, grew by 2.9% in 2017 in the Inland Empire (data not available at the county level), compared to 2.8% in the Los Angeles Metro (which includes Orange County) and 3.0% in the state overall.

The Center's current forecast for the Inland Empire is positive; however, a handful of challenges could impede continued growth in the County of San Bernardino if not addressed. A limited supply of housing in California, while not severe in the County, has characterized the state's postrecession economic recovery and may continue to drive affordability down. While trade flows have been stable in 2018, a cloudy global outlook driven by a tumultuous political environment and tepid international growth may adversely affect trade flowing through the San Pedro ports, and thereby affect the Inland Empire's Transportation and Warehousing sectors.

These issues, however, do not obfuscate the broad-based economic growth observed in the County in recent years. The fundamentals underlying the County's economy remain on solid footing. Though the Center's current forecast calls for job growth on the horizon, the economy is expected to grow at a slower rate over the near term compared to previous years. Why is growth slowing? A primary driver is the lack of labor supply. Job growth among County residents has outpaced the County's labor force growth every year since 2012. By 2018, so much slack has been eliminated from the labor market that job growth going forward will be bound by the supply of labor. This is not unique to the County of San Bernardino;

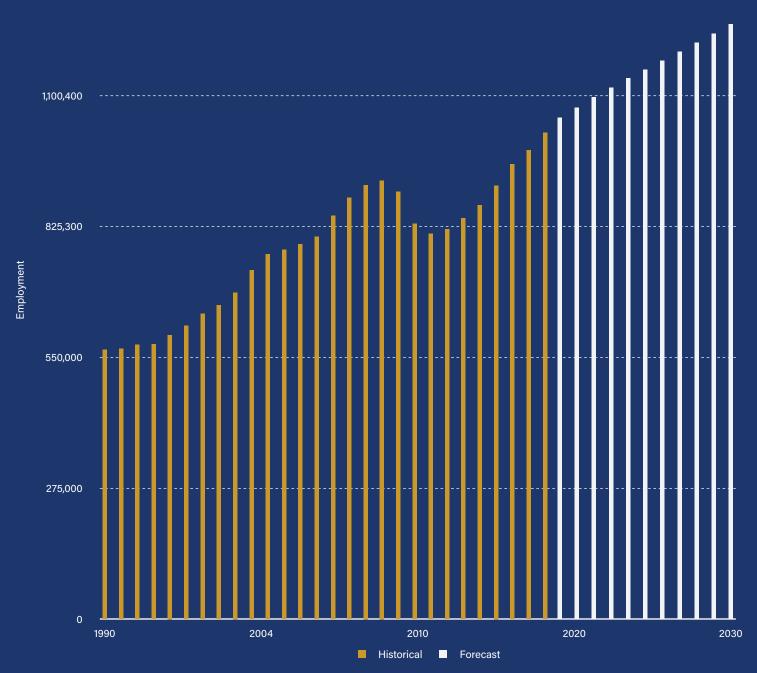
a tight labor market is constricting growth nationwide. Nationally, there are more job openings than there are people looking for work. At the state level, a shortfall of housing has amplified this trending economic slowdown and pushed growth inland, away from California's coastal economies where housing is most severely lacking. Despite the considerable slowing of growth over the last few years, the County continues to see a steady trajectory of employment gains, setting record highs nearly every month. By all accounts, the prospects for the economy of San Bernardino County are good. Major indicators are trending in the right direction and the Center's outlook for the region remains positive.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

EMPLOYMENT FORECAST - COUNTY OF SAN BERNARDINO

1990 TO 2030

1,375,500 -----



Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center



DEMOGRAPHICS

From 2012 to 2017, the population of San Bernardino County expanded by 3.8%, in line with the 3.9% growth in the state overall over the same period.

POPULATION GROWTH

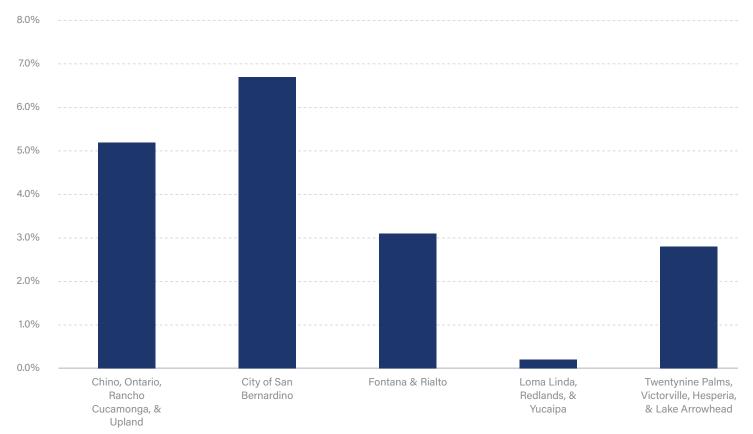
As mentioned, the steady growth of San Bernardino County's population has been a bright spot for the County and outstrips that of many other parts of the state where population growth is lagging. The County's relative affordability make the region an attractive place for households

looking for affordable housing as well as access to the robust job markets of Los Angeles, Orange, and Riverside Counties. From 2012 to 2017, the population of San Bernardino County expanded by 3.8%, in line with the 3.9% growth in the state overall over the same period. Population growth

from 2012 to 2017 was strongest in the City of San Bernardino subregion at 6.7% and in the Chino, Ontario, Rancho Cucamonga, and Upland subregion at 5.2%, while growth was flatter in the Loma Linda, Redlands, and Yucaipa subregion at 0.2%.

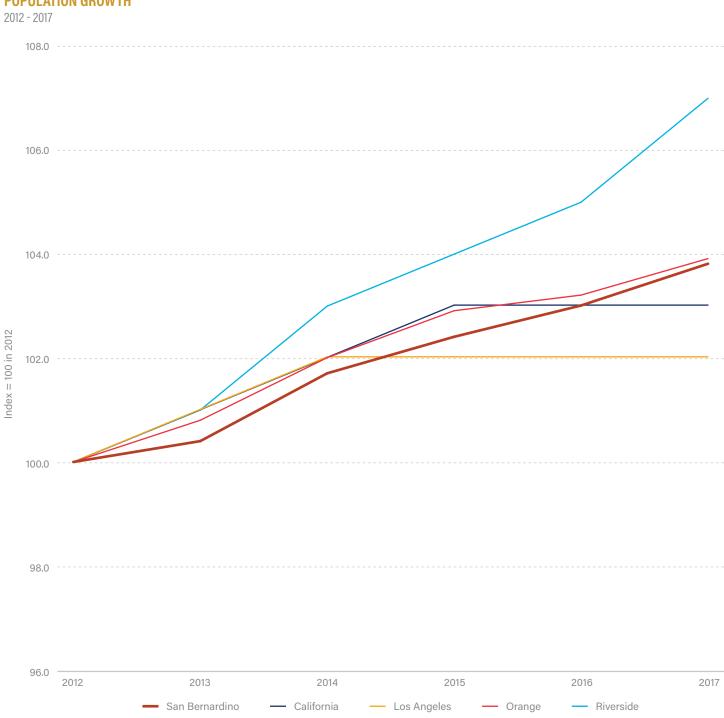
POPULATION GROWTH





Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

POPULATION GROWTH



Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

EDUCATIONAL **ATTAINMENT**

Educational attainment in San Bernardino County is lower relative to neighboring counties and the state overall. However, attainment levels are not uniform across the County. For example, Loma Linda, Redlands, and Yucaipa represent a hub of more highly educated residents, with 31.5% of the population 25 and older possessing a bachelor's degree or higher, compared to the 20.9% in the County overall. The educational attainment level of this subregion's 25 and older cohort is only roughly 2% behind the statewide average where 33.8% of the population 25 and older possess a bachelor's degree or higher. The Chino, Ontario, Rancho Cucamonga, and Upland subregion is another relatively educated part of the County, with 27.9% of the population 25 and older possessing a bachelor's degree or higher. Still, there is significant ground to make up in other parts of the County, with the City of San Bernardino and the area around Twentynine Palms, Victorville, Hesperia, & Lake Arrowhead having relatively fewer college-educated workers.

SHARE OF SAN BERNARDINO COUNTY RESIDENTS WITH BACHELOR'S DEGREE OR HIGHER

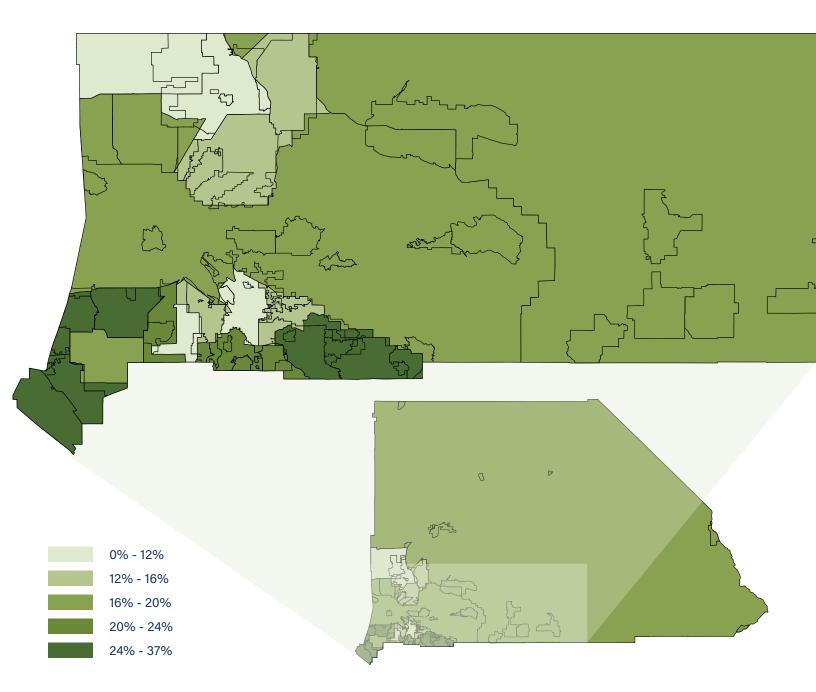
BY GEOGRAPHY

	Less than HS	HS/GED	Some College	Bachelor's Degree	Graduate Degree
CHINO, ONTARIO, RANCHO CUCAMONGA, & UPLAND	16.4	21.5	34.1	18.8	9.1
CITY OF SAN BERNARDINO	31.8	27.2	29.0	8.8	3.2
FONTANA & RIALTO	25.9	29.4	28.4	11.7	4.6
LOMA LINDA, REDLANDS, & YUCAIPA	16.5	21.8	30.4	18.7	12.8
TWENTYNINE PALMS, VICTORVILLE, HESPERIA, & LAKE ARROWHEAD	17.0	30.2	37.9	9.6	5.3
SAN BERNARDINO COUNTY TOTAL	20.1	25.9	33.1	13.8	7.1
LOS ANGELES	20.5	20.7	26.6	21.1	11.1
ORANGE	15.0	17.5	27.0	25.9	14.6
RIVERSIDE	17.5	27.8	32.6	14.4	7.7
CALIFORNIA	16.6	20.7	29.0	21.1	12.6

Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

SHARE OF SAN BERNARDINO COUNTY RESIDENTS WITH BACHELOR'S DEGREE OR HIGHER

BY PUBLIC USE MICRODATA AREAS (PUMAS)*



^{*}PUMAs are statistical geographic areas defined for the dissemination of Public Use Microdata Sample (PUMS) data. They are also used for disseminating American Community Survey (ACS) and Puerto Rico Community Survey period estimates. They contain at least 100,000 people and are built on census tracts and counties.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

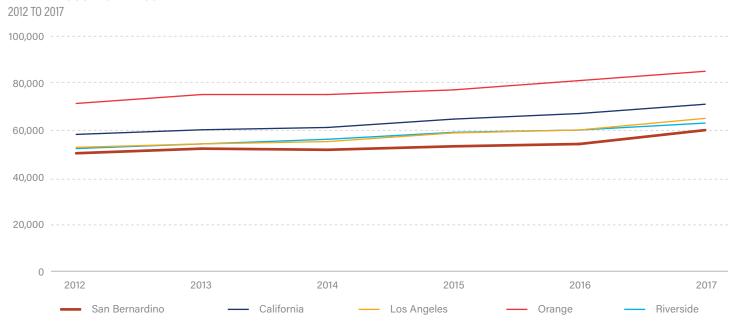
MEDIAN HOUSEHOLD INCOME

Median household income in the region continues to grow, although it remains below statewide averages. From 2016 to 2017, median household income in San Bernardino County expanded by 11.1%, coming in at roughly

\$60,000 USD. This compares with California's median household income of roughly \$71,000 USD in 2017. At the subregional level, incomes were highest in the Chino, Ontario, Rancho Cucamonga, and Upland subregion (\$74,300), but

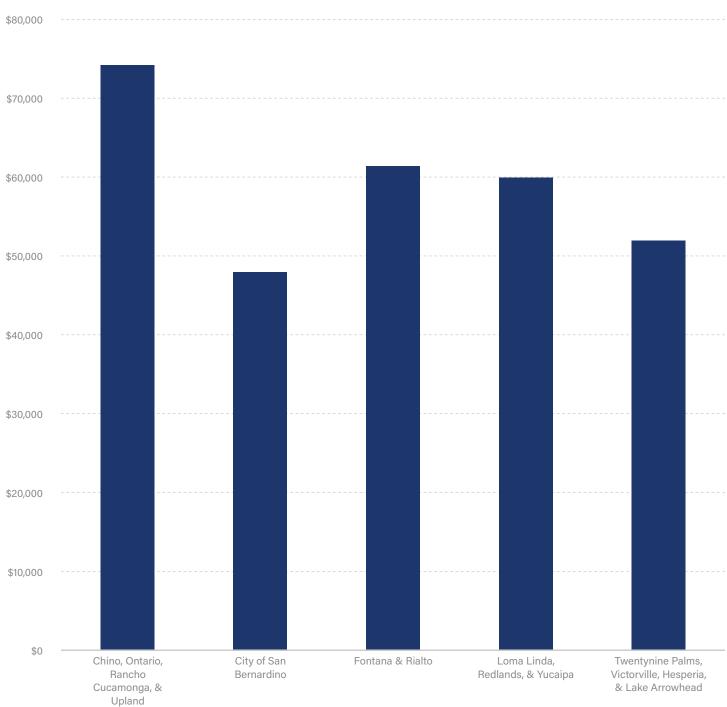
lower in the City of San Bernardino (\$48,000) and in the Twentynine Palms, Victorville, Hesperia, and Lake Arrowhead subregion (\$52,000).

MEDIAN HOUSEHOLD INCOME



MEDIAN HOUSEHOLD INCOME, 2017





COMMUTE PATTERNS

Households looking to capitalize on San Bernardino County's relative affordability also benefit from its proximity to higher-wage job centers in Los Angeles and Orange Counties. In 2017, roughly 272,000 residents commuted to neighboring counties for work each day, with Los Angeles County attracting roughly 133,000 of these outbound workers.

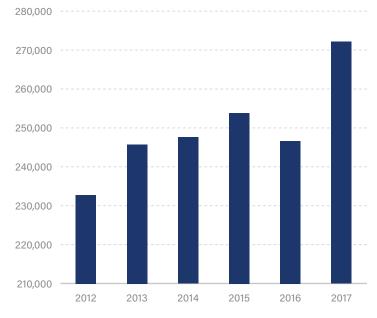
While a significant number of San Bernardino County residents commute out of the County daily for work, the County also draws in a significant number of workers from neighboring counties. In 2017, roughly 198,000 workers commuted from neighboring counties into San Bernardino County for work each day, with Riverside County accounting for roughly 116,000 of these inbound workers.

With the relative abundance of outbound commuters in San Bernardino County, commute times in the County are above the statewide average. In 2017, the average commute for San Bernardino County residents was 31.6 minutes, slightly above the 29.7 minute average in the state overall and considerably higher than the 28.0

minute average for Orange County residents, However, San Bernardino County has fared better than neighboring Riverside County, where the average commute time was 33.3 minutes. At the subregion level, the Twentynine Palms, Victorville, Hesperia, and Lake Arrowhead subregion and the Fontana and Rialto subregion had the longest commutes, at 33.8 minutes and 33.7 minutes, respectively. In contrast, the Loma Linda and Redlands subregion at 26.0 minutes and the City of San Bernardino at 26.9 minutes had average commutes well below the countywide average.

COMMUTING

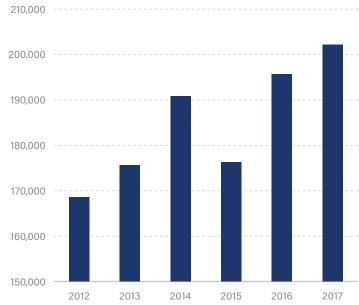
OUTBOUND RESIDENTS



Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

COMMUTING

INBOUND WORKERS



OUTBOUND COMMUTING, 2017

BY LOCATION

County	Outbound Residents
LOS ANGELES	132,578
RIVERSIDE	89,734
ORANGE	39,148
OTHER	10,742

Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

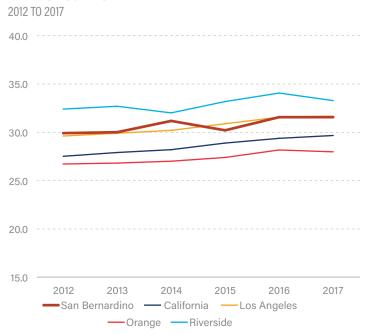
INBOUND COMMUTING, 2017

BY LOCATION

County	Inbound Workers		
RIVERSIDE	116,405		
LOS ANGELES	62,317		
ORANGE	11,472		
OTHER	7,640		

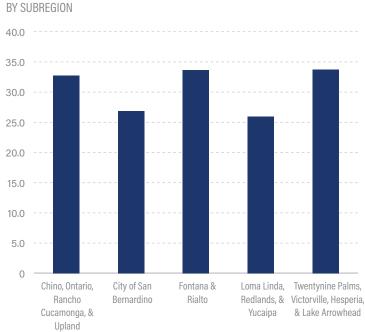
Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

AVERAGE COMMUTE TIME



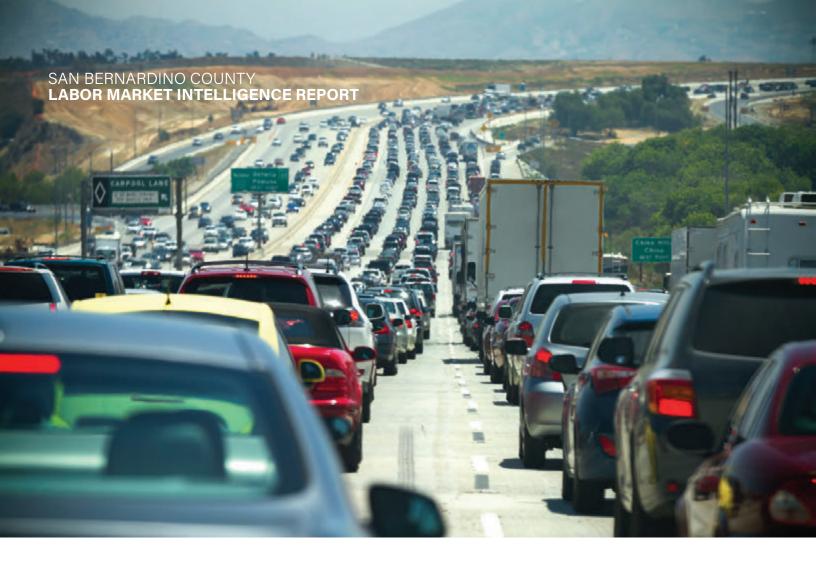
Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

AVERAGE COMMUTE TIME, 2017









NET MIGRATION

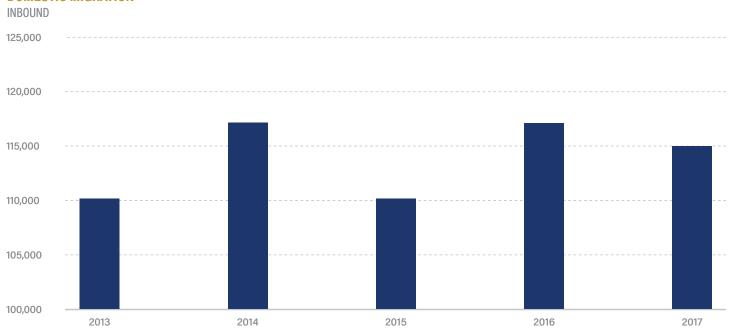
While many residents of California are leaving the state in search of more affordable areas, the Inland Empire continues to attract residents from across the nation, and in particular from the high-cost metropolitan areas of California.

In 2017, there were roughly 115,000 inbound migrants (domestic) to San Bernardino County, while outbound migration (domestic) totaled roughly 90,000. As a result, the County, on net, saw roughly 25,000 new residents

settle in the region through domestic migration in 2017.

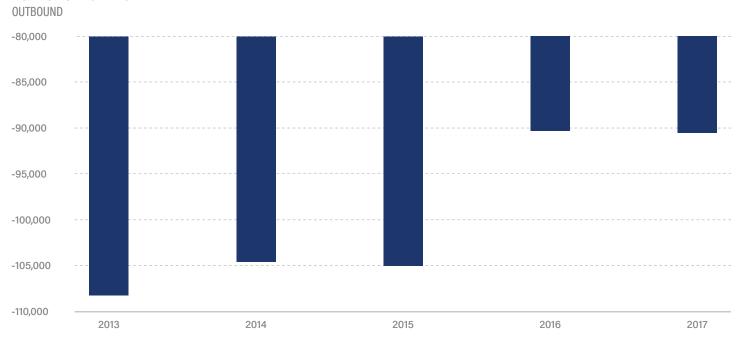
The lure for many inbound migrants is affordability. Indeed, Los Angeles, Orange, and San Diego Counties - high-cost coastal regions - are some of the largest sources of inbound migration for San Bernardino County, with former Los Angeles County residents accounting for a net total of over 100,000 migrants from 2013 to 2017.

DOMESTIC MIGRATION



Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

DOMESTIC MIGRATION





On the other hand, the affordability advantages offered by other states have been a catalyst for outbound migration from San Bernardino County. From 2013 to 2017, Arizona attracted 26,800 former San Bernardino County residents, with Texas (16,500) and Nevada (14,800) also

drawing a significant number. The bulk of domestic migrants both to and from the region tend to be young, with individuals under the age of 34 accounting for 63% of all inbound migration and 67% of all outbound migration over the last five

years. However, on net, middle-aged individuals (35 to 54) have accounted for the largest portion of domestic migration to San Bernardino County, making up just over half of all net domestic migrants.

DOMESTIC MIGRATION, 2017BY COUNTY

County Inbound Outbound Net Los Angeles 196,705 -96,230 100,475 Riverside 101,852 -104,587 -2,735 40,955 17,344 San Diego -23,611 32,310 Orange -30,875 1,435

Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

DOMESTIC MIGRATION, 2017BY STATE

State	Inbound	Outbound	Net
Arizona	14,966	-26,800	-11,834
Texas	10,680	-16,459	-5,779
Nevada	10,748	-14,844	-4,096
Washington	9,065	-9,666	-601

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT **DOMESTIC MIGRATION** BY AGE 300,000 250,000 200,000 150,000 100,000 50,000 0

Inbound ■ Outbound — Net

Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

25 to 34

-50,000 -100,000 -150,000 -200,000 -250,000

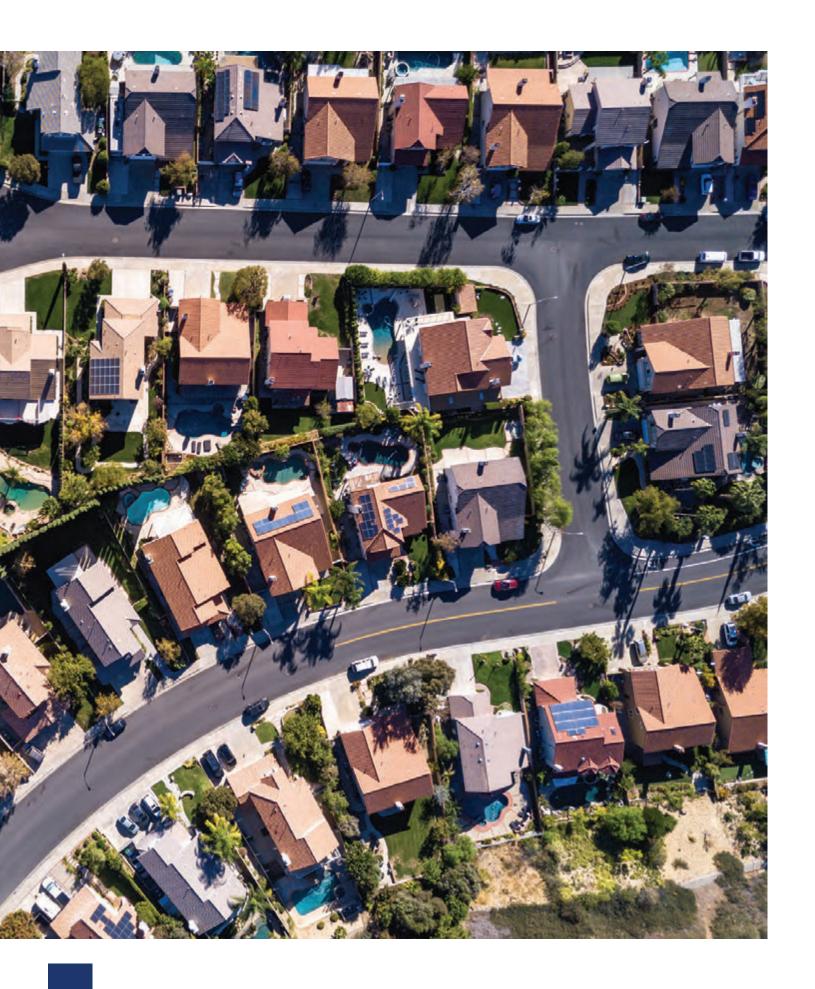
24 and Under



Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

The movement of workers, as opposed to residents, across county lines is more mixed. Both inbound and outbound migration was highest among workers earning less than \$50,000 per year. However, on net, the County saw an outflow of workers earning less than \$25,000 per year. The region also saw an outflow of workers earning over \$100,000 annually. Middle-income workers have been drawn to the region over the last five years, with the County benefiting from a net inflow of workers earning between \$25,000 and \$99,999 over the last five years.

65 and Over



COST OF LIVING ANALYSIS & EXTENDED HOUSING DISCUSSION

Median home prices across California have risen at a rapid pace in the decade following the Great Recession. With home prices moving out of reach for many households in the coastal markets, San Bernardino County has been an affordability haven for many seeking to become homeowners.

Home prices in San Bernardino County are roughly 60% less than in neighboring Orange County and 50% less than in neighboring Los Angeles County. With this affordability advantage, the movement of households from coastal markets to San Bernardino County is both intuitive and borne out in the data.

As a result, homeownership levels in San Bernardino County have risen over the last five years, with the number of homeowners rising by just over 10,600 from 2012 to 2017. However, this homeownership boon has been concentrated among the County's older population, with the vast majority of gains enjoyed by those 55 and older. In contrast, ownership levels have actually fallen for those under 55 in the region.

The rental market in San Bernardino County also provides an affordability advantage relative to neighboring counties. In 2017, median contract rent in San Bernardino County accounted for roughly 30% of median household income, well below the 33% in Los Angeles and Orange Counties.

Despite this advantage, over half of San Bernardino County residents are rent-burdened. In 2017, roughly 54% of the County's renter population was rent-burdened, paying over 30% of their income on rent. With the U.S. rent burden at 46%, as a percentage of the population, San Bernardino County is nearly 10% higher.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

While generally lower costs of living translate into higher disposable income, the trends around disposable income in San Bernardino County are mixed. Compared to neighboring Riverside County, the trend is positive, leaving San Bernardino County workers with more disposable income on average. In 2017, disposable income, after accounting for average ownership costs, totaled just under

\$19,300 for an average worker in San Bernardino County, significantly more than the \$15,500 disposable income for an average worker in Riverside County. That additional income gets spent in the local economy, supporting a variety of jobs up and down the region's supply chains. With regard to Los Angeles County, ownership costs for the median-priced home in San Bernardino County consume a

much lower percentage of the average worker's wages, roughly 44.7% compared to 66% in Los Angeles County. However, the average worker is still left with less disposable income in San Bernardino County, given the County's generally lower wages as compared to Los Angeles County and the state overall.

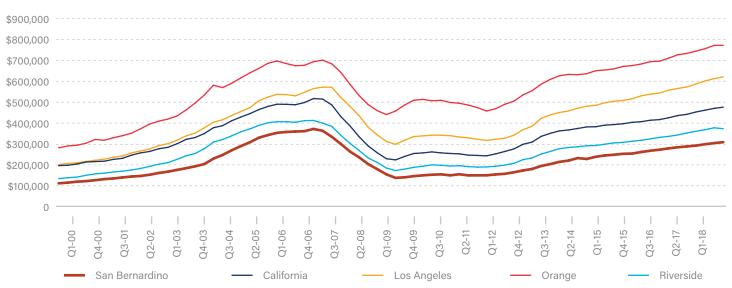
HOME OWNER TENURE BY AGE, SAN BERNARDINO COUNTY

Age	2017	5-Yr. Change	10-Yr. Change
Householder 15 to 24 years	2,350	-1,051	-1,067
Householder 25 to 34 years	36,251	2,586	-16,221
Householder 35 to 44 years	62,089	-3,878	-22,293
Householder 45 to 54 years	81,926	-9,940	-18,261
Householder 55 to 59 years	45,141	1,525	4,526
Householder 60 to 64 years	45,249	7,725	13,082
Householder 65 to 74 years	58,963	8,725	18,224
Householder 75 to 84 years	27,919	2,423	2,251
Householder 85+ years	10,808	2,521	4,064
OWNER OCCUPIED UNITS	370,696	10,636	-15,695

Source: U.S. Census Bureau, American Community Survey, 1-Year PUMS; Analysis by UCR Forecast Center

MEDIAN HOME PRICE BY GEOGRAPHY

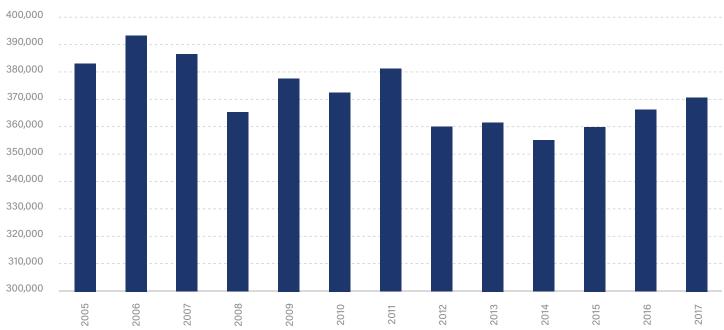




Source: CoreLogic; Analysis by UCR Forecast Center

OWNER-OCCUPIED HOUSEHOLDS, SAN BERNARDINO COUNTY



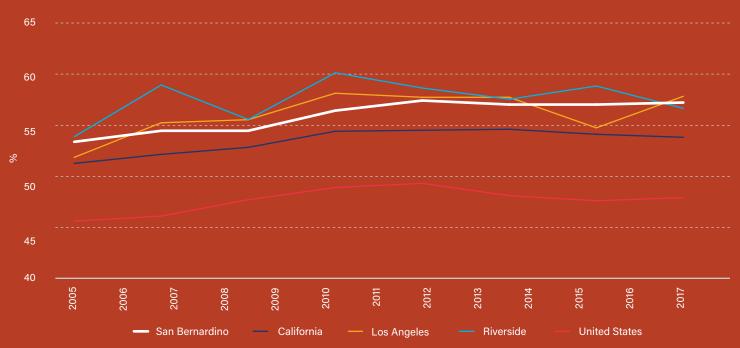


Source: U.S. Census Bureau, American Community Survey, 1-Year PUMS; Analysis by UCR Forecast Center

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

PERCENT OF RENTERS SPENDING GREATER THAN 30% OF INCOME ON RENT

2005 TO 2017



Source: U.S. Census Bureau, American Community Survey, 1-Year PUMS; Analysis by UCR Forecast Center

MEDIAN HOME PRICE

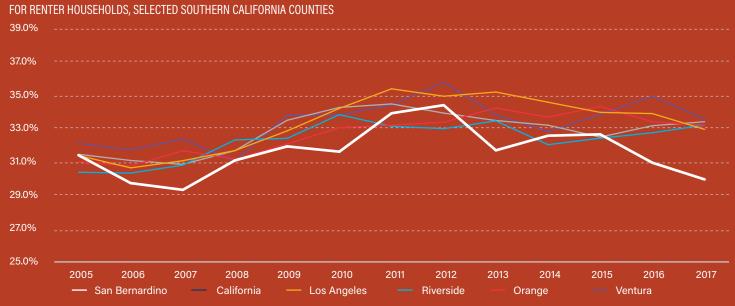
BY COUNTY, 2017

County	Median Home Price	Monthly Mort- gage Payment	Property Tax	Annual Cost of Ownership	Real Annual Cost	Wage Share of Cost (%)	Avg. Annual Wage
Los Angeles	614,832	3,036	6,148	42,583	40,502	66.0	64,564
Orange	774,292	3,824	7,743	53,627	51,006	85.5	62,732
Riverside	378,865	1,871	3,789	26,240	24,958	58.2	45,050
San Bernardino	304,895	1,506	3,049	21,117	20,085	44.7	47,212
San Diego	597,377	2,950	5,974	41,374	39,352	66.6	62,146
Ventura	623,979	3,081	6,240	43,217	41,104	79.6	54,322

Source: Core Logic, U.S. Bureau of Labor Statistics; Analysis by UCR Forecast Center

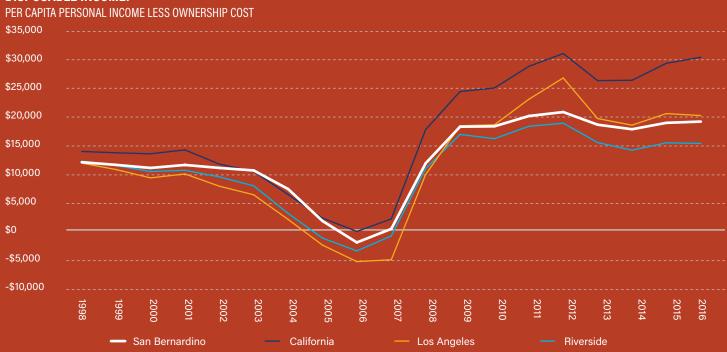
SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

MEDIAN CONTRACT RENT AS A PERCENTAGE OF MEDIAN HOUSEHOLD INCOME



Source: U.S. Census Bureau, American Community Survey, 1-Year PUMS; Analysis by UCR Forecast Center

DISPOSABLE INCOME:



Source: Core Logic, U.S. Bureau of Labor Statistics; Analysis by UCR Forecast Center



LABOR FORCE **PARTICIPATION RATE (LFPR)**

While youths (ages 16 to 24) in San Bernardino County have a higher Labor Force Participation Rate (LFPR) than youths in neighboring coastal counties, San Bernardino County's prime working age and older populations all have a lower LFPR.

SAN BERNARDINO COUNTY

LABOR MARKET INTELLIGENCE REPORT

Historically, San Bernardino County has had lower labor force participation rates than surrounding areas. However, the gap between San Bernardino County and other counties in the region widened after the Great Recession. Furthermore, San Bernardino County is the only region where there was a sharp decline in LFPR during and after the Great Recession. Even as the U.S. is well into its current economic expansion, San Bernardino County's LFPR has flattened and failed to rebound. These trends related to workers in the County

who are not participating in the labor force represent potential opportunity. For example, if San Bernardino County had the same LFPR as its comparison regions, there would be an additional 33,000 to 108,000 workers in the County's labor force.

LABOR FORCE PARTICIPATION RATE DIFFERENCE

BY AGE GROUP, 2017, SAN BERNARDINO COUNTY VS. COMPARISON REGIONS

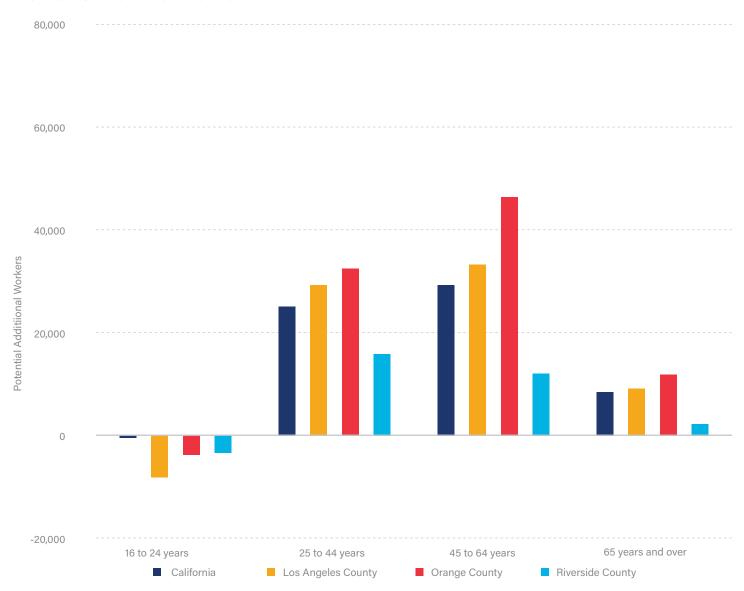


Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

As a test case, if San Bernardino County's lower LFPR is chiefly due to the County's lower incomes, fewer economic opportunities, and lower educational attainment levels than its coastal neighbors, one should expect Kern County, which has even lower educational attainment and a higher unemployment rate, to suffer from a worse LFPR. However, Kern County's LFPR for both its least and most educated cohorts has held up better than in San Bernardino County.

IF SAN BERNARDINO COUNTY HAD THESE REGIONS' LFPR INSTEAD

THEORETICAL NUMBER OF ADDITIONAL WORKERS



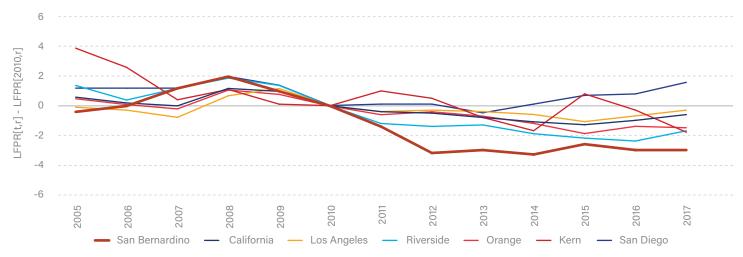
Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

Among its prime working age population (ages 25 to 64), LFPR has been trending down for workers of all educational attainment levels in San Bernardino County, but the downward trend is more pronounced among those with less than a high school education. Amid the current economic expansion, this trend in the data may speak to a divergence of experience and indicate a sign of desperation from those left behind by an otherwise strengthening economy.

LFPR (INDEXED TO 2010 VALUES): ALL PERSONS

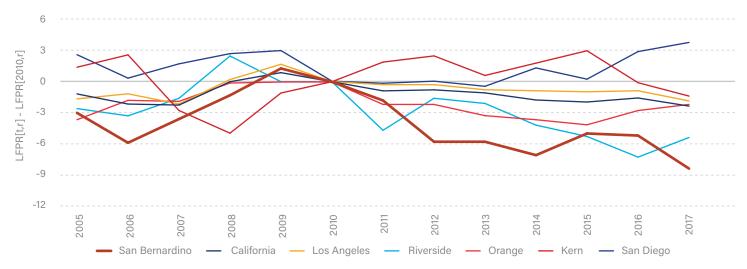
SHARPEST DROP IN SAN BERNARDINO COUNTY DURING AND FOLLOWING THE GREAT RECESSION, FLATLINED THEREAFTER



Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

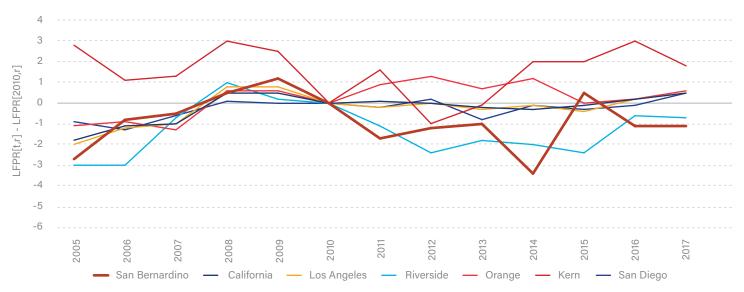
LFPR (INDEXED TO 2010 VALUES): LESS THAN HIGH SCHOOL

SHARPEST DROP IN SAN BERNARDINO COUNTY DURING AND FOLLOWING THE GREAT RECESSION



LFPR (INDEXED TO 2010 VALUES): BACHELOR'S DEGREE OR ABOVE

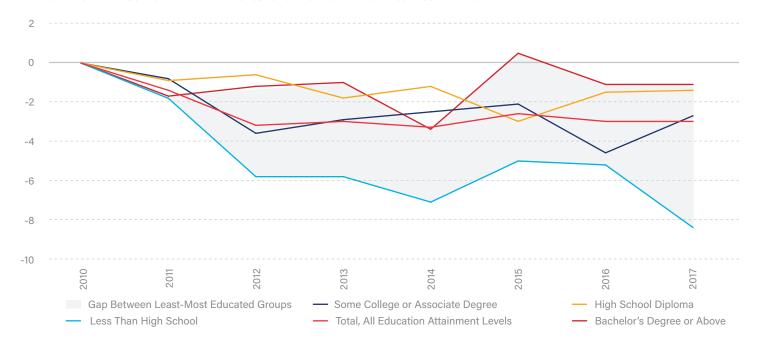




Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

LFPR, SAN BERNARDINO, AGES 25 TO 64:

LFPR DOWN FOR ALL EDUCATIONAL ATTAINMENT GROUPS BUT MORE SEVERE FOR LESS EDUCATED PEOPLE









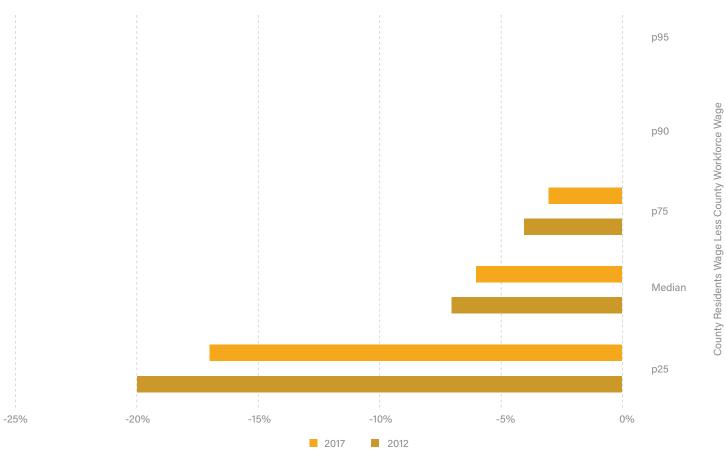
INDUSTRY AND OCCUPATIONAL OVERVIEW

OCCUPATIONS AND ASSOCIATED WAGES

In general, residents of San Bernardino County bring home lower wages than workers in San Bernardino County except for the top earning decile. The gap has narrowed since 2012 for the first, second, and third quartile wage earners.

WAGE GAP BETWEEN RESIDENTS AND WORKFORCE, SAN BERNARDINO COUNTY

TOTAL ALL OCCUPATIONS



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

Additionally, the lower the wage percentile, the larger the gap or the less County residents make compared with their County worker equivalents. These are likely County residents with

fewer job skills and/or low educational attainment levels.

Comparing the distribution of wages by both industry and occupation

reveals that County workers earn higher wages than County residents across high paying, low paying, and most common occupations.



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

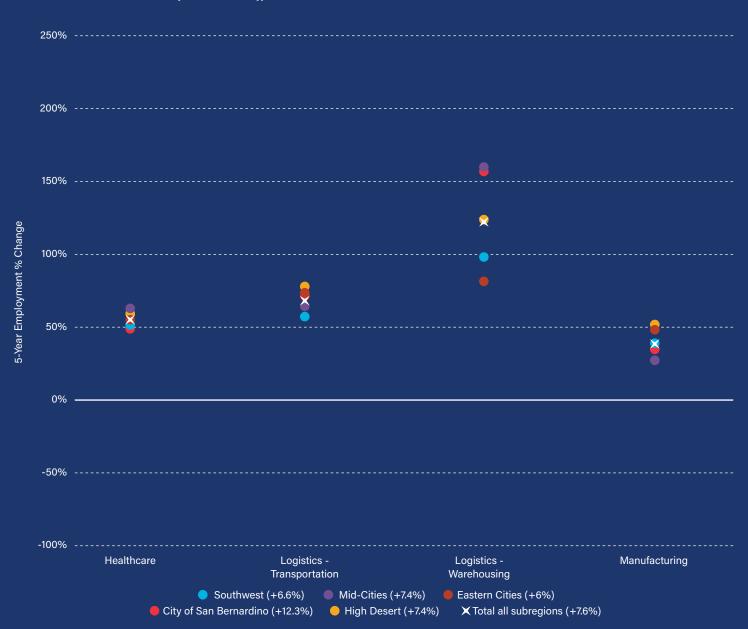
SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

Among County residents, those who live in San Bernardino City had the highest employment growth within the last 5 years. As an example,

gains in the Logistics/Warehousing industry, which has more than doubled within the last 5 years, were most concentrated in San Bernardino City

and Fontana/Rialto, though otherwise varied greatly among the County's other sub-regions.

COUNTY RESIDENTS 5-YEAR (2017 VS. 2012), EMPLOYMENT GROWTH BY INDUSTRY AND SUBREGIONS

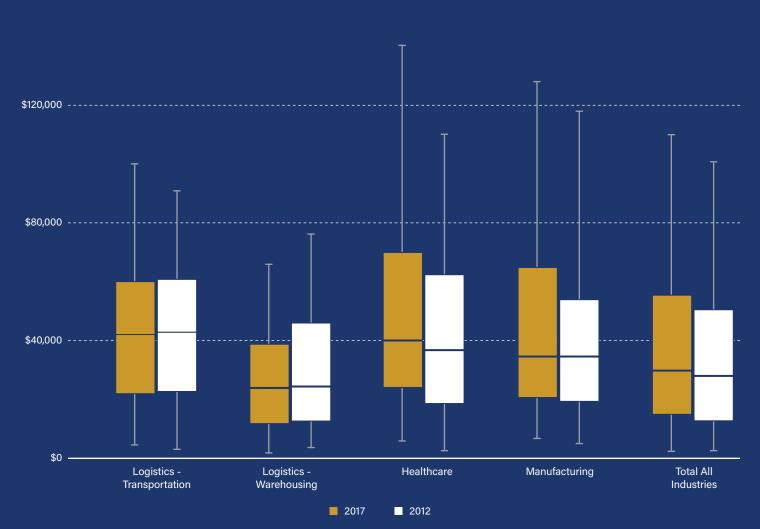


Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WAGE DISTRIBUTION BY INDUSTRY, 2017 VS. 2012, SAN BERNARDINO COUNTY

BY PLACE OF RESIDENCE (COUNTY RESIDENTS)

\$160,000 -----



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

Yet employment gains in any one industry don't always translate into wage gains. County workers in Logistics-Warehousing, one of San Bernardino County's backbone industries, actually saw their wages decreased by 7%. Across all industries however, County resident wages increased by 14% since 2012.

Another potential challenge is the disparity in the percentage increase of wages across earners. While wages are increasing across industries, the percentage increase of median wages lags behind the percentage increase of the 90th and 95th percentile wages.

Similar to the Logistics/Warehousing industry which saw a surge in employment but a decline in wages, Logistics/Transportation workers in the 25th to 75th percentile also saw their wages decline.



SAN BERNARDINO COUNTY'S INDUSTRY PROFILE

As mentioned, the San Bernardino County economy has recovered well since the depths of the Great Recession. Since 2010 – when employment levels reached the recession nadir – the County's economy has added over 130,000 jobs, a growth rate of roughly 27%.

This figure compares favorably to employment growth in the rest of the state. Over the same period, employment in the state of California increased by around only 19% percent. At the same, wages paid by the County's employers have not grown as quickly as in the rest of the state. Over the period 2010-2017, San Bernardino County wages grew by 16% compared to 25% for the entire state. In 2017, the average wage paid

by the County's employers stood at \$43,033 per year compared to \$65,492 at the state level.

Why do wages in San Bernardino County lag significantly behind those in the rest of the state? A key feature of the comparative economic landscape is the extent to which different places specialize in different sectors of the economy. For example, New York City is known as the home of derivatives trading and brokerage activities, Los Angeles is home to Hollywood, Silicon Valley is a world-renowned 'tech center,' and Detroit is known as "Motor City" due to the concentration of auto-producers found there. The industries in which local employers specialize influence the difference in income levels from one place to another.



Industries can be broadly divided into two categories, "traded" industries and "non-traded" industries. Traded industries are those in which production occurs in one place, but for which consumption primarily occurs in other locations. Such goods and services are "traded" because they are exchanged between different locations and transported to others. Movies produced in Hollywood are consumed throughout the world. Non-traded activities, by contrast, are those goods and services for which production and consumption occur in close proximity. Restaurants and hairdressers, for example, serve local markets and their services are not traded between distant locations. Regional differences in income are not primarily determined by local goods and service sectors

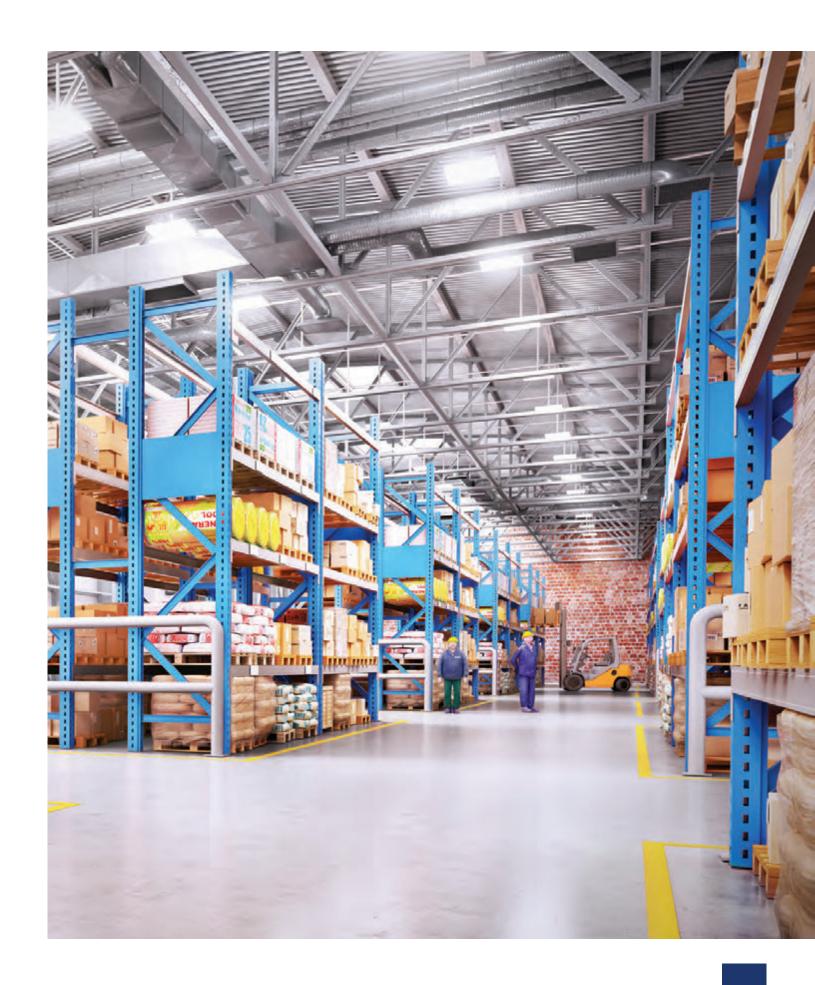
(non-traded activities), but instead are driven primarily by the traded sectors of a local economy.

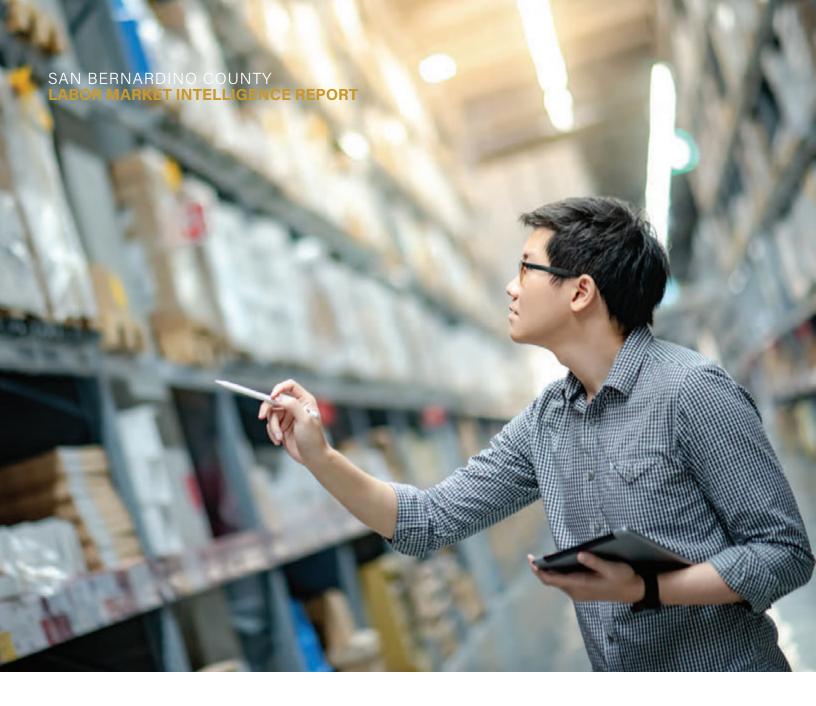
In this next phase of the analysis, UCR Center researchers consider four key sectors of the San Bernardino County economy: Logistics/ Transportation, Logistics/Warehousing, Manufacturing, and Healthcare. The first three industries represent the largest traded sectors in the County's economy - those sectors that drive the County's overall income levels. These three industries also reflect higher location quotients with regard to employment compared to most other industries in the County, indicating there is a unique concentration of them in San Bernardino County as compared to the nation. Healthcare, a

non-traded activity, represents 17% of the County's total employment and is one of the largest growing industries in the County. All four of these industry clusters grew faster in terms of employment in San Bernardino County since 2010 than they did at the state or national levels. Together, these sectors account for around 40% of the county's total employment, but they have accounted for 55% of all job growth in the County since 2010.

The UCR Forecasting Center will provide a deep dive analysis of these four industries to provide more granular insight as to the dynamics of each which may inform the County's strategies for intervention.







LOGISTICS OVERVIEW AND OUTLOOK

The Inland Empire region is by certain metrics the nation's leading hub for the Logistics industry (Transportation & Warehousing). The industry has taken root in the region due to its proximity to the busiest ports complex in the U.S., in addition to a matrix of other transportation and logistics-related infrastructure.

SAN BERNARDINO COUNTY LABOR MARKET INTELLIGENCE REPORT

The region's abundant supply of relatively cheap land has also been an input to the industry's growing concentration there. A lynchpin of the San Bernardino County economy, the Logistics sector has enjoyed continued growth fueled by strong consumer demand locally and across the nation. Job growth in the sector in San Bernardino County has eclipsed the sector's job growth statewide, and warehouse/distribution properties remain in strong demand in the County.

Gains in this sector are linked to an acceleration in activity at the San Pedro Bay ports of Los Angeles and Long Beach. Through the first half of this year, total container activity was up by 4.1%, with outbound containers up by 4.2% and inbound containers rising by 5.2%. A portion of these trade flows, as well as those that move via air freight and truck transportation, pass through the Inland Empire region, contributing to elevated levels of economic activity in the region's Logistics sector. This is reflected in Logistics sector

employment, which was up by 13.8% year-to-year as of the first quarter of 2018. Since the Great Recession ended in mid 2009, the local Logistics sector has nearly doubled in size in San Bernardino County. Over the last five years, the Logistics sector has grown at an average rate of 10% year to year. While the Center expects the sector's growth to continue over the near term, double-digit growth is not viewed as sustainable for the industry. A number of factors influence the industry's outlook. The first factor impacting the industry's trajectory is e-commerce as a share of total retail sales, a growing trend at a national level. At roughly 10% of total sales and growing, the online retail boom bodes well for warehousing and distribution centers across the broader San Bernardino County region.

Furthermore, industry analysts predict that by 2020 roughly 20% of all U.S. retail sales will shift to the web, and that Amazon is positioned to capture two-thirds of that shift.¹

A second factor shaping the future of the Logistics industry is the shortage of workers to fill the jobs found within the industry. The tight labor market is exerting pressure on the national industry, accelerating its turn towards automation. Amazon has begun its movement in that direction, automating elements of its workflow. At this point in time, the anticipated impacts of automation on the Logistics industry are a matter of speculation. Considerations around automation are not expected to significantly affect the growth of the Logistics industry in San Bernardino County over the forecast horizon. On net, the Center expects the Logistics sector to continue positively contributing to the County's job growth, albeit at a slower pace than the double-digit rates of growth seen in recent years.

The Logistics industry can be broadly divided into two major sub-sectors: Transportation and Warehousing, analyzed separately in the following chapters.

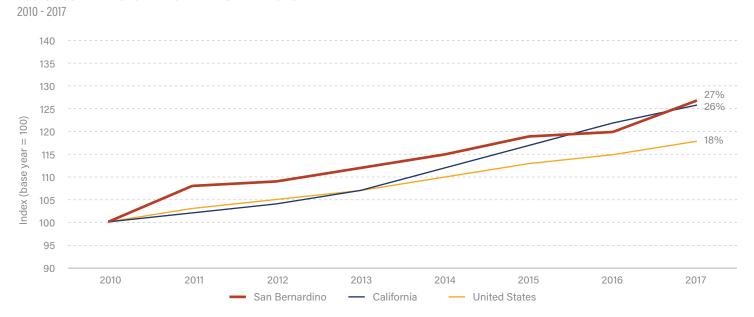


LOGISTICS / TRANSPORTATION: INDUSTRY DEEP DIVE

LOGISTICS / TRANSPORTATION: INDUSTRY ANALYSIS

In addition to Warehousing, the Logistics industry is also comprised of a significant number of Transportation jobs. Together, Warehousing and Transportation account for 16% – roughly 1 in 6 – of the County's total employment.

LOGISITCS - TRANSPORTATION EMPLOYMENT GROWTH



Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

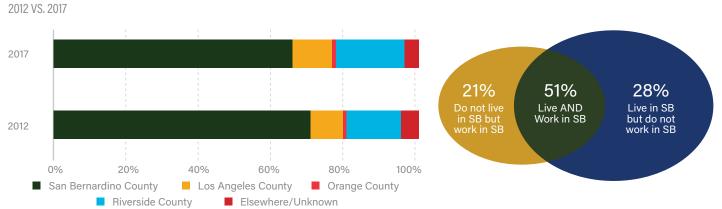
While Transportation does not account for as many jobs as the Warehousing sector, it still accounts for around 6% of the County's jobs overall. Since 2010, employment in the Transportation sector has grown by around 27% (around 9,000 jobs), which is roughly in line with the sector's growth in the state economy.

Unlike the Warehousing sector, Transportation wages have been growing since 2010 and have increased by 13% since then. However, this is still a slower pace of growth for wages than observed in the rest of the County's economy (16%). Together, wages in the County's Logistics sector – including Transportation and Warehousing – have increased by 8% over the period 2010-2017. This means that wages in the Logistics sector have grown at half the rate of the wages in the rest of the economy. The wages paid by the County's combined Logistics sector represent the single biggest challenge in terms of increasing wages in the County's economy overall.

LOGISTICS / TRANSPORTATION: OCCUPATIONAL ANALYSIS

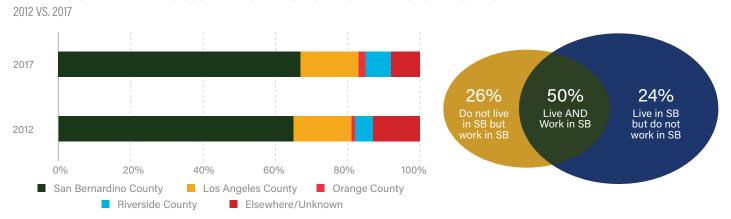
The Transportation industry has seen substantial employment growth, albeit not to the magnitude of the Warehousing industry.

WHERE DO TRANSPORTATION WORKERS IN SAN BERNARDINO COUNTY RESIDE?



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WHERE DO SAN BERNARDINO COUNTY RESIDENTS WORKING IN TRANSPORTATION WORK?



FIVE YEAR PERCENT CHANGE OF PERSONS WORKING IN TRANSPORTATION INDUSTRY

Live in / Work In	Working in SB	Not working in SB
Living in SB	+39%	+25%
Not living in SB	+77%	

Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

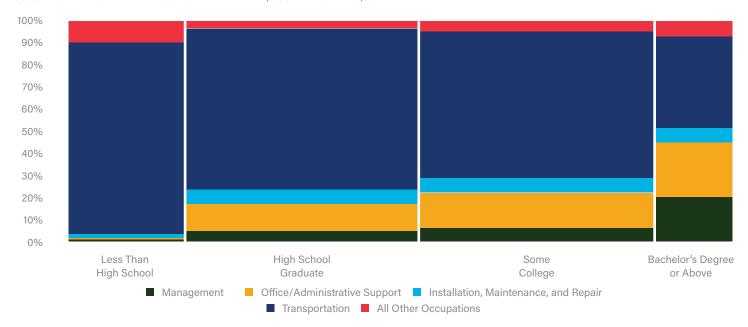
The proportion of workers in the Transportation industry in San Bernardino County who also live in San Bernardino County has decreased from 71% of all County Transportation workers in 2012 to 66% in 2017. Meanwhile, the share of County residents who both work in

the Transportation industry and in San Bernardino County increased slightly. Based on this data, the Transportation industry has pulled in more workers from the County resident pool and it has had to go outside the County to fill vacancies, increasing the percentage of County Transportation workers

who don't reside in the County. As one of the fastest growing industries in the County, the Transportation sector has created more jobs than the locally available talent pool can accommodate.

TRANSPORTATION INDUSTRY:

OCCUPATIONAL PROFILE AND EDUCATIONAL ATTAINMENT, COUNTY RESIDENTS, 2017

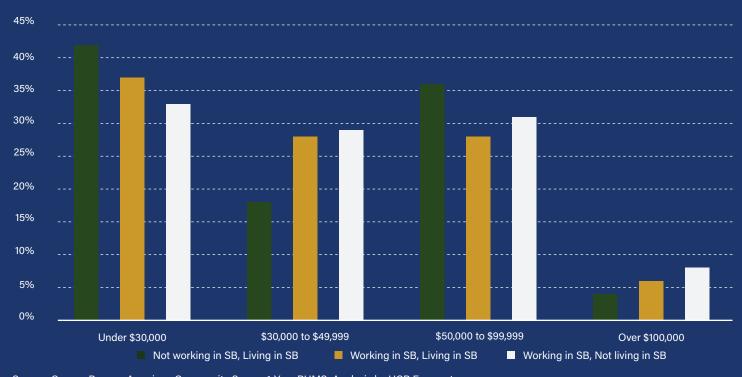


The vast majority (over 90%) of County residents employed in the Transportation industry work in just a few major occupational groups: Management, Office/Administrative Support, Installation/Maintenance/ Repair, and Transportation and Materials Moving. Driver/sales workers and truck drivers are by far the most common occupations within the industry, making up just less than half of all Transportation occupations in the County. Railroad conductors and yardmasters are the County's next most common occupations among those with some college (including

associate degree) after driver/sales workers and truck drivers. County residents with a high school diploma or less may find themselves more likely to be employed as laborers or freight, stock, and material movers.

PERCENT DISTRIBUTION OF WAGES IN TRANSPORTATION INDUSTRY, SAN BERNARDINO COUNTY, 2017

BY PLACE OF RESIDENCE VS. PLACE OF WORK



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast

Over half of the County residents working in the Transportation industry have a high school diploma or less and only one in ten of the County residents working in Transportation have a bachelor's degree or above. For those Transportation workers who live in San Bernardino County but work outside of the County, wages are comparatively lower, although not to the same extent

as those employed in the Warehousing industry (to be discussed in the following section). Nearly 40% of those workers earned less than \$30,000 in 2017. On the other hand, approximately 30% of the County residents working in Transportation earned between \$50,000 to \$99,999 in 2017. Overall, Transportation workers who work in San Bernardino but live outside

earned more than those Transportation workers who live in San Bernardino County. This observation may suggest that while jobs in the Transportation industry can pay relatively well, many of the industry's better paid positions are filled by workers who live outside of San Bernardino County.



LOGISTICS / WAREHOUSING: INDUSTRY DEEP DIVE

LOGISTICS / WAREHOUSING: INDUSTRY ANALYSIS

Since 2010, the Warehousing industry in San Bernardino County has experienced extraordinary growth. Over the seven-year period 2010-2017, the number of warehousing jobs in the County has nearly doubled in size, growing from roughly 35,000 jobs to nearly 69,000.

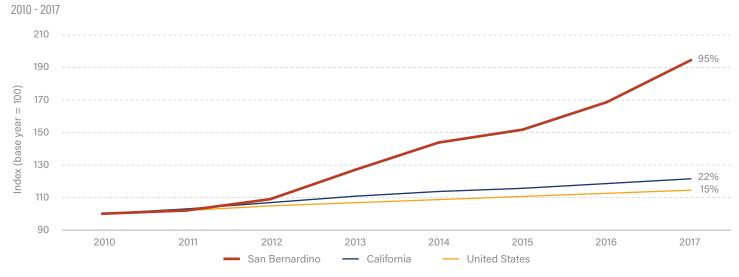
This rate of growth (95%) has far out-paced the industry's growth in California and in the national economy. Warehousing employment grew only by 22% in the state of California and by 15% in the national economy. In other words, the industry in San Bernardino County has been growing at nearly five times the industry's growth rate in the state and over six times that of the national sector's rate. In 2017, the

Warehousing sector accounted for around 9% of the County's economy.

The impressive job growth in the sector has not been met with commensurate wage growth. In 2017, Warehousing employment paid, on average, \$46,148 per year compared to around \$43,000 for the rest of the County's economy. Furthermore, wages in the County have grown by

16% since 2010, while growing by only 5% percent in the Warehousing industry. In fact, wages in Warehousing peaked in 2015 and have since fallen by over \$2,000 per year. On an annualized basis, wages in the sector have grown at less than 1% per year, which, accounting for inflation, means that real wages in the sector have declined since 2010.

WAREHOUSING INDUSTRY EMPLOYMENT GROWTH



Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

WAREHOUSING INDUSTRY WAGE GROWTH VS. ALL SECTORS, SAN BERNARDINO COUNTY



Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

Recall from the discussion earlier that overall wages in a given jurisdiction are primarily determined by the traded sectors of its economy. The Warehousing sector is a classic, traded sector, as the goods that are processed within the County's warehouses are shipped to distant locations. In other words, the performance of the local Warehousing industry in San Bernardino County is reliant on demand for products in distant markets. Therefore, the wage trends in the Warehousing sector have acted as a considerable drag on the capacity for wages to increase in the County's broader economy.

What may help explain the low wages paid in the Warehousing sector? A way to gauge qualitative differences within and among industries that may impact

wages paid is to consider how they vary according to the task content of the occupations that comprise them. Throughout the economy, different occupations require different degrees of analytical and cognitive abilities. The U.S. Department of Labor measures the characteristics of each occupation, from which it is possible to extrapolate the skill content required to work in any given industry. It is common to consider the extent to which a given industry requires workers who perform relatively repetitive, routine functions - such as data entry or answering telephones – and the extent to which a given industry requires workers who perform relatively non-routine, analytical activities, such as complex problem-solving. Intuitively, industries that are comprised of a high-share of "routine" activities typically pay

lower wages than industries that are comprised of a large share of "cognitive" activities.

The Manufacturing sector (to be discussed at greater length later in this chapter) in the state of California scored 60% higher than the industry in San Bernardino County, based on the cognitive content of the tasks that comprised their respective Manufacturing sectors. Using the same scale, the functions of the Manufacturing sector in San Bernardino County require twice the level of cognitive ability as the functions that comprise the County's Warehousing sector. In other words, the Warehousing sector of the economy requires relatively low-skilled workers.

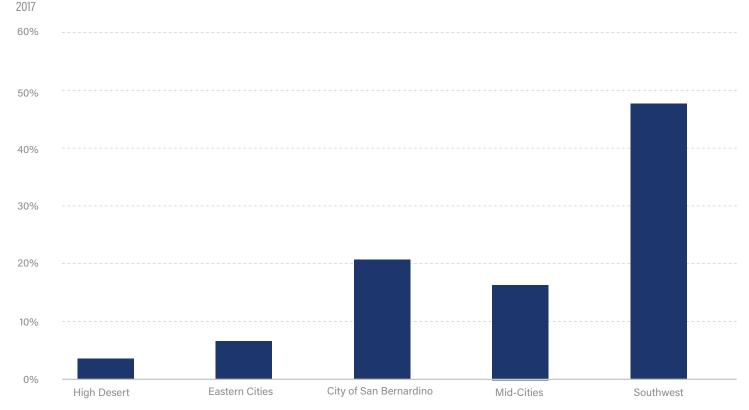
To further illustrate this point, industries reflected in the adjacent table, including Bakeries, Fabric Mills, and Amusement Parks among others, require similar skill content as the Warehousing industry. This means one can assume a worker in the Warehousing sector has a roughly similar skill level to a worker in the Amusement Parks or Fabric Mills sectors of the economy. The table also displays the average annual wages for these sectors.

The southwest cities account for the majority of the employment in the Warehousing sector of San Bernardino County's economy, accounting for 50% of the County's Warehousing employment in 2017. Despite the large share of Warehousing employment found in the southwest region of the County, the southwest has accounted for only 40% of the industry's growth since 2010.

Sector	Annual Wages (\$)
Bakeries and Tortilla Manufacturing	38,353
Fabric Mills	41,934
Textile Furnishings Mills	47,517
Amusement Parks and Arcades	30,109
Other Amusement and Recreation Industries	23,184

Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

PERCENT SHARE OF WAREHOUSING EMPLOYMENT BY SUBREGION, SAN BERNARDINO COUNTY



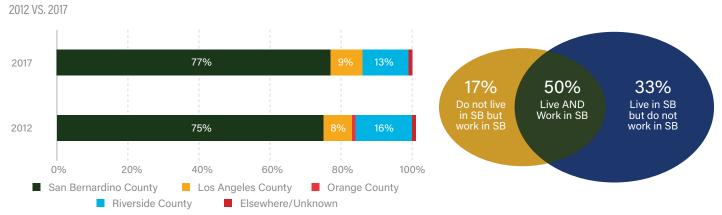
Source: California Economic Development Department; Analysis by UCR Forecast Center

LOGISTICS / WAREHOUSING: INDUSTRY ANALYSIS

The proportion of workers in the Warehousing industry who both live and work in San Bernardino County has ticked up significantly within the past five years, increasing from 60% in 2012 to 71% in 2017.

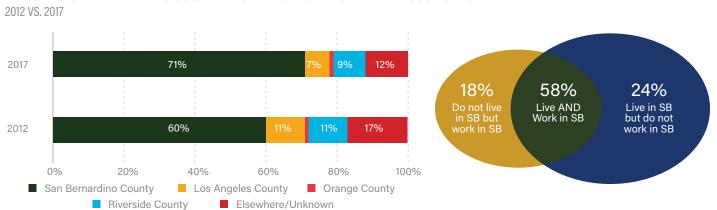
Amazon's increasingly expansive presence in the region has undoubtedly contributed to the boom of County resident-workers in Warehousing. The share of those who live in San Bernardino County but work in Warehousing outside of the County has dropped from 33% in 2012 to 24% in 2017.

WHERE DO WAREHOUSING WORKERS IN SAN BERNARDINO COUNTY RESIDE?



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WHERE DO SAN BERNARDINO COUNTY RESIDENTS WORKING IN WAREHOUSING WORK?



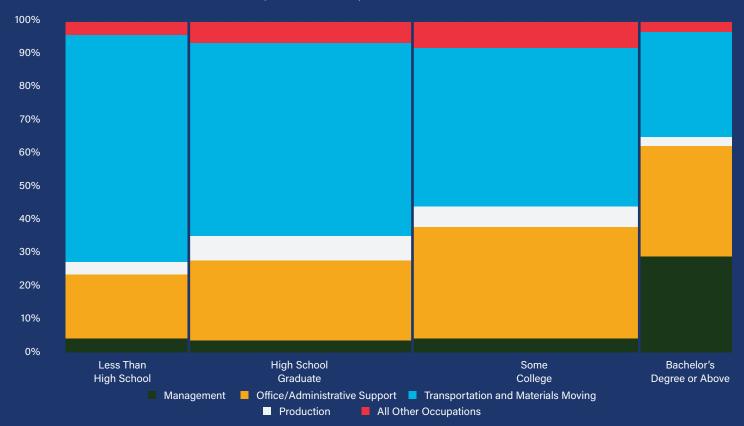
FIVE YEAR PERCENT CHANGE OF PERSONS WORKING IN WAREHOUSING INDUSTRY

Live In / Work In	Working in SB	Not working in SB
Living in SB	+39%	+25%
Not living in SB	+77%	

Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WAREHOUSING INDUSTRY:

OCCUPATIONAL PROFILE AND EDUCATIONAL ATTAINMENT, COUNTY RESIDENTS, 2017



The occupational profile of the Warehousing industry in San Bernardino County is very similar to that of the Transportation industry, as both are components of the Logistics industry complex. The vast majority of the County residents employed by the Warehousing industry work in just a few major occupational groups: Management, Office/Administrative Support, Production, and Transportation and Materials Moving. Compared to the Transportation industry, the Warehousing industry employs a higher share of workers

from the Production occupational group, as Warehousing is more closely tied to the Manufacturing industry.

Note that the Office/Administrative Support occupational group makes up about a quarter of all occupations within the Warehousing industry. This observation in the data may be misleading as typical Office/Administrative Support positions are generally considered sedentary and don't involve much physical labor. In the case of Warehousing, however, many of the County residents

employed in the Office/Administrative Support occupations are actually material recording, scheduling, dispatching, and distribution workers such as stock clerks and order fillers (19% of the Office/Administrative Support occupational group) and shipping, receiving, and traffic clerks (13% of the Office/Administrative Support occupational group).

The table below provides additional examples of common occupations in San Bernardino County within each occupational group.

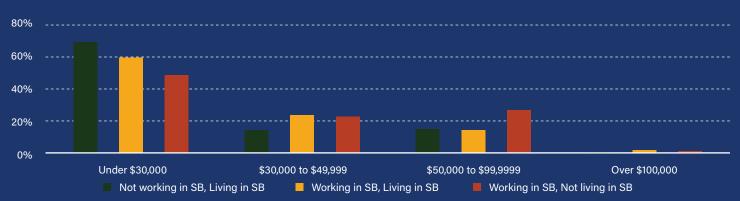
EXAMPLES OF COMMON OCCUPATIONS IN SELECTED OCCUPATIONAL GROUPS: WAREHOUSING INDUSTRY

Occupational Group	Occupations
Management	General and operations managers
Office/Administrative Support	Stock clerks and order fillers; Shipping, receiving, and traffic clerks
Production	Inspectors, testers, sorters, samplers, and weighers
Transportation and Materials Moving	Packers and packagers; Laborers and freight, stock, and material movers

Source: U.S. Census Bureau, ACS 1-Year PUMS; Analysis by UCR Forecast Center

PERCENT DISTRIBUTION OF WAGES IN WAREHOUSING INDUSTRY, SAN BERNARDINO COUNTY, 2017

BY PLACE OF RESIDENCE VS. PLACE OF WORK





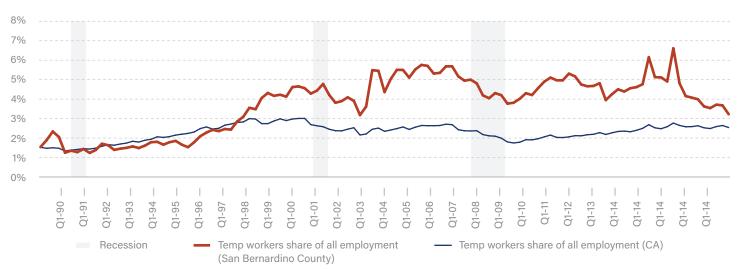
With regard to County residents working in the Warehousing industry, nine out of ten of them have no bachelor's degree, an educational attainment profile similar to that of the Transportation industry. However, unlike the Transportation industry, an even greater share of workers earn low wages. Among workers who live in San Bernardino County but work in Warehousing outside of the County, about 70% earned less than \$30,000 in 2017, while 60% of those who live

in San Bernardino County and work in Warehousing in San Bernardino County made less than \$30,000 in that same year. In addition, 27% of Warehousing workers who work in San Bernardino County but live elsewhere earned between \$50,000 and \$99,999, which is almost double the proportion of Warehousing workers making those wages who live and work in San Bernardino County (14%) and who live in San Bernardino County but work elsewhere (15%). Similar to

general trends in the Transportation industry, workers in the Warehousing industry who work in San Bernardino County but live elsewhere earned more on average than those who live and work in San Bernardino County. This suggests the possibility that while a share of jobs in the Warehousing industry do pay reasonably well, many of those better paid Warehousing positions go to workers who live outside of San Bernardino County.

TEMP HELP SERVICES WORKERS AS PERCENTAGE OF TOTAL PRIVATE EMPLOYMENT

SAN BERNARDINO COUNTY VS. CALIFORNIA



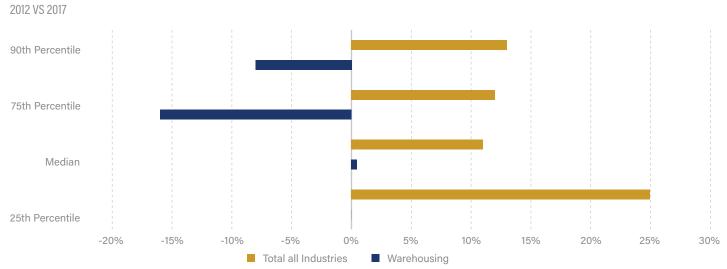


As discussed earlier, caution is advised with regard to interpreting the jobs boom in the Warehousing industry with optimism, as wages have actually declined for workers in this industry. Compared to the other industries examined in this report, the Warehousing industry is the only industry in which wages have either stagnated or declined across various wage brackets. The growth observed in the Warehousing industry has

also coincided with the increase in the share of temporary help services workers (temp agency workers) who are often paid low hourly wages, have unstable work hours, and may have little to no workplace benefits. While the share of temporary help services workers has come down from its peak in 2015, temp workers have represented a greater share of the County's employment than the state's employment since 1998.

A glut of temporary and seasonal workers may generate ripple effects through the County's economy. For example, housing demand may be impacted since it is often difficult for these workers to get stable housing without a stable job, and it is hard to keep a stable job without stable housing.

PERCENT WAGE CHANGE FOR COUNTY RESIDENTS, SAN BERNARDINO COUNTY



Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

MANUFACTURING INDUSTRY DEEP DIVE



MANUFACTURING: OVERVIEW AND OUTLOOK

The United States remains a very large manufacturer as measured by real output. However, American manufacturers have increasingly relied on technology for their production methods, displacing workers over time in the process.

In fact, the number of workers in U.S. manufacturing peaked in 1979 and has generally declined in the decades since. This national trend over time is locally observed as well by examining Manufacturing employment for San Bernardino County which peaked in late 2000.

Manufacturing in San Bernardino
County was hit hard following the
Great Recession, declining nearly 35%
from peak to trough. However, while
Manufacturing employment is still
below its pre-recession peak in San
Bernardino County, the local industry
continues to gain impressive ground,
with exceptional growth occurring over

the last couple of years in particular. Since bottoming out during the Great Recession, Manufacturing employment has grown 22.5%, and this uptick is just one positive sign of recovery.

Some segments of the Manufacturing industry are unlikely to return any time soon to pre-recession employment levels, but that's not to say the Manufacturing industry is on its way out. Nationally, manufacturing technology is transforming the sector and the industry is growing as a result of this iterative process. There are current and future growth prospects for the Manufacturing industry worthy of optimism – 3D printing technologies,

medical device markets, and aerospace defense funding, to name a few – but the growth in industry activity will not be matched by gains in industry employment.

While the Center doesn't project a substantial gain in Manufacturing employment, the Center does remain cautiously optimistic about the industry's outlook in San Bernardino County, given the recent momentum in the industry's employment in the County relative to the state. In the short term, our projections suggest the industry is poised for stable growth, particularly for advanced manufacturing segments.

MANUFACTURING: INDUSTRY ANALYSIS

In 2017, the Manufacturing sector accounted for around 9% of all jobs in both San Bernardino County and in the state of California. Nationally, it accounted for around 10% of all jobs.

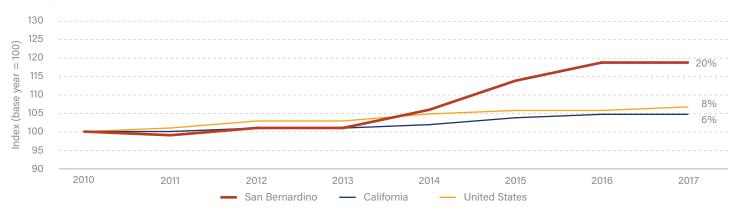
Since 2010 - the industry's low point following the Great Recession - the number of Manufacturing jobs in the County has increased by around 12,000, a growth rate as mentioned of 22.5%. This growth is particularly impressive when compared to the industry's employment growth at the state and national levels, where manufacturing employment grew by 6% and 8% respectively over that same period. In other words, Manufacturing employment in San Bernardino County has been growing at three times the pace of the industry's growth in the rest of the state.

While the growth of Manufacturing employment in San Bernardino County is impressive, the wages paid by the sector's employers in the County are lower than in the rest of the state and in the national economy. In 2017, the average Manufacturing job in San Bernardino County paid an annual wage of \$55,670, compared to \$92,295 in the state of California. and \$66,835 in the U.S. This means that the average Manufacturing job in the state of California generates more income for the state's economy than the average Manufacturing job in San Bernardino County does for the

County's economy. To put this slightly differently, the Manufacturing sector increases wages by more in the state's economy than it does in San Bernardino County. Moreover, the divergence in Manufacturing wages between the state and County of San Bernardino has been increasing over time. Over the period 2010-2017, wages in the state's Manufacturing sector grew by 27% compared to their 22% growth rate in the County's economy.

MANUFACTURING EMPLOYMENT GROWTH





Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

To understand why the Manufacturing sector pays lower wages in San Bernardino County than it does in the rest of the state, consider the segments of the Manufacturing sector that are present in the County and the state respectively.

The Manufacturing sector is a relatively diverse industry, with a wide range of subsectors producing goods varying significantly in complexity. Consequently, different subsectors of the Manufacturing industry pay different wages, depending on the skill intensity of the occupations that comprise any one subsector. The adjacent table displays the highest-employing subsectors of the Manufacturing industry in the

County's economy and in the state's economy respectively. It reveals the marked difference in the nature of the Manufacturing activities in San Bernardino County compared to those in the rest of the state. The state's economy is specialized in high-value segments of the Manufacturing industry which pay higher wages, such as the manufacture of semiconductors, aerospace parts, and computers. By contrast, the County's Manufacturing

industry is specialized in lower-value segments of the industry, such as cement and concrete products, bakery and tortilla production, and nuts and bolts manufacturing.

Again, as in this report's analysis of the Warehousing industry, we can turn to the U.S. Department of Labor's measuring of occupational characteristics to gauge the task intensity of a sector's functions.

SAN BERNARDINO MANUFACTURING INDUSTRY

FMPI OYMENT AND WAGES

Sub-Sector	Employment	Wages
Plastics Product Manufacturing	5,518	\$59,649
Cement an Concrete Product Manufacturing	3,199	\$62,954
Household and Institutional Furniture and Kitchen Cabinet Manufacturing	2,483	\$38,936
Bakeries and Tortilla Manufacturing	2,416	\$40,197
Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	2,063	\$48,462

Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

The figure "Difference in Cognitive Content" reflects the difference between the cognitive content of the Manufacturing sector in the state of California compared to that of the Manufacturing sector in San Bernardino County. The functions of the Manufacturing industry in California require 60% more "cognitive" capacity than the average Manufacturing job in San Bernardino County. In other

CALIFORNIA MANUFACTURING INDUSTRY

EMPLOYMENT AND WAGES

Sub-Sector	Employment	Wages
Plastics Product Manufacturing	5,518	\$59,649
Cement an Concrete Product Manufacturing	3,199	\$62,954
Household and Institutional Furniture and Kitchen Cabinet Manufacturing	2,483	\$38,936
Bakeries and Tortilla Manufacturing	2,416	\$40,197
Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	2,063	\$48,462

Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

words, the Manufacturing sector in San Bernardino County is more reliant on occupations that are relatively repetitive and routine in nature. On a brighter note, the difference in the state's and the County's demand for Manufacturing occupations requiring cognitive capacity has fallen slightly since 2010.

In summary, the Manufacturing sector in San Bernardino County is qualitatively different from the sector in the rest of the state. The County's industry is specialized in lower-value goods, the production of which relies on relatively less-skilled activities.

The "Location of Manufacturing Employment, 2017" figure displays the distribution of Manufacturing employment across the five subregions of San Bernardino County. Manufacturing employment is largely concentrated in the southwest part of the County, where 60% of all

Manufacturing employment is located. However, the southwest region has accounted for only 39% of Manufacturing employment growth since 2010, indicating that important growth in the industry is occurring in the rest of the County.

DIFFERENCE IN COGNITIVE CONTENT, STATEWIDE MANUFACTURING V. SAN BERNARDINO COUNTY MANUFACTURING

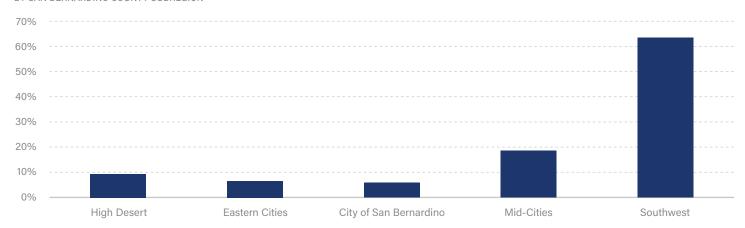




Source: UCR Forecast Center's calculations based on data from the Quarterly Census of Employment and Wages, the Bureau of Labor Statistics' Standard Occupation Classifications and the Department of Labor's O*Net database. The methodology was based on the work of Acemoglu and Autor (2011)¹.

LOCATION OF MANUFACTURING EMPLOYMENT, 2017

BY SAN BERNARDINO COUNTY SUBREGION



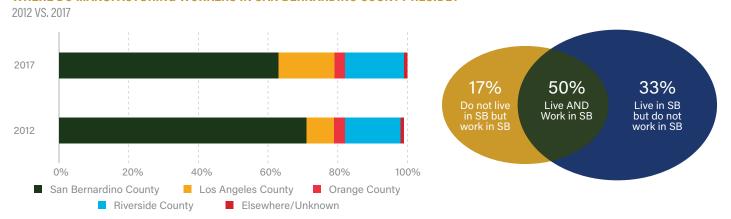
Source: California Economic Development Department; Analysis by UCR Forecast Center

¹ Acemoglu, Daron & Autor, David, 2011. "Skills, Tasks and Technologies: Implications for Employment and Earnings," Handbook of Labor Economics, Elsevier.

MANUFACTURING: OCCUPATIONAL ANALYSIS

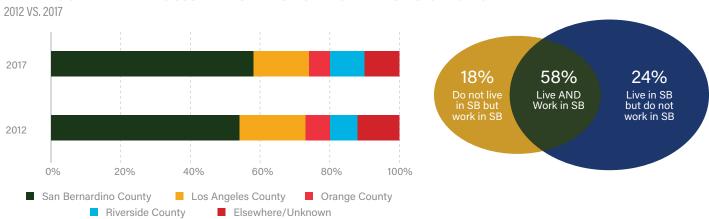
The Manufacturing industry is the only industry examined in-depth in this report where employment is declining among the County resident population. Surprisingly, between 2012 and 2017, the number of Manufacturing workers commuting from Los Angeles County to San Bernardino County for work doubled. As a result, the number of Manufacturing workers who work in San Bernardino County but live outside the County has increased 26%.

WHERE DO MANUFACTURING WORKERS IN SAN BERNARDINO COUNTY RESIDE?



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WHERE DO SAN BERNARDINO COUNTY RESIDENTS WORKING IN MANUFACTURING WORK?



FIVE YEAR PERCENT CHANGE OF PERSONS WORKING IN MANUFACTURING INDUSTRY

Live In / Work In	Working in SB	Not working in SB
Living in SB	-12%	-28%
Not living in SB	+26%	

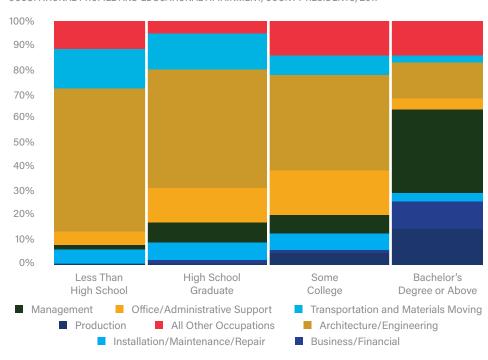
Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

Despite the declining employment in Manufacturing among County residents, a larger share of them employed by the Manufacturing industry worked in San Bernardino County in 2017 (58%) compared to 2012 (54%), possibly due to declining Manufacturing employment elsewhere in the County's surrounding regions.

Unlike the Logistics industries, there exists a variety of occupations in the Manufacturing industry. Production (42%) is the largest occupational group, followed by Office/Administrative Support (12%), Management (12%), and Transportation and Materials Moving (11%). County residents with a high school diploma or less comprise the lion's share of the industry's Production occupational group. On the other hand, County residents with a bachelor's degree or more represent the largest share of the Management occupational group.

MANUFACTURING INDUSTRY:

OCCUPATIONAL PROFILE AND EDUCATIONAL ATTAINMENT, COUNTY RESIDENTS, 2017



Overall, County residents working in the Manufacturing industry with a high school diploma or less are mostly employed in the Production and Transportation occupational groups. County residents with some college or an associate degree are mostly employed in Office/Administrative Support and Production occupational groups.

Finally, County residents with a bachelor's degree or more are mostly employed in Architecture/Engineering (mostly in engineering occupations such as industrial engineers and electrical and electronics engineers),

Business/Financial, and, as mentioned, Management occupational groups. These three occupational groups represented by those with a bachelor's degree or more in San Bernardino County are much less prone to automation risks than the other, aforementioned occupational groups represented by those with lower educational attainment levels.

TOP OCCUPATIONS IN MANUFACTURING BY EDUCATIONAL ATTAINMENT AMONG COUNTY RESIDENTS

Less Than High School	High School Graduate	Some College	Bachelor's Degree
Miscellaneous Production Workers	Miscellaneous Assemblers And Fabricators	First-Line Supervisors Of Production And Operating Workers	Miscellaneous Managers
Miscellaneous Metal Workers And Plastic Workers	Miscellaneous Production Workers	Miscellaneous Production Workers	Industrial Production Managers
Miscellaneous Assemblers And Fabricators	First-Line Supervisors Of Production And Operating Workers	Laborers And Freight, Stock, And Material Movers	Human Resources Workers

Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

Similar to the Logistics industry, Manufacturing workers who work in San Bernardino County but live outside of the County earned higher wages on average than those Manufacturing workers who live in San Bernardino County and work in the County or elsewhere. Among those

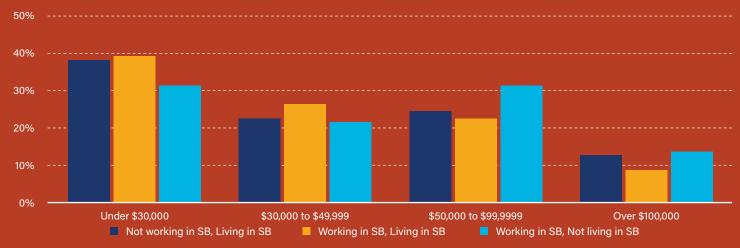
Manufacturing workers who commute to San Bernardino County from other counties, 46% earned at least \$50,000 in 2017. By comparison, among those Manufacturing workers who live and work in San Bernardino County, just 32% earned at least \$50,000.

Wages are strongly correlated with educational attainment among County residents. Because those with at least a bachelor's degree are mostly employed in more highly skilled and specialized occupational groups

such as Engineering, Management, Business, and Financial, the vast majority of this population – just shy of 70% - made at least \$50,000 in 2017. In contrast, 59% of those with less than a high school diploma earned less than \$30,000 in 2017, as many of the workers in this educational attainment bracket are employed as miscellaneous production, metal, plastic, or assembly workers.

PERCENT DISTRIBUTION OF WAGES OF MANUFACTURING INDUSTRY, SAN BERNARDINO COUNTY, 2017

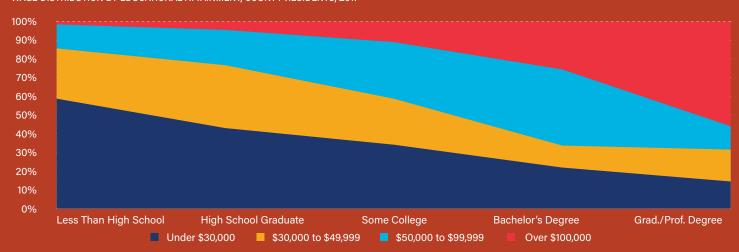
BY PLACE OF RESIDENCE VS. PLACE OF WORK

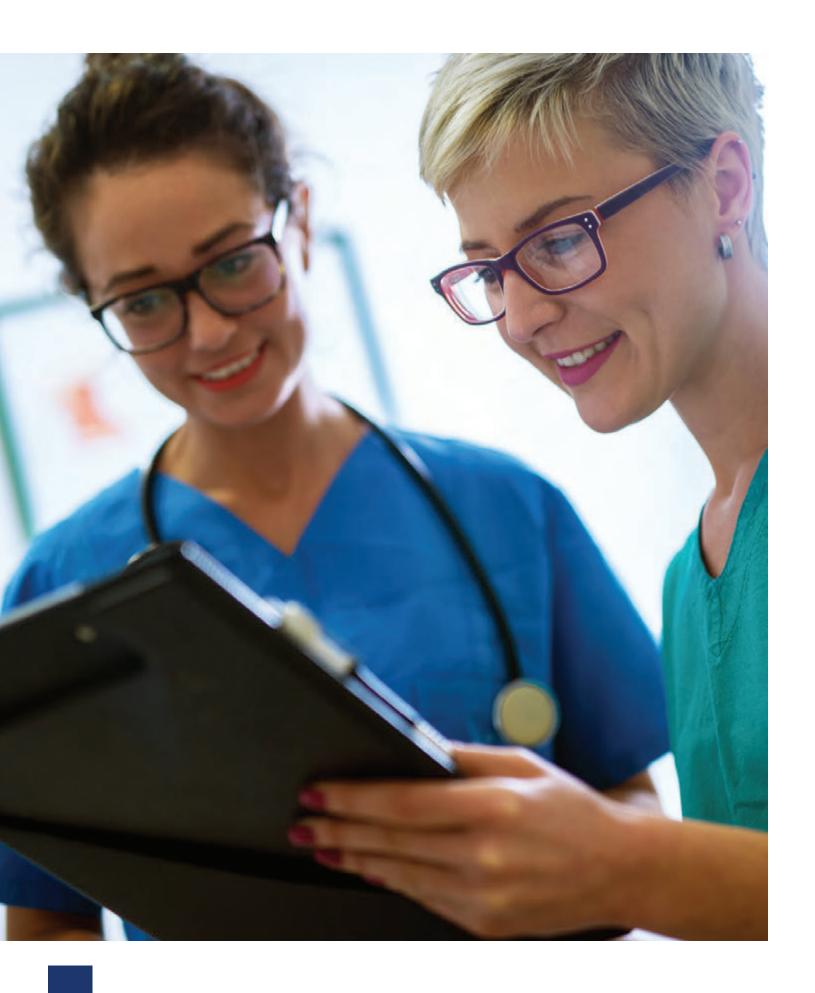


Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

MANUFACTURING INDUSTRY:

WAGE DISTRIBUTION BY EDUCATIONAL ATTAINMENT, COUNTY RESIDENTS, 2017





HEALTHCARE: INDUSTRY DEEP DIVE

HEALTHCARE: OVERVIEW AND OUTLOOK

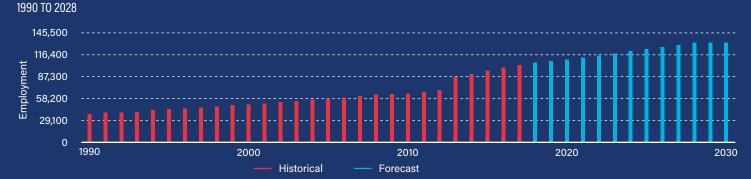
Healthcare tends to be one of the largest industries in practically every moderately sized economy and San Bernardino County is no exception, with Healthcare representing the County's second largest industry behind Government and accounting for 14.3% of the County's total employment.

In addition, while not within the purview of this private industry analysis, healthcarerelated government jobs account for roughly 10% of Government employment in San Bernardino County. Two significant catalysts to the creation of Healthcare jobs in the County are the County's aging population and the historically high number of consumers who entered the healthcare market as a result of the Affordable Care Act. These factors have resulted in more Healthcare jobs for local communities across the County. Other demographic trends, like a generally increasing life expectancy, will continue to drive up employment in the Healthcare industry into the foreseeable future.

Despite policy challenges at the national level, the outlook for the Healthcare industry remains positive for San Bernardino County. Because consumption of the Healthcare industry's products and services tends to be local, it is largely insulated from the negative effects of a dynamic, national industry landscape. Moreover, political pressure to increase access to affordable healthcare as observed in the midterm elections of 2018 are expected to keep Healthcare employment on its current growth trajectory. As for possible changes to the Affordable Care Act, it is too early to say how potential healthcare

reforms may impact the Healthcare industry. The Center expects the Healthcare industry to make the largest contributions to job gains in San Bernardino County over the ten-year period from 2018 to 2028. While the Center does not foresee a recession on the horizon in the near term, if an economic downturn were to materialize, the impact on the Healthcare industry would likely be minimal relative to the impact on other sectors of the County's economy, given the aforementioned local nature of the industry.

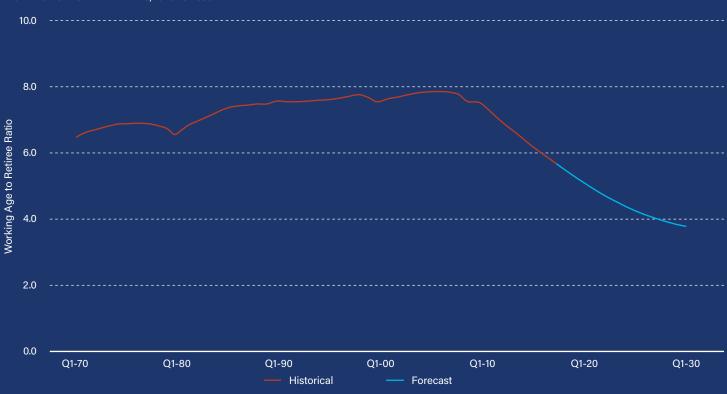
HEALTHCARE EMPLOYMENT FORECAST: COUNTY OF SAN BERNARDINO



Source: Bureau of Labor Statistics; Employment Forecast by UCR Forecast Center

POPULATION FORECAST: COUNY OF SAN BERNARDINO

WORKING AGE TO RETIREE RATIO, 1970 TO 2030



Source: California Department of Finance; Demographic Forecast by UCR Forecast Center

Because the Healthcare industry tracks population to an extent, the Center has included its population forecast for the County. Over the next ten years, San Bernardino County's population is expected to grow at a steady pace. Growth is contingent on natural increase (births minus deaths) and net positive migration. The Center forecasts that the San Bernardino County population will continue to expand, with growth averaging 1.2% over the next five years. Projected growth will depend heavily on attracting in-migration (both domestic and international), as well as retaining young adults.

What about the long term? The Center's projections suggest the County will likely see a substantial increase in its elderly (75 and over) population. Conversely, projections show that the County's younger population will grow at a much slower rate. These projections are based heavily on assumptions pertaining to local age, race, fertility, and life expectancy, and they represent one possible growth scenario for the County's population forecast. The senior population is expected to continue growing significantly and with the last of the baby boomers retiring, the working age to retiree population is expected to decline. Over the long

term, this shift in demographics could have a number of implications for the County's Healthcare industry. With a large number of baby boomers entering retirement - the youngest turning 65 by 2029 - the County's aging population will mean an increase in demand for healthcare and supportive services. Caring for an aging population will also likely require a shift in resources at the County level, given the inordinate costs associated with senior healthcare needs. This transition may also place an increasing burden on the County's future taxpayers as they support the region's retired population.

HEALTHCARE: INDUSTRY ANALYSIS

Unlike the Manufacturing and Logistics industries, the Healthcare sector is a non-traded industry, primarily serving local residents. Yet, as is the case for the state and national economies, the Healthcare sector of San Bernardino County's economy is becoming an important part of the industry landscape.

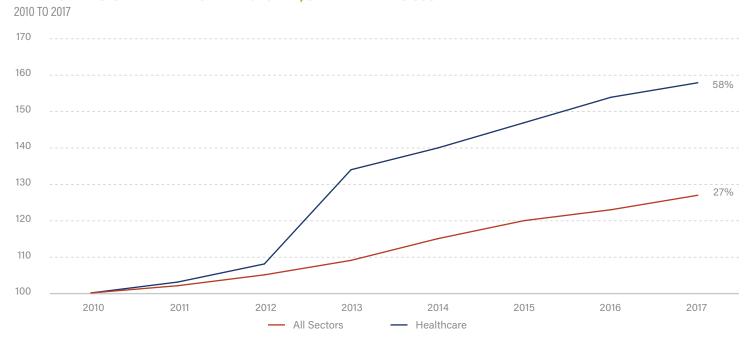
In 2010, the Healthcare industry accounted for 13% of the County's employment; by 2017, it accounted for 17%. As these figures suggest, employment in the Healthcare sector far outpaced growth in the rest of the County's economy over that same

period. During this time, the County's Healthcare sector grew by an impressive 59%, adding around 38,000 jobs.

Similar to trends in the Warehousing sector, wage growth in the Healthcare sector has fallen behind

that of the County's economy overall. Over the period 2010-2017, wages in the Healthcare industry have been flat, at around \$47,000 per year. Recall that wages in the rest of the County's economy grew by 16% over that same period.

HEALTHCARE VS. OVERALL EMPLOYMENT GROWTH, SAN BERNARDINO COUNTY



Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center





As is the case in the Manufacturing sector, Healthcare is a diverse industry, encompassing a variety of different functions. The table below lists the highest-employing segments of the County's Healthcare industry in 2017. Individual Family Services represents the highest-employing subsector of the industry, accounting for nearly 27,000 jobs. However, the Individual Family Services subsector, despite being

a job creation engine, is also an incredibly low-paying segment of the industry, paying an annual wage of less than \$16,000. Some subsectors of the Healthcare industry do pay high wages. For example, together, hospitals and offices of physicians and outpatient centers pay salaries on average higher than \$70,000 per year. Yet, overall, most segments of the Healthcare industry pay lower wages than the County's average wage.

As mentioned, broader demographic trends in the economy indicate a continued fast pace of growth for the Healthcare sector. The County's aging population will likely translate into increased demand for nursing facilities, home health services, and health services more broadly. At present, however, these subsectors tend to provide lower-paying jobs.

HIGHEST-EMPLOYING HEALTHCARE SECTORS IN SAN BERNARDINO COUNTY, 2017

FMPI OYMENT AND WAGES

	Total Number of Jobs	Annual Wages
Individual and Family Services	26,805	\$15,539
General Medical and Surgical Hospitals	21,248	\$70,944
Offices of Physicians	11,561	\$81,841
Outpatient Care Centers	10,204	\$83,960
Nursing Care Facilities (Skilled Nursing Facilities)	6,849	\$36,181
Offices of Dentists	5,398	\$40,780
Home Healthcare Services	4,375	\$35,181
Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	2,857	\$24,189
Offices of Other Health Practitioners	2,690	\$35,710
Vocational Rehabilitation Services	2,029	\$20,688

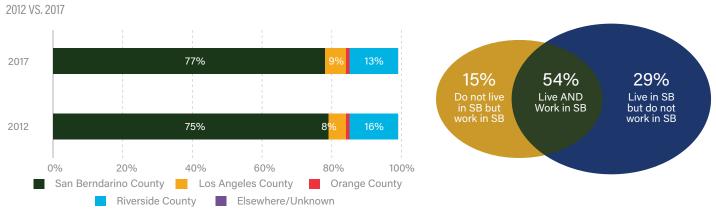
Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

In summary, since 2010, San Bernardino County has experienced significant employment growth in its Healthcare industry, far outpacing the industry's growth in the state and nation. But, the wage growth in the County's Healthcare sector has been far less impressive. Four subsectors have alone accounted for 55% of Healthcare employment growth in the County since 2010, yet these subsectors tend to pay relatively low wages.

HEALTHCARE: OCCUPATIONAL ANALYSIS

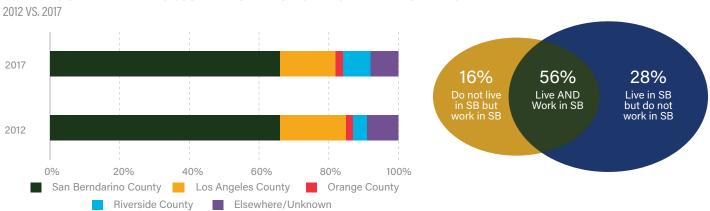
Healthcare is one of the most dynamic industries in San Bernardino County, but of the industries profiled in this report, it is the only industry for which the general County workforce profile has not changed in the last five years.

WHERE DO HEALTHCARE WORKERS IN SAN BERNARDINO COUNTY RESIDE?



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

WHERE DO SAN BERNARDINO COUNTY RESIDENTS WORKING IN HEALTHCARE WORK?



Among Healthcare professionals who work in San Bernardino County, 78% also reside in San Bernardino County. Meanwhile, among Healthcare professionals who live in San Bernardino County, about one-third commute outside of San Bernardino County for work, with Los Angeles County being the most popular destination. While fewer than the number of San Bernardino County residents commuting to Los Angeles, the number of County residents commuting to Riverside County doubled in 5 years from 2012 to 2017. This trend is notably more prevalent among those without a bachelor's degree or above.

The Healthcare industry is the largest sector in the Loma Linda, Redlands, and Yucaipa sub-region with 15% of the sub-region's residents employed in Healthcare.

Compared with the other industries examined in this report, Healthcare is by far the least prone to automation threats. In addition, workers employed in the Healthcare industry in San Bernardino County tend to be more educated than those employed in the Logistics and Manufacturing industries.

Among County residents working in the Healthcare industry, educational attainment levels have notably increased. In 2017, 35% of County residents working in the Healthcare industry had at least a bachelor's degree, while 2012's share of bachelor degree-holding Healthcare workers was only 28%. This means the number of County residents working in Healthcare with a bachelor's degree or above increased by 38% in five years. Furthermore, the share of County residents working in Healthcare with a high school degree or less decreased by 6% over that same period.

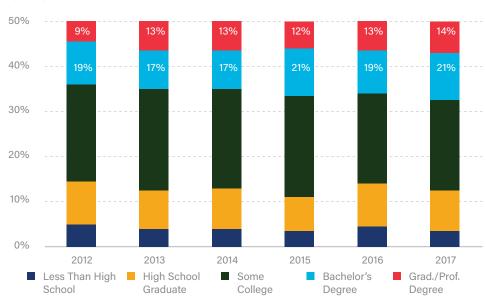
EDUCATIONAL ATTAINMENT PROFILE OF HEALTHCARE INDUSTRY, SAN BERNARDINO COUNTY, 2017



Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

EDUCATIONAL ATTAINMENT PROFILE OF SAN BERNARDINO COUNTY RESIDENTS WORKING IN HEALTHCARE INDUSTRY

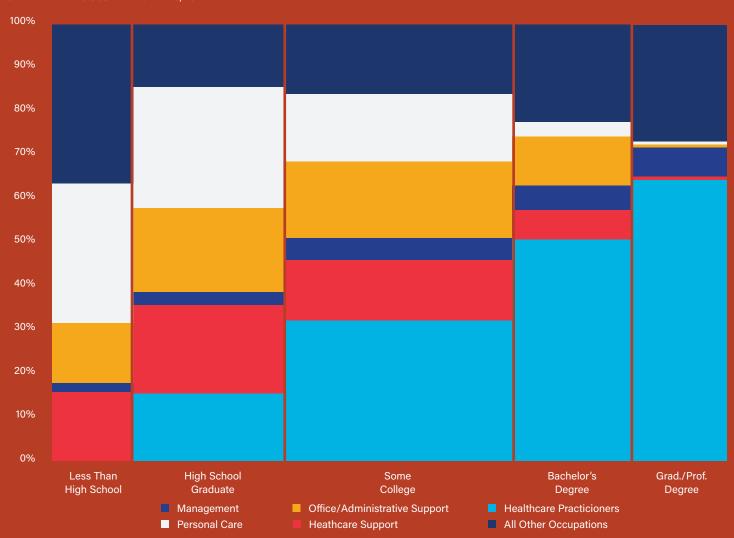
2012 - 2017



Source: U.S. Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

HEALTHCARE INDUSTRY: OCCUPATIONAL PROFILE AND EDUCATIONAL ATTAINMENT PROFILE

SAN BERNARDINO COUNTY RESIDENTS, 2017



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

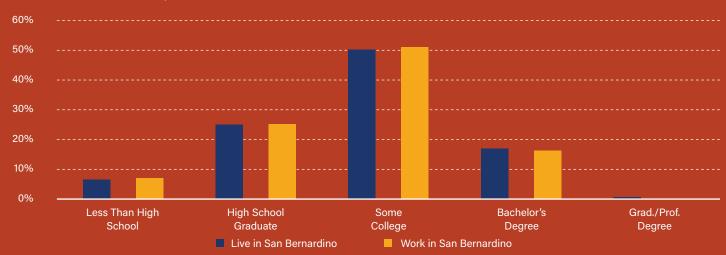
While Healthcare Practitioner is the most common occupation among County residents with at least some college (including an associate degree), the most common sub-occupations differ depending on workers' educational attainment levels. About one-third of County residents with some college (including an

associate degree), are employed in the Healthcare Practitioner occupations and Registered Nurse, Licensed Practical Nurse, and Licensed Vocational Nurse are the most common sub-occupations. For County residents working in Healthcare with a bachelor's degree, about half are employed in the Healthcare

Practitioner occupations and Registered Nurse is the most common sub-occupation. Finally, among County residents working in Healthcare with a graduate or professional degree, two-thirds are employed in the Healthcare Practitioner occupations and Physician and Surgeon are the two most common sub-occupations.

EDUCATIONAL ATTAINMENT OF OFFICE/ADMINISTRATIVE SUPPORT

WORKERS IN HEALTHCARE INDUSTRY, 2017



Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

With regard to the industry's other occupational groupings, there are about as many County residents working in Office/Administrative Support occupations as there are in Personal Care occupations and Healthcare Support occupations. Over half of the Office/Administrative Support workers are employed in just a handful of positions: Billing and Posting Clerks, Receptionists

and Information Clerks, Secretaries and Administrative Assistants, and Other General Office Clerks. Among all County residents working in Healthcare in Office/Administrative Support occupations, about half have either some college or associate degree and about one-fourth have a high school diploma. Generally, the educational attainment profile of San Bernardino County residents working

in Healthcare is nearly identical to that of the County's Healthcare workforce.

As for those with a high school diploma or less, Personal Care (e.g., Personal Care Aides) and Healthcare Support (e.g., Home Health Aides), both of which tend to reflect low-paying jobs, are the most common occupations in San Bernardino County.

TOP OCCUPATIONS OF SAN BERNARDINO COUNTY RESIDENT HEALTHCARE INDUSTRY WORKERS BY EDUCATIONAL ATTAINMENT HEALTHCARE INDUSTRY WORKERS BY EDUCATIONAL ATTAINMENT

Less Than High School	High School Graduate	Some College	Bachelor's Degree	Grad./Prof. Degree
Personal Care Aides	Personal Care Aides	Personal Care Aides	Registered Nurses	Physicians and Surgeons
Nursing, Psychiatric, And Home Health Aides	Nursing, Psychiatric, And Home Health Aides	Registered Nurses	Healthcare Social Workers	Registered Nurses
Secretaries and Admin Assistants	Licensed Practical Nurses/Licensed Vocational Nurses	Licensed Practical Nurses/Licensed Vocational Nurses	Nursing, Psychiatric, And Home Health Aides	Counselors (e.g., Rehab, Substance Abuse)

Source: Quarterly Census of Employment and Wages; Analysis by UCR Forecast Center

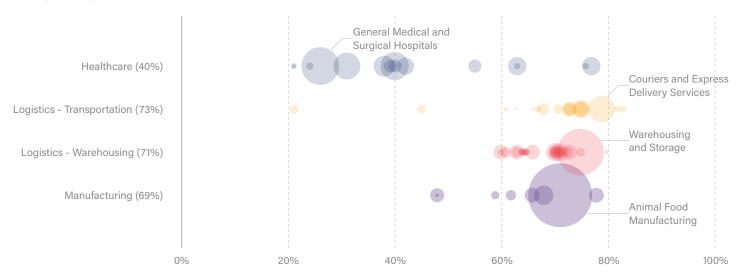
DISCUSSION OF AUTOMATION PROBABILITIES



Given the dominant presence of the Logistics and Manufacturing industries, which are primarily staffed in San Bernardino County by workers with few skills and/or lower educational attainment levels, the County must prepare for the threats of automation without dramatizing the unpredictable range of impacts automation inevitably has on any one industry.

AUTOMATION PROBABILITY

BY INDUSTRY CLUSTER



Source: NESTA; Analysis by UCR Forecast Center. Note: Bubble size corresponds to employment size in 2017

Many subsectors of the four industries in focus are vulnerable to automation threats. Particularly for Logistics and Manufacturing, the largest subsectors by employment are also the most vulnerable to automation using the NESTA methodology. The subsectors of the Healthcare industry, comprised

of jobs typically requiring more inperson, human-centered activities, have lower overall automation scores.

To further understand how automation might impact the range of workers in any one industry, it is important to examine the occupational profile of the industry. While industries constitute the economic backbone of a region, its workers are typically trained for proficiency in a chosen occupation that might have applications in more than one sector.

INDUSTRY BY OCCUPATION, DISTRIBUTION OF SAN BERNARDINO COUNTY RESIDENTS



Logistics -

Transportation

Healthcare Support

■ Transportation and Materials Moving

Office/Administrative Support

Logistics - Warehousing

Source: Census Bureau, American Community Survey 1-Year PUMS; Analysis by UCR Forecast Center

Heathcare

Installation, Maintenance, & Repair

For all four of the industries in focus, the majority of County residents are employed in the respective industry's primary or representative occupations, making up between 42% to 71% of each industry's employment base in San Bernardino County. Primary occupations would include Healthcare Practitioners and Healthcare Support occupations (58%) for the Healthcare industry, and Transportation and Materials Moving occupations for both the Transportation (71%) and Warehousing (55%) industries.

Management

Production

0%

representative occupations include Production (42%). Where the industry's primary occupations are not at a high risk of threat from automation, this trend bodes well for the County as is the case for Healthcare; but where the industry's automation score is high for example as it is with the Warehousing industry, the 55% of workers in the primary occupations of that industry don't necessarily have an easy, secondary application of their skills and experience. As an example, workers in occupations like Office and Administrative Support are generally

better-positioned to apply their skills in a secondary industry if their primary industry is rapidly automated. That being said, the impacts of automation on any one industry have historically defied prediction. While the County may be wise to think about retraining given the data observations discussed above, this isn't to say certain automation trends may create jobs and opportunities not otherwise highlighted in the broader discussion of automation among policymakers.

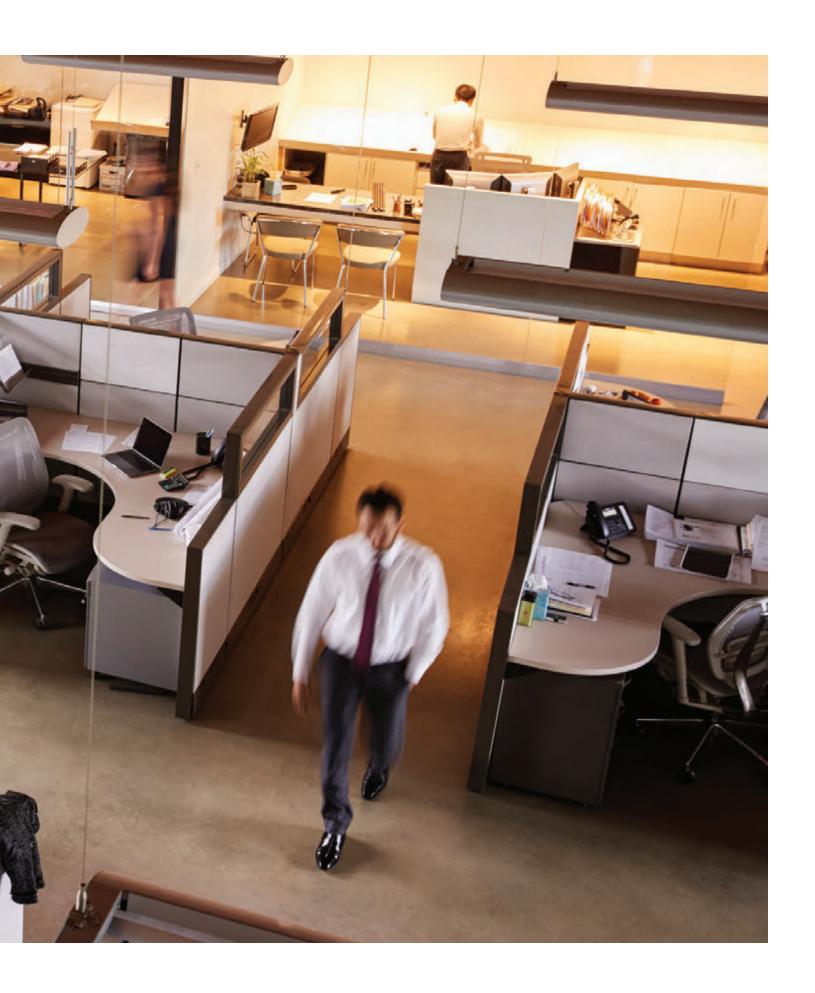
Manufacturing

■ Construction & Extraction

Other Occupations

Healthcare Practitioners and Technical







PARADIGMS FOR WORKFORCE DEVELOPMENT

There are a variety of ways to define workforce development and that variance can imply a range of different goals, target audiences, and activities. Generally, workforce development can be organized around three different organizing principles: (1) the individual; (2) the region or community; and (3) the organization or firm. Despite differences in focus and vantage point, workforce development goals and activities are broadly concerned with economic growth and more specifically, sustainable economic growth through the creation, maintenance, and retention of a viable workforce.



Workforce development organizations or bodies thinking about economic growth from the perspective of the individual are focused on improving the economic security of individual members of a community or geographic jurisdiction. As it is defined often by the public sector and public funding, workforce development initiatives using the lens of the individual often focus on serving vulnerable communities or individuals not otherwise being served by the education-to-career systems in place. To note, as policymakers make more consistent and coherent their approach to issues of workforce and talent development, they are increasingly thinking about the traditional education-to-career system as part and parcel of the workforce development complex so that education and workforce development don't problematically imply the same goal for different audiences. For those programs serving vulnerable communities, warp-around services, designed to ensure an individual's basic needs are met, are often an important complement to workforce development services. Wrap-around services traditionally cut across human and social services like welfare, housing, healthcare, job training, and education. Individual-focused workforce development organizations are concerned with not only preparing a worker for success, but also ensuring that his or her success is attainable and able to be sustained. As the St. Louis Fed notes, this (individual) perspective on workforce

development combines "social services, community supports, job training, and education."²

Organizations like REDF advocate for models such as employment-based social enterprise to solve for the unemployment rate of vulnerable communities like the formerly incarcerated, the formerly homeless, and opportunity youth. REDF's 2015 Mathematica Policy Research study found that the provision of broader supports in conjunction with employment opportunity increased the likelihood of self-sufficiency and life stability.3 Further, the analysis assessed the return on investment (ROI) of this broader investment on the part of multiple government agencies and government service providers and found that for every \$1 invested in the social enterprise, \$2.23 was returned to taxpayers in addition to additional savings. It is important to note that the fiscal ROI for workers was negative, as the report explained, "workers, however, actually experience small net monetary losses from social enterprise employment: their gains in economic selfsufficiency and life stability are offset by reductions in government transfers and public subsidies for housing."4 Yet, overwhelmingly, demand from workers for these programs and the opportunity they offer for self-sufficiency repeatedly outstrips supply.5

² Haralson, L. E. (2010). What is Workforce Development? Bridges, Federal Reserve Bank of St. Louis. Spring 2010. Retrieved: November 1, 2018. Retrieved from: https://www.stlouisfed.org/publications/bridges/spring-2010/what-is-workforce-development

^{3,4,5} Rotz, D. et al. (2015). Economic self-sufficiency and life stability one year after starting a social enterprise job. Mathematica Policy Research. January 13, 2015. Retrieved: November 1, 2018. Retrieved from: https://redf.org/app/uploads/2015/02/REDF-MJS-Final-Report.pdf

The regional or community-oriented approach is most closely aligned with a regional economic development approach to workforce development and aims to educate and train individuals to sustain a broader competitive economic environment. Workforce development from the vantage point of a region is concerned with a specified geography's stock of human capital and how it is depleted or replenished through education, migration, and the aging of workers. While regional workforce development initiatives often focus on the role of education for young people and more specifically, postsecondary education, the looming executive cliff with the retirement of the baby boomer generation has drawn increasing attention to the importance of management and executive leadership training. As one San Bernardino County industry stakeholder explained, "Executive training is a top three priority. Employers know that once the baby boomers retire, there's going to be a significant dearth of people who can take their place or who are even aware of and interested in that opportunity...We have already brought people out of retirement and back to work because we need them and don't have a good alternative. We can't do that forever."6

The final lens is that of the organization and it is primarily focused on training workers for the needs of specific employers as they strategize to remain competitive globally. While this approach is defined conceptually by the needs of individual employers, best practice in this space reflects a targeting of sector strategies or clusters of occupations, necessarily applicable to more than one employer in a region. If the career opportunities in one firm invoke the imagery of a ladder an employee must climb to achieve economic mobility, workforce development organizations are recommended to train for the lattice – or the matrix of

skills or occupations relevant to a specific industry cluster as opposed to one firm's needs.

Professors of Workforce Development and Education at Ohio State University, Dr. Robert Jacobs and Joshua Hawley offered a comprehensive definition of workforce development integrating all of these approaches: Workforce development is the coordination of public and private-sector policies and programs that provides individuals with the opportunity for a sustainable livelihood and helps organizations achieve exemplary goals, consistent with the societal (regional) context.⁷ Similarly, the Aspen Institute's comprehensive definition of a workforce development approach includes "substantial employer engagement, deep community connections, career advancement, human service supports, and industry-driven education and training."

It's important to clarify what paradigms this report draws on in providing insight and recommendation. While all three approaches – focusing respectively on the individual, the organization, and the region – are integrated throughout, the policy recommendations put forward are primarily situated within a regional paradigm for workforce development. The voiced needs and feedback from individual employers through stakeholder interview and focus groups have also been thoughtfully considered in order to inform the broader regional lens leveraged.

Both the Center's insights gathered from the literature and the feedback from local stakeholders via interview and focus group can be categorized into two buckets: (1) Processoriented and (2) Skills-oriented. The following analysis will mirror that division.

⁶ Industry Stakeholder insight

^{7,8} Haralson, L. E. (2010). What is Workforce Development? Bridges, Federal Reserve Bank of St. Louis. Spring 2010. Retrieved: November 1, 2018. Retrieved from: https://www.stlouisfed.org/publications/bridges/spring-2010/what-is-workforce-development

INSIGHT AND FEEDBACK

INSIGHT AND FEEDBACK ON PROCESSES REGARDING WORKFORCE DEVELOPMENT IN SAN BERNARDINO COUNTY

While the full cast of actors in a workforce development ecosystem is large and varied, the primary ecosystem actors this report considers include: (1) individual workers and students; (2) community-based organizations (CBOs); (3) government and government-affiliated organizations; (4) private firms and employers; and, (5) educational institutions.

Stakeholders in San Bernardino County comprising community and faithbased organizations, educational institutions, government workers, and private employers provided feedback on which challenges they perceived as most urgent around the processes associated with workforce development.

Those challenges can be thought about in three groups:

1

Classroom Assets

Responsive curriculum development:

Dynamic industry-education collaboration around curricular development and agile, short and long-term strategy formation

Industry expert-educators:

Vetted but reasonable processes and requirements for getting industry experts in the classroom in a teaching capacity

Rational credentialing:

Streamlined and vetted requirements and use cases associated with certifications, not for credit courses, for credit courses, and noncredit courses.

2

Funding as Incentive

Dynamic funding streams:

Flexible enough parameters on funding and coordinated funding campaigns for maximum ROI

Productive reporting:

Shared and practical burden of reporting

3

Shared Vision

Coordinated goals:

Jointly set goals across sectors and actors

Community-directed communications:

Intentional efforts to communicate out goals set and prioritized by institutional actors (education, government)

Consideration of audience:

Thoughtful consideration of equitable geographic access to training and caution toward demographic pigeonholing

ECOSYSTEM COLLABORATION

While some of these more specific challenges noted will be discussed later in more detail, the challenges enumerated broadly speak to a need for cross-sectoral collaboration and communication.

Collective impact is a term used to describe a model for multi-sectoral partnership around shared goals and interventions. In a series of research briefs by Columbia University's Community College Research Center (CCRC), the definition of collective impact and its challenges, as well as the best practices provided by the model, are explored. Characterized by a "shift in responsibility for improvement in outcomes from individual organizations to entire systems that affect the lives of people in a particular location," collective impact notably includes the shared measurement of indicators and clearly articulated shared goals.9 Many of the challenges mentioned above by San Bernardino County stakeholders are addressed in a collective impact approach including the precise alignment of both funding and communication strategies among other priorities across multiple organizations. The CCRC follows the Ford Foundation's Corridors of College Success initiative to examine collective impact as a vehicle specifically for "place-based work related to post-secondary access and completion."10 In addition to CCRC, other organizations that

have acted as field builders and advocates for collective impact as a model for workforce development served as resources to the Corridors project including: StriveTogether, Jobs for the Future, and the Data Quality Campaign.

One of the challenges associated with collective impact examined in the CCRC series is the establishment of a backbone organization, or the "centralized management team for partnership efforts...that functions independently."

The Collective Impact Forum has most robustly defined the core functions of a backbone organization in its "backbone toolkit," outlining strategic and logistic activities under each core function. In a CCRC case study examining one of the Corridor project site's struggle with the identification of a backbone organization, CCRC researchers examine potential backbone organizations or backbone coalitions and their associated benefits as well as their tradeoffs. Some of those benefits and tradeoffs are recapped in the table by backbone organizational type.

POTENTIAL BENEFITS AND CHALLENGES OF DIFFERENT TYPES OF BACKBONES

IDENTIFIED BY A CCRC CASE STUDY

Organization Type	Potential Benefits	Potential Challenges
Community-based organization	Roots in the community	Low capacity (perceived lack of time, staff, and/or resources)
City government	History of convening diverse stakeholders	Too political
Public school system	History of convening diverse stakeholders	Too political
Postsecondary institution	Demonstrated leadership in partnering with the community	Competition between local colleges
Workforce organization	Connections to the labor market	Lack of knowledge about education sectors
Multiple organization	Distribution of responsibilities according to organizational experts	More difficult to act as a single unit

Klempin S. (Feb. 2016). Establishing the Backbone: An Underexplored Facet of Collective Impact Efforts. CCRC Research Brief, Number 60. February 2016. Retrieved: November 15, 2018. Retrieved from: https://ccrc.tc.columbia.edu/media/k2/attachments/establishing-backbone-collective-impact.pdf

While the Workforce Development Board of San Bernardino County need not act as a backbone organization for the County's workforce development ecosystem, many of the challenges articulated by stakeholders around process were related to challenges around coordinated efforts throughout the County and across sectors. As one industry stakeholder noted, "We try and create solutions ourselves and run into roadblocks at the community college level, at the state level. It's not that the County is not well-intended or does not have useful resources in place, but those efforts are not widely known or coordinated in a systematic way. So, when we have a challenge, we self-organize and try to solve for it as employers in the same industry but that doesn't work either." Backbone organizations or coalitions are solely established to solve for

these challenges and to coordinate collaborative efforts.

But, collective impact as a model is intended to mandate more than collaboration. It instead calls for the disruptive alignment of missions and activities under a shared vision among multiple (more than two) organizations, requiring departure from a binary partnership approach. The final brief in the CCRC series outlines the key, ongoing challenges facing the collective impact advocacy community the first of which is the very definition of collaboration among partners in a collective impact model. The other two challenges discussed include maintaining organizational competency in a well-coordinated system and the feasible use of data in support of collective impact work. With regard to the note on funding

made by San Bernardino stakeholders, CCRC researchers in parsing the reality of collective impact from the concept noted, "Our findings indicate that incentives and disincentives, particularly around funding, are misaligned. Two informants suggested that there is a need to create incentives so that leaders behave differently." Government organizations are encouraged to use funding streams accordingly, aligning disparate organizations for the cogeneration of shared outcomes

Apart from models directed at multisectoral partnership among ecosystem actors, there is an abundance of literature focused on articulating best practice for any one of the ecosystem actors, including individual firms and community colleges as well as community college systems.

^{11,12,13} Klempin S. (Feb. 2016). Establishing the Backbone: An Underexplored Facet of Collective Impact Efforts. CCRC Research Brief, Number 60. February 2016. Retrieved: November 15, 2018. Retrieved from: https://ccrc.tc.columbia.edu/media/k2/attachments/establishing-backbone-collective-impact.pdf

MODELS FOR INDIVIDUAL FIRMS

Models around both High Road employment practices and High-Performance Work Organizations (HPWO) provide assumptions, intervention examples, and case studies from which individual firms and government organizations as their partners can learn.

Celebrated by former President Barack Obama in his highly publicized visits to a Costco superstore and Zingerman's Deli in Ann Arbor Michigan, High Road employers are focused on current workers whose circumstances are not as directly impacted by education or training; further, many of the lowwage workers targeted by High Road policies do have postsecondary education that isn't being leveraged in the workplace. Thus, High Road employers are more concerned with compensation and working conditions as means of improving job quality; however, the High Road is not meant to be synonymous with job quality. Job quality literature is primarily focused on the working conditions of lowerwage workers whereas High Road literature is concerned with the full range of the occupational hierarchy and is broader in its approach. High

Road employment invokes issues of work quality, work intensity, working time quality, and good physical environment.

In the article, "In Search of the High Road: Meaning and Evidence," High Road employers are defined as those that pay "adequate" wages.14 While the term adequate is not meant to be synonymous with or define "familysustaining," as that phrase means too many different things to too many different audiences, it is meant to imply intentionally above the low market clearing rate for any one industry's wages. The article goes on to define High Road employment as "paying or providing a path to an adequate wage in a low-wage industry."15 The evidence and theory on High Road employment suggest both that it can be a choice the employer selects into,

as similarly situated firms may choose different optimizing scenarios, and that the establishment plays an important role in significant wage differentials even within the same four-digit NAICS codes. This literature is empowering of firms and further, of managerial policy and managers themselves which have been observed to play a key role in wage differences across the same industry. To further qualify High Road employment's definition, the term can imply different thresholds in different segments of the same industry, as different segments might represent substantially different needs for human capital and skill level.

The Hitachi Foundation's Pioneer Employers initiative focuses on identifying High Road employers in manufacturing and in healthcare who are committed to the economic

mobility of their employees.¹⁶ The case study employers profiled in both industries as part of the Hitachi initiative tend to articulate the value proposition of High Road employment in terms very similar to another model for individual firms to look to when thinking about employee economic mobility: High-Performance Work Organization (HPWO) practices. HPWO policies target increased productivity and quality of work through better organizational performance. While predominantly lowerwage industries like those profiled in this report could be thought of as ill-suited to the kind of performance gains that are the goal of HPWO policies, the term "job-crafting" has been used to describe the discretion employees have in low-wage industries with regard to both effort and creativity that when optimized have had demonstrably positive impacts on customer experiences and ultimately, sales.¹⁷ In 2015, the New York City Economic Development Corporation launched a program called Best for NYC in partnership with B Lab in order to use the B Analytics platform to equip firms with a tool for tracking the

implementation of High Road practices and the potential efficiencies that result.¹⁸ The Best for NYC program also engaged anchor institutions in similar activities. There is a large bank of best practices that pertain specifically to engaging anchor institutions in support of good business and procurement practices, one of the most famous of which is the Cleveland model.¹⁹

The ultimate conclusions on the strict profitability of High Road or HPWO employment policies are not clear; however, both of these models offer opportunities for cost savings to employers in the form of reduction of turnover, employee productivity, product quality, and improved workplace safety and inventory management among other benefits. These practices may also protect a firm against suboptimal employee performance made more likely as a result of financial volatility, which while difficult if not impossible to calculate in terms of savings or profits may translate as mitigated risk for the firm.

¹⁵ Osterman P. (2017). In Search of the High Road: Meaning and Evidence. ILR Review. Retrieved: November 15, 2018. Retrieved from: http://iwer.mit.edu/wp-content/uploads/2018/04/In-Search-of-the-High-Road.pdf

¹⁶ http://hitachifdn.nonprofitsoapbox.com/our-work/good-companies-at-work/pioneer-employers

¹⁷ Osterman P. (2017). In Search of the High Road: Meaning and Evidence. ILR Review. Retrieved: November 15, 2018. Retrieved from: http://iwer.mit.edu/wp-content/uploads/2018/04/In-Search-of-the-High-Road.pdf

¹⁸ http://bestfor.nyc/

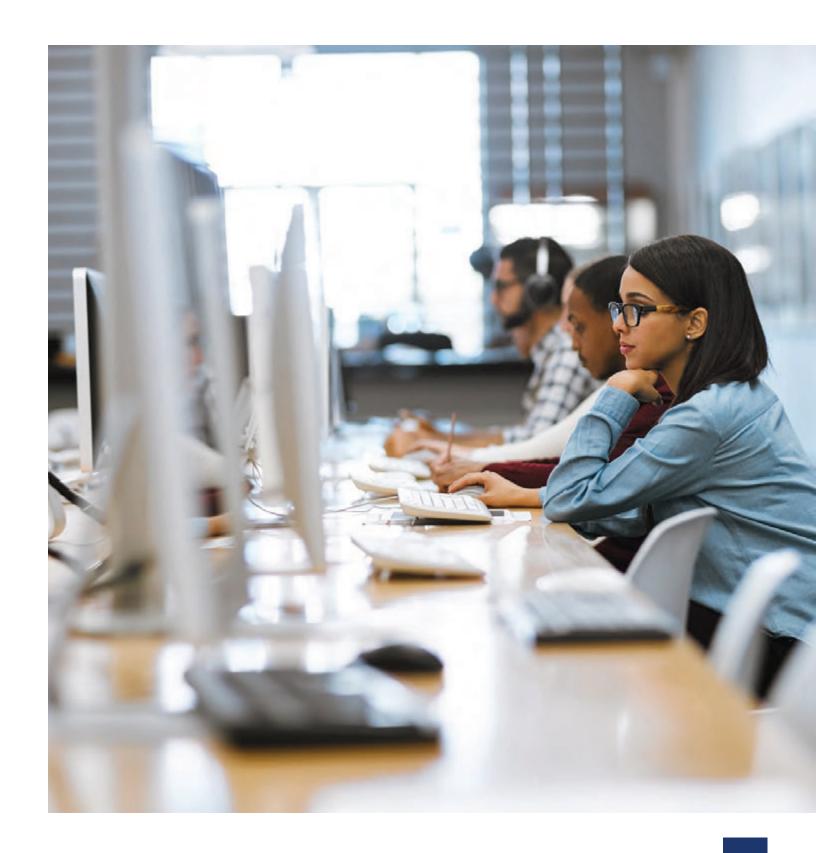
¹⁹ https://community-wealth.org/content/cleveland-model-how-evergreen-cooperatives-are-building-community-wealth

BEST PRACTICES FOR EDUCATIONAL INSTITUTIONS INCLUDING COMMUNITY COLLEGES

There is overwhelming literature on best practices for educational institutions and particularly for community colleges. Community colleges are by and large the largest training ground for the U.S. workforce both by their sheer volume of students and the range of missions any one community college often has to serve.

Community colleges serve high school graduates, the lion's share of whom seek a traditional collegiate experience either in the form of a vocational track or a transfer track. Community colleges also serve older student populations returning to school, often part-time, for intentionally focused vocational training. Finally, community colleges are the primary vehicle for continuing education credentials which are frequently designed in partnership with the local employer community. These missions serve different audiences with varying goals and, thus, their associated activities necessitate different metrics for success. This multiplicity of mission can set community college systems up for failure on multiple fronts. Indeed, the trends in noncompletion rates of students at community colleges is often regarded as a failure of the system itself when perhaps completion of a degree is a poor success metric for certain segments of the community college student population. Efforts to clearly understand the goals of a school's student populations are one guard against setting inappropriate goals and thus benchmarks for success - both for the students and the institutions.

In a chapter entitled, "The promise, performance, and policies of community colleges," two presiding principles are offered for putting in place sound policies at U.S. community colleges: "First, it is important to build a system that offers multiple options, and second the system should not track students — particularly low-income or minority students — into a narrow vocational path."20 With regard to the latter point, San Bernardino County stakeholders spoke to the systematic incentives that encourage "demographic pigeonholing" in workforce development initiatives. For example, employers connected conceptual dots between the difficulty in getting employer-informed courses approved for credit and the lack of incentive for employees to view their continued career training as continued personal education. While there are no easy solutions and there have been mixed empirical results with stackable credentials, there are risks - some of which pertain to the behavioral economic decision-making of students themselves - in framing vocational training as something substantively different from a credit-bearing education.



INSIGHT AND FEEDBACK

INSIGHT AND FEEDBACK ON SKILLS REGARDING WORKFORCE DEVELOPMENT IN SAN BERNARDINO COUNTY

Using the literature on leadership development, the Center has categorized the skills noted by San Bernardino County stakeholders into three organizational buckets: (1) Technical skills; (2) Behavioral skills; and (3) Mindset skills.²¹

Technical skills are those practices, techniques, skills, and processes required to accomplish a specified set of tasks. Behavioral skills or relational skills are those skills having to do with the management of relationships among and between people and processes. Behavioral skills are often associated with a middle management skillset. Lastly, Mindset or conceptual skills are those skills or competencies having to do with being able to see and translate into action the bigger picture(s). Mindset-related skills are ideally emblematic of executive leadership.²²

Stakeholders comprising community and faith-based organizations, educational institutions, government workers, and private employers provided feedback on which skills they perceived as most urgent in San Bernardino County.

Those challenges can be thought about in three groups:

1	2	3
Technical	Behavioral	Mindset
 Computational/mathematical skills (STEM) Technical reading and writing Mechatronic (mechanical/ electric) skills Machinist/fabrication skills 	 Conflict mediation, ethics Radical candor, honesty with upper management Safety and safety management Inter-cultural personability and communication 	 Process orientation and systems-thinking Entrepreneurial skillset Value proposition skills and marketing Problem-solving skills

Given limitations on scope, resources, and data to examine specific skill needs of specific industries in San Bernardino County in the context of this report, a sample skill in each of the above buckets is explored, leveraging the broader literature.

TECHNICAL

SKILL-MATCHING IN MANUFACTURING

As mentioned earlier in this chapter, there is a wide range of goals associated with workforce development initiatives and clarifying the specific goal for any one intervention is essential in identifying the appropriate activities and metrics for success.

Across many and varied industries there are claims of skills gaps. For certain low-wage industries, the skills gap claim is undermined by the extent to which wages have not risen in accordance with classical implications of excess skill demand. For those industries, there may not be a skills mismatch but rather a surplus of low-wage jobs in an industry that despite the upward pressure on wages which demand for a particular skillset would be expected to exert, firms don't or cannot easily raise wages given the cost inputs and dynamics of the industry and so workers select against those opportunities wherever possible. In many low-wage industries, there is also prevalent discussion of a hollowing out of middle skill jobs. Of the industries examined in this report, Transportation and Healthcare best fit that profile.

On the other side of the spectrum, the Manufacturing industry is often discussed as representative of potential opportunity for middle-skill jobs. It is also frequently invoked in the broader discourse around skills gap and skills mismatch. MIT researchers recently conducted a national survey of manufacturing employers to test assumptions around a skills gap in the industry and explore predictive characteristics associated with hiring difficulties.²⁴

Before evaluating the potential for a skills gap, it's important to consider alternative scenarios that may present as a skills gap but whose challenges are different from those of a systematic gap between workers' skills and employers' needs. A structural skills gap results from the mismatch between workers' skillsets and job openings, such that the unsuitable skills of a significant segment of the labor force results in their structural unemployment even as economic conditions improve. One limitation of the ongoing research in this space is the use of educational attainment level as proxy for skill level, both because changing educational

composition of a labor shed does not necessarily have bearing on the skills demanded by employers and because educational attainment levels "obscure skill levels within educational categories." In other words, employers don't set out to hire a college graduate above all other credentials, but a worker with a certain set of skills and credentials that imply a certain level of proficiency as it applies to that set of skills, which may or may not be a college degree in a particular field.

Scenarios that may present as a skills gap but are not reflective of a structural skills mismatch include (1) vocal and visible employers' desire for increased publicly funded training or for general subsidy; (2) lack of competitiveness resulting from external (globalization) or internal (organization of production) factors; and (3) temporary adjustment challenges due to rapid spike in demand. The rate of technological change is also a frequently cited predictor of potential skills mismatch. It is often assumed that "skills-biased technological change" (SBTC) puts at an advantage the skills related to more complex cognitive tasks as technology acts as substitute for simpler tasks, but that's not always the case. With regard to manufacturing production workers the results have been ambiguous, "with some skills becoming redundant and others seeing enhanced demand."26

The final bucket of challenges that look like structural skills mismatch but are not include challenges associated with how firms interact with the sources of labor supply including educational institutions and the public sector more broadly. The first is the challenge of communication, i.e. "employers are willing to pay more for a high-productivity set of skills, and local community colleges are willing to train in such skills, but the two sides do not communicate about their needs and constraints."²⁷ As a nod to the earlier discussion



Overall the picture that emerges is one in which what matters for the smooth operation of the labor market is the connection between the demand and supply sides of the market rather than the unilateral actions of either side. Pure regional/supply-side variables are not predictive, and either are variables related to purely internal plant practices. Rather, factors that point to the existence of multiple disaggregated establishments or that complicate the interaction between an employer and labor-supply institutions (such as unique skills demands) emerge as the most significant predictors of hiring challenges. The mechanics of labor market disaggregation, communication, and coordination may ultimately provide a more appropriate framework for thinking about labor market challenges than convention skill mismatch formulations.³²



of collective impact, many workforce development ecosystems solve for communication challenges by establishing the neutrality and authority of an intermediary. The second challenge is related to coordination, whereby "payoff to investing in a production system that utilizes higher skills depends on worker investments in human capital while the payoff to making those human capital investments depends on employer investments."28 This challenge is less relevant to employers big enough and vertically integrated enough such that they are wellpositioned to initiate that investment process themselves. Relatedly, the final challenge pertains to the general disaggregation of the manufacturing industry in the U.S. Research on U.S. manufacturing has revealed a decline by more than 40% in the average size of a manufacturing establishment and the labor market challenges associated.²⁹ The assumption made about disaggregation related to labor supply in this case is that this disaggregation of the manufacturing industry may have resulted in more limited capacity for internal training by firms and a greater reliance on external sources of skills training.

All of the scenarios described above don't equate to a structural skills mismatch but may still provide a useful framework for addressing workforce development challenges. As for the aforementioned national survey of manufacturing employers, a structural skill mismatch was observed to be much lower than other and previous findings. The upper bound of the skills gap observed in the survey data was between 16% and 25% of establishments whereas in other studies like the 2011 Deloitte study that percentage was estimated to be over 60-70%. Ultimately, the MIT study indicated that about three quarters of U.S. manufacturers don't face structural hiring challenges. A few of the more nuanced insights of the study include the observation that, on the whole, higher-level computer

demands were not predictive of hiring difficulties (as they are often assumed to be per elements of the automation narrative), but higher-level math demands were, as were extended reading skills. In that same vein and overturning aspects of the automation narrative, high-tech plants were not associated with significantly greater hiring difficulty. Also, soft skills demand broadly was not associated with hiring difficulties. After high-level reading and math skills, the most consistent and largest predictors of hiring challenges were (1) unique skills and (2) membership in an industry cluster.

These two predictors - unique skills demand and industry cluster membership - together highlight the importance of the relationships among individual establishments, other regional actors, and labor supply. The predictive nature of unique skills demand and its correlation with long-term vacancies indicated that firms are "either unwilling or unable to solve their skill challenges through internal training, even for skills that are highly specific to a particular plant."31 This may be due to limited internal capacity and resources. The predictive nature of membership in an industry cluster undermines some of the traditional assumptions made about the impacts of industry clusters. While industry clusters may provide lower transaction and search costs through the addressing of issues related to communication, innovation, and human resources among others as a collective, not all industry clusters convert on those potential benefits. When they don't, an industry cluster may behave as a disaggregated group of establishments at an efficiency lower than one large, vertically integrated firm. The challenges previously cited around communication and coordination are exacerbated when many small, disorganized establishments don't have the infrastructure individually or collectively to interact in an institutional environment on issues of skills training.

BEHAVIORAL B2C SKILLSET DEMAND

Stakeholders from San Bernardino County generally spoke to not just the general need for a relational skillset, or "soft skills" as they are generally described, but specifically to a need for customer-facing skills.

Industry stakeholders described an increasingly hollowed out market environment where technology diminished the need for their supply chains' middle men or firms and provided opportunity for direct business-to-customer interactions and transactions. One stakeholder explained the phenomenon, saying, "We're moving away from the archaic supply chain of extraction, manufacturing, distribution center, warehouse, retailer. That paradigm has evolved. Many of the manufacturers are going direct to consumer just for improved efficiency, especially with the last-mile logistics innovation that's occurring."³³

While some industry stakeholders spoke to the virtues of a marketing or sales skillset, one industry stakeholder captured well the challenge of increased customerinterfacing and the conceptual underpinning of its related skillset: "My people need to be able to not just sell or market but proposition value. They need to be able to understand and grasp the value assessment process of our customers and buyers and use that understanding in the way they articulate our value add. It's a 360 perspective they need to have."³⁴

MINDSET

ENTREPRENEURIAL COMPETENCY DEVELOPMENT

Industry stakeholders in San Bernardino County spoke to the importance of entrepreneurship. One stakeholder commented, "The County should definitely continue being supportive of the region's entrepreneurs. Even if it's in a totally different industry, that experience of having to figure it out – how to start a hair care company or a personal fitness company – makes a good worker."³⁵

Entrepreneurship, in the way that it is used by policymakers, can go ill-defined and often be confused for other phenomena, like innovation which is measured traditionally with metrics like patents and R&D funding. Entrepreneurship is also sometimes conflated with "startups," new firm starts often with a particular funding model (venture-backed, five-year return model) and touting a tech-based, on some level, service or good. On the other end of the spectrum, "big tent" entrepreneurship as branded by the Kauffman Foundation includes small businesses and the self-employed, regardless of the nature of the product or service or the funding model.³⁶ Across all of its dimensions, entrepreneurship's direct relationship to economic growth is unclear. What is clear is that the experience of entrepreneurship and the skillsets associated however ambiguous are desired by employers and useful in a myriad of business contexts. Thus, a body of work has grown around defining, measuring, and training for "entrepreneurial competencies."

Both the words "entrepreneurial" and "competency" suffer from inconsistent definitions. For the purposes of this discussion, entrepreneurship from a process perspective necessitates "an opportunity is recognized, a business concept is formulated, resources are identified and acquired, a venture is launched, adjustments are made, and the founder eventually exits. These actions must be accomplished in a context that has been characterized as ambiguous, uncertain, stressful, intense, lonely, volatile,

exhilarating, and frustrating."37 Additionally, a competency refers to "the knowledge, skills, attitudes, values, and behaviors that people need to successful perform a particular activity or task."38 Entrepreneurial competencies are importantly distinguished from standard business skills and from entrepreneurial traits often used to describe entrepreneurs as people. Competencies provide a useful framework for skills development because they directly correlate with job performance and they can be measured against a standard. That competencies by definition can be measured means they can be improved with training and are different from an individual's strengths or tendencies. Entrepreneurial competencies identified in the literature include: (1) opportunity recognition; (2) opportunity assessment; (3) risk management/mitigation; (4) conveying a compelling vision; (5) creative problem solving/ imaginativeness; (6) value creation; and (7) building and using networks, among others.39

Because entrepreneurship unlike straightforward business skills is distinguished in it's being "action-based," teaching entrepreneurial competencies might require a more interactive and simulation-oriented pedagogical approach. Entrepreneurial competencies are a good framework for thinking about the value of entrepreneurship in terms of a skillset and, further, a teachable one.

³⁶ https://www.kauffman.org/kauffman-index/reporting/~/media/60c4bff5bbc74a2181db7fd7d0dd6e64.ashx ^{37,38,39} Morris M. et al. A Competency-based Perspective on Entrepreneurship Education. Journal of Small Business Management. 2013. Retrieved on: December 1, 2018. Retrieved from: https://onlinelibrary.wiley.com/doi/epdf/10.1111/jsbm.12023

RECOMMENDATIONS

POLICY CONTEXT AND COMPETITIVE ADVANTAGE

In considering the aforementioned categories in which to think about skills demanded by employers in San Bernardino County, the County would be well-advised to further tailor any intervention both to the region and to an industry or industry cluster. Broader economic frameworks that tap into regional advantages and apply to more than one industry such that they may be used to connect and cross-pollinate cross-sectoral initiatives can be useful; green/clean energy regulation is a good example. Given the region's unique presence of regulatory actors and expertise in the application of the state's ambitious emissions goals in industries like transportation and goods movement, the firms in the region stand to benefit from developing a competitive advantage in regulation around sustainability.

San Bernardino County would not be the first to look to sustainability as a competitive advantage. The Brookings Institution, in its work on successful metro export plans, has used Portland's decision to focus on sustainability as an export following the Great Recession as a tremendously successful export plan. After the Portland Development Commission identified the abstract idea of "sustainability" as one of two targets for intensified export strategy, the City launched the "We Build Green Cities" Campaign which was a City-wide effort to market and export Portland firms' ideas, services, and products around sustainability.

⁴⁰ Adapted from The Metropolitan Revolution book by Bruce Katz and Jennifer Bradley. Story presented by the Brookings Metropolitan Policy Program. Retrieved: November 15, 2018. Retrieved from: https://medium.com/@metrorev/how-can-a-region-sell-its-strengths-in-the-global-economy-84a6b99e86a0

Sustainability and more specifically in San Bernardino County's context, green regulation, presents opportunity for skills building from a variety of vantage points and across sectors. There are numerous models nationally and internationally whereby green and clean economy business opportunities are leveraged in a workforce setting. Two are summarized below.

EMERALD CITIES COLLABORATIVE

Emerald Cities Collaborative is a national nonprofit network of organizations working together to advance a sustainable environment while creating high-road -- sustainable, just and inclusive -- economies with opportunities for all. In Los Angeles alone, one of the Emerald Cities, there are programs geared at green capacity building in small businesses (E-Contractor Academy); green career pathway creation (ACES [Architecture, Construction, Engineering Students] Pathway Program; and, an Apprenticeship Resource Guide.⁴³

SUSTAINABLE SOUTH BRONX (SSBX)

Sustainable South Bronx (SSBx) is another example of using the growing business opportunity of greener economies as a framework for skills building and workforce development. Sustainable South Bronx addresses economic and environmental issues in the South Bronx- and throughout New York Citythrough a combination of green jobs training, community greening programs, and social enterprise. SSBx targets underserved populations that suffer from higher rates of unemployment and the organization provides skills training in green construction and offers USBC, EPA Lead, and OSHA 10 certifications among others.⁴⁴

The opportunities around more environmentally sustainable business as it pertains to the core sectors of the County of San Bernardino like logistics and manufacturing are significant, particularly given California's leading position in this space. That business opportunity could be a useful foundation for cross-sectoral partnership around skills building.

⁴¹ McDearman B. and Liu A. (2012). Ten Steps to Delivering a Successful Metro Export Plan. Brookings-Rockefeller Project on State and Metropolitan Innovation, Metropolitan Policy Program, The Brookings Institution. Retrieved: November 15, 2018. Retrieved from: https://www.brookings.edu/wp-content/uploads/2016/06/export-plan-guide.pdf

⁴² http://www.webuildgreencities.com/

⁴³ http://emeraldcities.org/cities/losangeles

⁴⁴ http://www.thehopeprogram.org/how-it-works/

GLOBAL VALUE CHAIN APPROACH

The green regulatory framework may be useful context for also thinking about "global value chain" (GVC) upgrading. Duke University's Center on Globalization, Governance and Competitiveness has conducted research to better understand the role of workforce development in upgrading strategies. As a recent report explains, "the majority of current workforce tools were conceptualized prior to the widespread adoption of value chain strategies by development stakeholders."45 For example, the International Labor Organization and the U.S. Agency for International Development undertook research that replaced their previous models influenced by local clusterbased industry development approaches with GVC approaches. GVC approaches focus on industries' global relationships and how local relationships between SMEs and "lead firms" structure local access to final (global) markets. Goals of GVC approaches include entry into and dominance of increasingly global industry markets. A summary of differences between cluster-based and GVC-based approaches and their workforce implications is below.

	Cluster-Based Perspective	GVC Perspective	Workforce Implications
Trade	Trade in finished goods	Trade in "tasks" (activities) and intermediate goods	Process-based knowledge and skills rival product-based knowledge
Networks	Dense networks of local firms	Production networks "controlled" by lead firms	Increased importance of managerial learning from global sources
Participation	"Organic" participation in clusters by all firms	GVC participation requires deliberate "choice"	Knowledge of position in and trajectory of upgrading provides insight into skill requirements
Norms and Regulations	Local norms of cooperation	Compliance with international standards	Rising importance of training to comply with new product and process standards and internationally recognized certifications
Barriers to entry	Low barriers to entry for locally improved products	Commercial and product standards constitute high barriers to entry for developing country firms	Lead firms as gatekeepers to enforce skill requirements and product quality; international partnerships
Geography	Geographically concentrated production of related goods and services	Geographically dispersed production of intermediate goods and final products	Reduced access to "tacit knowledge" about industries

^{45,46} Psilos P. and Gereffi G. Workforce Development in the Global Economy: Linking Skills and Capabilities to Upgrading. Duke University. Retrieved on: December 4, 2018. Retrieved from: https://gvcc.duke.edu/wp-content/uploads/Workforce-Development-in-the-Global-Economy-Linking-Skills-and-Capabilities-Chapter-1.pdf

SUMMARY LIST OF **RECOMMENDATIONS**

1

CLARIFY THE WORKFORCE DEVELOPMENT PARADIGM(S) FOR THE COUNTY'S PORTFOLIO(S) OF INTERVENTIONS:

As discussed, workforce development can be thought about from a variety of vantage points that imply different sets of goals and activities. While the County may engage all three paradigms through different programmatic investments, it can be useful to organize programmatic portfolios around particular paradigms so that broad goals, constraints, and essential ecosystem partners are considered.

2

CONSIDER ESTABLISHING A BACKBONE ORGANIZATION OR COALITION OF ORGANIZATIONS FOR THE COORDINATION OF WORKFORCE DEVELOPMENT EFFORTS ACROSS THE COUNTY:

Backbone organizations are tasked with solving challenges around coordination and communication. They are also responsible for articulating shared goals and keeping partner organizations accountable to clearly defined metrics for success.

3

ENGAGE MANAGERIAL POLICY AND MANAGERS OF LOCAL EMPLOYERS ON HIGH ROAD EMPLOYMENT PRACTICES AND COLLABORATIVELY FURTHER EXPLORE HIGH-PERFORMANCE WORK ORGANIZATION PRACTICES:

The County can engage leaders in the local business community to improve the quality of the County's existing jobs, leveraging models like Best for NYC and anchor institution models.

4

FACILITATE A COLLABORATIVE EFFORT AMONG COMMUNITY COLLEGES TO IDENTIFY THEIR DISTINCT STUDENT POPULATIONS AND THEIR RESPECTIVE GOALS, CONNECTING THOSE POPULATIONS AMONG INSTITUTIONS.

Juggling institutional goals, partnerships, and strategy development for all three student populations discussed in the report is burdensome for any one community college; government bodies can help facilitate the sharing of that burden particularly as it applies to employer-driven curriculum development and training opportunities. This also decreases redundant outreach to the private sector.

SUMMARY LIST OF **RECOMMENDATIONS**

5

IDENTIFY POTENTIAL WAYS OF CODIFYING REGIONALLY-RELEVANT VOCATIONAL TRAINING IN THE TRADITIONAL CREDIT-BEARING EDUCATION SYSTEM.

San Bernardino County employers voiced frustration around translating their needs into credit-bearing courses in the formal education system. When vocational training lives outside of the education-to-career system, there is increased risk for demographic pigeonholing and self-selection bias.

6

FOCUS ON CHALLENGES AROUND (1) COMMUNICATING THOSE HIGH-PRODUCTIVITY SKILLS EMPLOYERS ARE WILLING TO PAY MORE FOR AND COMMUNITY COLLEGES ARE WILLING TO PIVOT TRAINING TOWARD; AND (2) COORDINATING INVESTMENTS FOR WHICH PAYOFF IS ACCEPTABLE TO EMPLOYERS AND COSTS ARE ACCEPTABLE TO TRAINING INSTITUTIONS BUT FOR WHICH THERE IS NO INITIATING INVESTOR.

In disaggregated industry clusters, communication and coordination between employers and workforce training institutions is difficult and act as barriers to mutually beneficial investments in upskilling.

7

EXPLORE NEED FOR CUSTOMER-FACING SKILLS INCLUDING SKILLS AROUND VALUE PROPOSITION.

Based on San Bernardino County stakeholders' feedback, employers in the region noted the ability to proposition value as a higher priority soft skill given the increased interaction firms are having with customers directly, as a result of technology.

8

IDENTIFY WHICH SPECIFIC ENTREPRENEURIAL COMPETENCIES ARE MOST USEFUL TO SAN BERNARDINO COUNTY'S CORE INDUSTRIES AND THEIR RESPECTIVE FIRMS.

Entrepreneurial competencies help articulate the value of entrepreneurship and entrepreneurial experiences into skills and standards which can be integrated into training. There may be industry-specific trends around entrepreneurial competencies and their respective value to the processes and dynamics of particular industries in San Bernardino County.

9

USE SUSTAINABILITY AND GREEN REGULATORY FRAMEWORKS TO EXPLORE CROSS-SECTORAL UPSKILLING INITIATIVES.

San Bernardino County given its assets, core sectors, and regulatory infrastructure is well-positioned to explore a competitive advantage in green regulatory infrastructure across its core sectors.

10

LEVERAGE GVC (GLOBAL VALUE CHAIN) APPROACHES IN DEVELOPMENT TO IDENTIFY GLOBAL MARKET OPPORTUNITIES FOR COMPETITIVENESS.

The County may consider green regulatory initiatives or any other initiatives in a GVC context which introduce a different set of priorities than those of a local industry-cluster approach to workforce development. GVC approaches focus on global market entry as well as success and factors influencing that trajectory like lead firms which often act as gatekeepers or facilitators for international trade.

PREPARED **BY**

The UC Riverside Center for Economic Forecasting and Development

The UC Riverside Center for Economic Forecasting and Development at the School of Business Administration is the first world class university forecasting center located in Inland Southern California. The Center opened its doors in October 2015 as a major initiative for economic research and collaboration in one of California's most vital growth regions. Home to a dedicated team of economists, researchers, and professionals, the Center is directed and administered by the partners and staff of Beacon Economics LLC, one of California's leading economic research firms. With many decades of experience, the Center's staff is committed to producing focused, enlightening, and usable research for Inland Southern California and beyond.

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The San Bernardino County Workforce Development Board

The San Bernardino County Workforce Development Board (WDB) is a policy-making entity empowered by the Workforce Innovation and Opportunity Act (WIOA) to educate and train local workers and support businesses. The WDB is comprised of a majority of private business owners who collaborate with leaders from various education, labor, public service, and community based organizations. The focus of this board is to ensure that the residents of San Bernardino County have the skills, training, and education to achieve their career goals, and San Bernardino County employers are able to hire, develop, and retain outstanding employees.

More information available at: http://wp.sbcounty.gov/workforce/

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The contents of this report are based on information derived from carefully selected sources we believe are reasonable. We do not guarantee its accuracy or completeness and nothing in this document shall be construed to be a representation of such a guarantee.



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