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LOCAL GOVERNMENT ISSUES IN FOCUS

The Changing Manufacturing Sector in Upstate New York: Opportunities for Growth

Executive Summary

As State and local officials focus on economic recovery, it is critically important to acknowledge the changes that have occurred in the State’s manufacturing base—particularly in areas of upstate New York (Upstate), which has been in a state of economic and demographic transformation for decades. Mirroring a nationwide trend, New York State has been losing manufacturing jobs over the past several decades. However, the remaining manufacturing base contains some bright spots that demonstrate the potential for an economic resurgence in New York.

- **Despite continued job losses, manufacturing remains an important component of the Upstate economy.** From 2000 to 2004, manufacturing declined by nearly 20 percent in Upstate New York, and by another 8 percent from 2004 to 2008—representing a loss of nearly 105,000 jobs in eight years. Despite this decline, manufacturing is still a major force in the Upstate labor market, where one in every nine employees works in a manufacturing job. These jobs account for 20 percent of private sector wages.
- **Computer and electronic product manufacturing grew, and Upstate added more high tech jobs as a result.** While most components of the manufacturing sector experienced declines, computer and electronic manufacturing industries showed improvement from 2004 to 2008, increasing employment by 9 percent. If these trends continue, computer and electronic equipment will be the number one product of Upstate New York by 2013. As of 2008, there were over 250,000 high tech industry jobs Upstate and 44 percent were in the most advanced technology areas. Overall, jobs in these advanced high-tech industries (of which computer and electronics manufacturing is a large component) have increased by over 7 percent from 2004 to 2008—adding over 7,000 jobs Upstate.
- **Growth also occurred in other leading-edge industries.** In other “leading-edge” technology areas, Upstate has also shown significant improvement—adding 6,000 jobs in information and communications from 2004 to 2008, and 1,800 jobs in life science technologies. Both of these industries carry average salaries in excess of \$70,000.
- **Upstate is well situated to seize additional high-tech employment opportunities.** New York has an excellent higher educational system, with many top engineering and scientific programs and professional program offerings. Statewide, college enrollments have increased by 16 percent from 2000 to 2008 and (as of 2008) there were 1.2 million students enrolled in degree-credit programs in New York State’s 270 colleges and universities.

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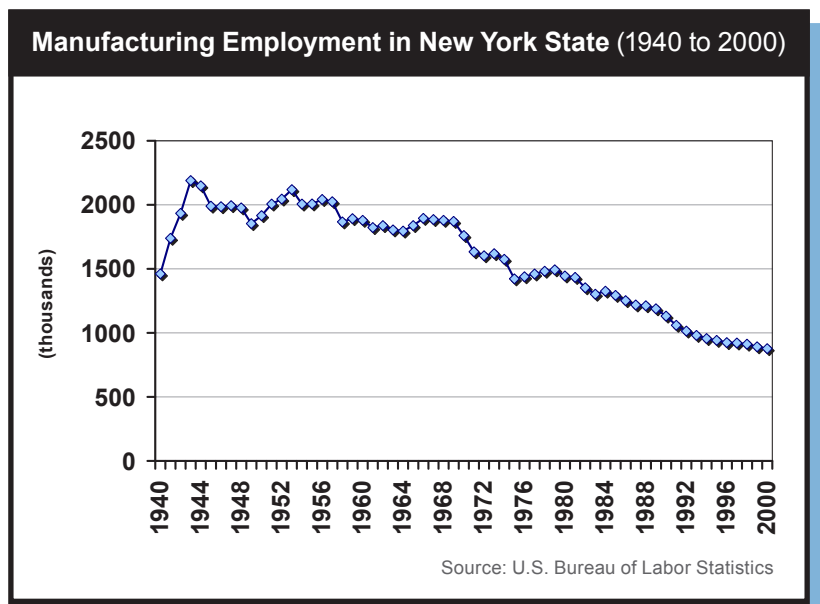
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- **Labor force changes are regionally specific, and each region faces distinctive challenges and opportunities.** Computer and electronic product manufacturing is the number one production industry for the Southern Tier and Central New York. The Finger Lakes Region has been hit hard by declines in chemical manufacturing, but has seen growth in computers and electronics. Western New York has seen significant job losses in the auto industry sector, but has seen growth in advanced high-tech employment.
 - **Other good jobs come with high tech.** As a result of growth in high-tech manufacturing, the overall occupational mix has also improved, bringing higher paying jobs to Upstate. From 2005 to 2008, Upstate’s metro areas added over 1,500 jobs in computer and mathematics occupations and nearly 7,000 jobs in architecture and engineering. These jobs require more skills and education and typically carry higher salaries.
 - **Retaining the “graduating talent” and creating a business-friendly environment continues to be a challenge.** Upstate has had difficulty retaining graduates of its programs, as many opt to leave the area in pursuit of warmer climates, greater job opportunities or an urban lifestyle. Upstate regions need to focus on the amenities and services that high-tech companies and their educated workforce seek: good schools, affordable housing, stable taxes and quality communities.

These bright spots in computer and electronic product manufacturing can only gain a firm hold and expand in New York State if all players involved in the innovation strategy; academia, government, labor, economic development groups and capital managers, can work together with the single goal of making New York State the leading state in cutting-edge manufacturing.

Introduction

The current employment picture in New York State (and the rest of the nation) presents serious challenges to policy makers. The recession has produced unprecedented job losses, and increasing unemployment in all regions of the State. Prior to these recent downward trends, New York State's employment base had already been undergoing a steady structural shift—one that continues to push the State away from production and manufacturing and into a more service-driven economy. The loss of manufacturing means that many higher-paying jobs disappear.



Manufacturing jobs were once a source of economic prosperity for New York State's residents and provided a source of financial stability for the localities that played host to large manufacturing plants. Indeed, large manufacturing corporations have been the anchor for many upstate communities—Kodak in Rochester, General Motors and the auto industry in Buffalo, General Electric in Schenectady. But as a sector, manufacturing has been significantly reduced in New York State—declining by over 60 percent since the 1940s. With the emergence of a global economy, many policy makers assume that these once plentiful and high-paying manufacturing jobs will not be returning to New York State.

However, within these negative trends lies the potential for economic revival: while the production component of manufacturing has left much of Upstate,¹ those regions that have a supply of well-educated, highly skilled workers and have invested in skilled manufacturing areas, have begun to stem the tide and retain the research, development, and more advanced manufacturing jobs of otherwise declining industries.

With its affordable housing, proximity to New York City and Boston, and excellent education systems, Upstate New York has been able to make gains in attracting high-tech industries in recent years. As a result, New York State has an opportunity to transform the Upstate industrial sector from “smokestack” production into a leading center of high-tech manufacturing. In some areas, such as Rochester and the Capital Region, this appears to be already occurring.

This report focuses on the occupational and industrial shifts that have occurred in Upstate New York in recent years, provides a detailed analysis of these changes in the manufacturing sector and highlights areas and pockets of opportunity for developing the State's workforce in order to capitalize on these industrial changes. Though final data is unavailable to measure the impact of any 2009 job losses on this sector, it appears that Upstate is still poised for a resurgence in high-tech manufacturing (see page 18 for additional detail on the *potential* impact of the 2009 data).

How Has the Manufacturing Base Shifted in Upstate New York?

From 2000 to 2008, the manufacturing sector of Upstate New York lost nearly 105,000 jobs. The decline was more rapid in the first half of the period—declining by nearly 20 percent from 2000 to 2004—compared to the latter half of the period, where manufacturing declined by 8 percent.

Upstate employment has declined since 2000 for virtually all types of manufacturing. Because the various sectors have changed at different rates, the industrial mix within the manufacturing sector has shifted significantly. The most notable shifting occurred within the top six employment subsectors. Computer and electronic product manufacturing moved from third to second in terms of employment, supplanting fabricated metal manufacturing, which fell from second to third. Food manufacturing moved up in rank while chemical manufacturing and transportation equipment manufacturing declined in rank. The top six employment subsectors account for 61 percent of Upstate New York's total manufacturing employment.

If employment in the computer and machinery manufacturing sectors continues to change at the 2004 to 2008 rate, by 2013 computer and electronic manufacturing will be the number one manufacturing industry in Upstate New York.

Machinery manufacturing, which is the most prominent type of manufacturing in Upstate New York, declined by 26 percent from 2000 to 2004, but has shown signs of stabilizing in recent years—declining only slightly from 2004 to 2008 (-0.4%). Despite losing over 14,000 jobs since 2000, machinery manufacturing remained the number one manufacturing subsector. Computer and electronic product manufacturing declined by 21 percent from 2000 to 2004, but has shown signs of recovery in recent years—increasing

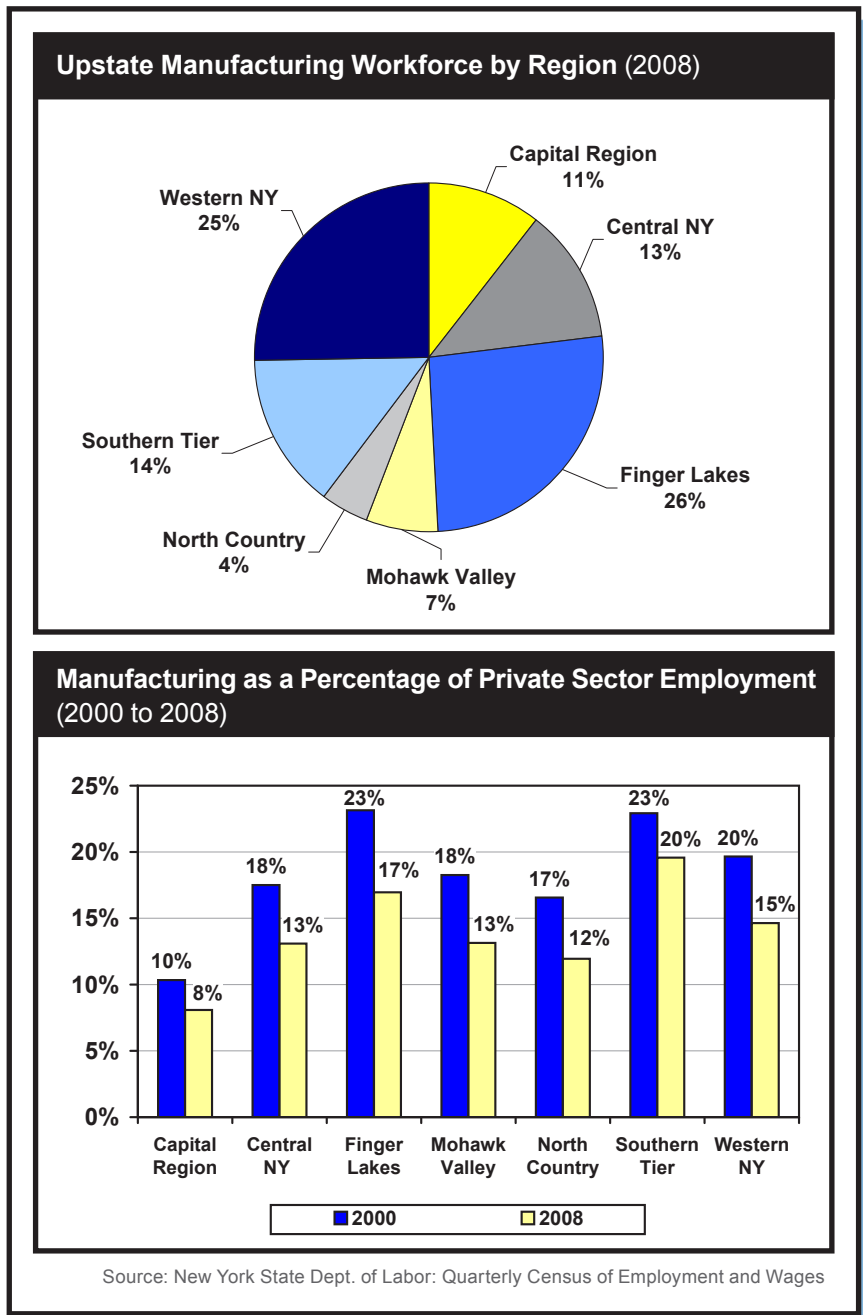
Title	Employment						Employment Change				Annual Wage
	2000	2004	2008	Share of Mfg. Workforce 2008	Rank 2000	Rank 2008	Change 2000 to 2004	Change 2004 to 2008	% Change 2000 to 2004	% Change 2004 to 2008	2008
Total, All Industries	2,675,725	2,634,878	2,668,555				-40,847	33,677	-1.5%	1.3%	\$39,398
Total, All Private	2,164,793	2,104,121	2,129,110				-60,672	24,989	-2.8%	1.2%	\$38,430
Manufacturing	402,880	323,618	297,904				-79,262	-25,714	-19.7%	-7.9%	\$54,568
Machinery Manufacturing	54,278	40,015	39,871	13.4%	1	1	-14,263	-144	-26.3%	-0.4%	\$63,533
Computer and Electronic Product Mfg	41,823	32,917	35,831	12.0%	3	2	-8,906	2,914	-21.3%	8.9%	\$65,894
Fabricated Metal Product Mfg	41,981	35,038	34,241	11.5%	2	3	-6,943	-797	-16.5%	-2.3%	\$47,908
Food Manufacturing	28,097	26,302	24,439	8.2%	6	4	-1,795	-1,863	-6.4%	-7.1%	\$42,487
Chemical Manufacturing	40,826	32,067	23,438	7.9%	4	5	-8,759	-8,629	-21.5%	-26.9%	\$73,213
Transportation Equipment Mfg	36,255	29,459	22,615	7.6%	5	6	-6,796	-6,844	-18.7%	-23.2%	\$61,447
Miscellaneous Manufacturing	21,436	16,253	17,380	5.8%	7	7	-5,183	1,127	-24.2%	6.9%	\$55,008
Plastics & Rubber Products Mfg	20,919	17,647	15,982	5.4%	8	8	-3,272	-1,665	-15.6%	-9.4%	\$43,798
Printing and Related Support Activities	17,237	15,981	13,405	4.5%	9	9	-1,256	-2,576	-7.3%	-16.1%	\$39,649
Paper Manufacturing	16,963	13,528	12,399	4.2%	10	10	-3,435	-1,129	-20.2%	-8.3%	\$51,328
Nonmetallic Mineral Product Mfg	16,874	12,793	11,900	4.0%	11	11	-4,081	-893	-24.2%	-7.0%	\$51,799
Primary Metal Manufacturing	13,696	10,327	10,208	3.4%	12	12	-3,369	-119	-24.6%	-1.2%	\$60,027
Electrical Equipment and Appliances	12,980	10,473	9,092	3.1%	13	13	-2,507	-1,381	-19.3%	-13.2%	\$51,221
Furniture and Related Product Mfg	12,188	9,658	7,987	2.7%	14	14	-2,530	-1,671	-20.8%	-17.3%	\$37,604
Wood Product Manufacturing	7,855	6,678	5,690	1.9%	15	15	-1,177	-988	-15.0%	-14.8%	\$33,637
Beverage & Tobacco Product Mfg	3,221	4,454	4,314	1.4%	18	16	1,233	-140	38.3%	-3.1%	\$44,111
Apparel Manufacturing	4,721	3,119	2,404	0.8%	16	17	-1,602	-715	-33.9%	-22.9%	\$35,812
Textile Product Mills	2,761	2,276	1,978	0.7%	19	18	-485	-298	-17.6%	-13.1%	\$33,369
Textile Mills	3,285	2,204	1,671	0.6%	17	19	-1,081	-533	-32.9%	-24.2%	\$42,052
Petroleum & Coal Products Mfg	2,435	1,160	1,199	0.4%	20	20	-1,275	39	-52.4%	3.4%	\$55,035
Leather and Allied Products Mfg	1,269	907	778	0.3%	21	21	-362	-129	-28.5%	-14.2%	\$39,043

Source: New York State Department of Labor, Quarterly Census of Employment and Wages

by 9 percent from 2004 to 2008. Computer manufacturing therefore increased from the third largest subsector in 2000 to the second largest in 2008. If employment in the manufacturing subsectors continues to change at this same rate, computers and electronics manufacturing will be the number one subsector (in terms of employment) for Upstate New York. This subsector also tends to be one of the higher paying industries with an average salary of \$66,000, second only to chemical manufacturing.

The fabricated metals subsector slipped from second largest in 2000 to third in 2008. However, as with machinery manufacturing, the rate of decline has markedly decreased from 2004 to 2008. Fabricated metal is the number one manufacturing industry for Western New York and the Mohawk Valley Region, and among the top five in most of the other Upstate regions.

Employment declined at a rapid rate in the chemical manufacturing and transportation equipment manufacturing subsectors from 2000 to 2008. In the case of chemical manufacturing, Upstate New York lost over 17,000 jobs. The Finger Lakes Region was most severely affected by this industrial decline and lost over 14,000 jobs in chemical manufacturing from 2000 to 2008—a decline of 60 percent. Most of this decrease can be attributed to the continued downsizing that occurred within Eastman Kodak and caused chemical manufacturing to slip from the largest manufacturing sector in the Finger Lakes Region to the second largest. This industrial shift has had a significant impact on the region—in 1980, Eastman Kodak employed approximately 60,000 workers in the Finger Lakes Region, while as of 2009, it employed roughly 7,000. This is especially bad news for the Finger Lakes Region because these jobs are typically among the highest paying within the manufacturing sector.

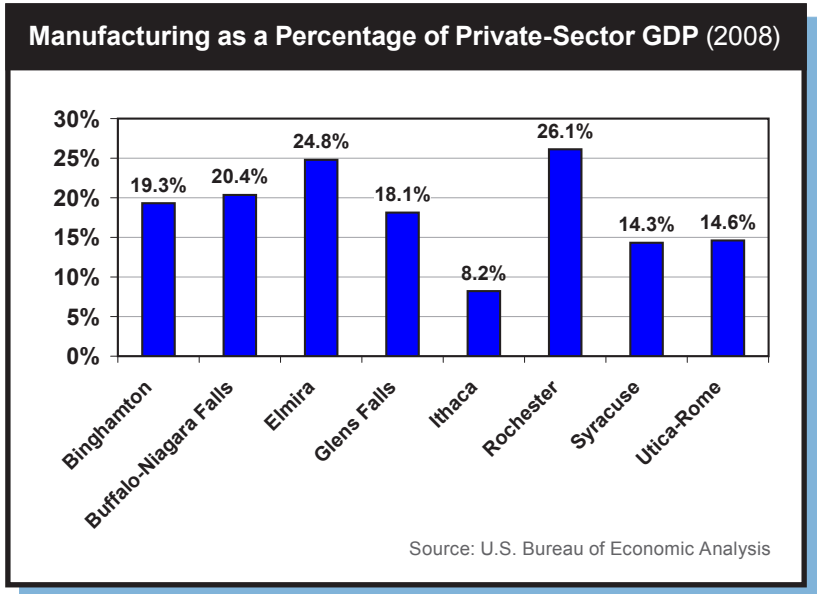


The Important Role of Manufacturing in the Upstate New York Economy

Despite persistent job losses, manufacturing continues to be an important component of the Upstate economy. These jobs provide significantly better salaries than many of those in the non-manufacturing sectors.

In terms of total wages, manufacturing is still the number one sector Upstate. The manufacturing sector makes up 14 percent of the private sector workforce (and 11 percent of the total workforce), yet the manufacturing sector provides nearly 20 percent of the total wages in the private sector. With an average annual wage of nearly \$55,000 (compared to \$37,000 for jobs outside of manufacturing), manufacturing jobs are in higher paying occupations and employment in manufacturing still means better pay for most workers.

The largest portion of the Upstate manufacturing workforce is located in the Finger Lakes (26 percent) and in Western New York (25 percent). Other concentrations exist in the Southern Tier (14 percent) and Central New York (13 percent).



Although declining Upstate, manufacturing is still the number one employment sector within the Southern Tier and the Finger Lakes regions and the second largest industry for employment in Western New York, where one out of every seven private sector employees works in a manufacturing job. Manufacturing accounts for 20 percent of the Southern Tier private sector workforce and 17 percent of Finger Lakes private sector employment.

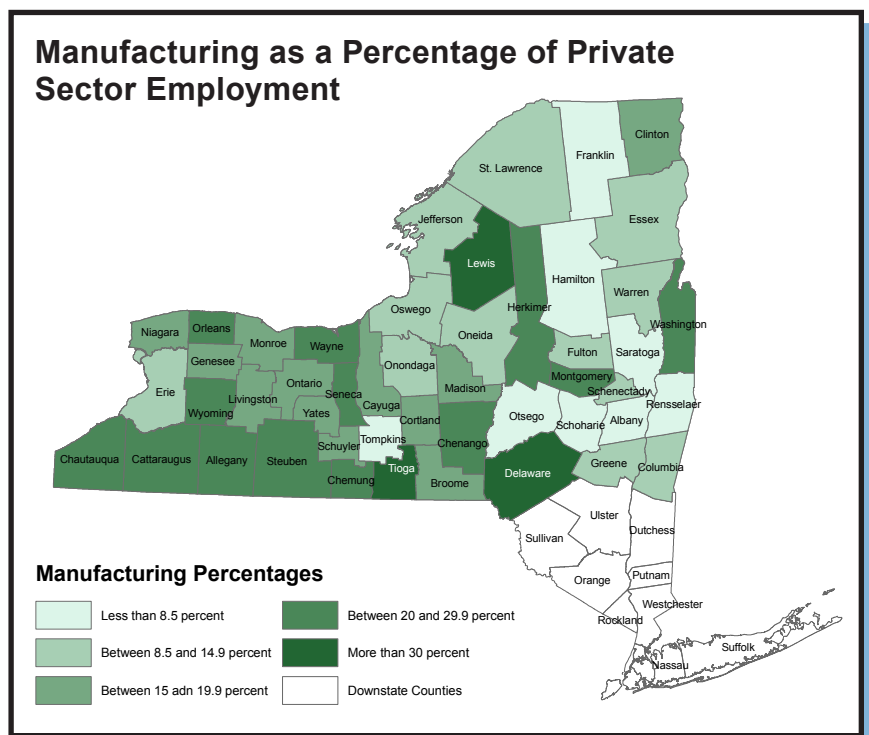
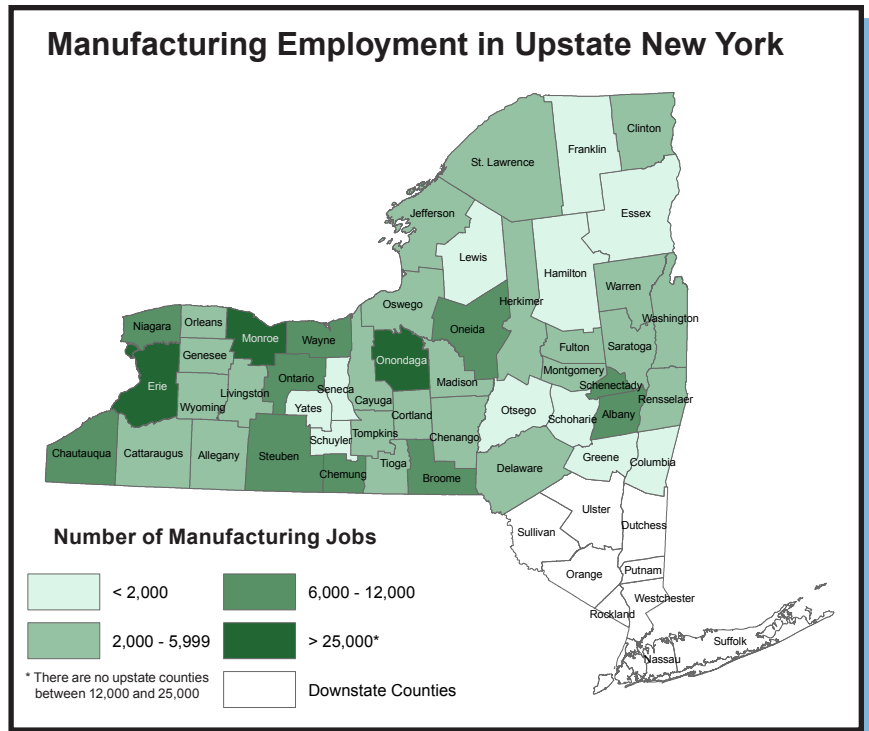
Manufacturing also remains a leading contributor to the State's GDP.² In Rochester, 26 percent of the GDP is derived from the manufacturing industry, and all Upstate metro areas (with the exception of Ithaca) derive more than 14 percent of GDP from the manufacturing industry.

Manufacturing by Region: What Gets Made Where?

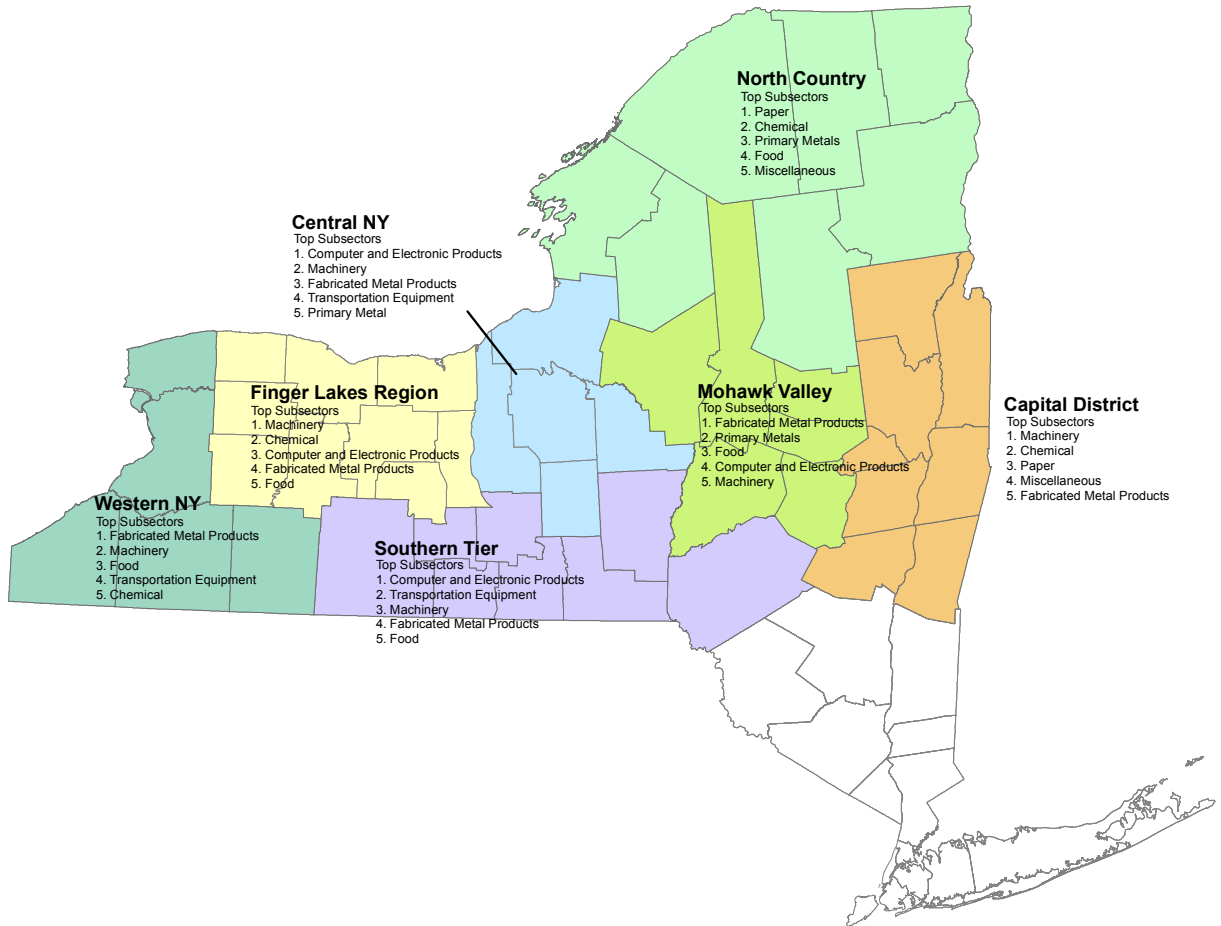
The geographic distribution of manufacturing employment continues to show the highest concentrations in the more populous urban counties. However, manufacturing jobs are also somewhat dispersed—with 13 of the 48 upstate counties having more than 6,000 manufacturing jobs.

While the urban counties have more manufacturing jobs overall, their rural counterparts rely more heavily on manufacturing as a source of employment. There were 16 Upstate counties for which more than 20 percent of the private sector jobs are in manufacturing. Many of these manufacturing-reliant counties are in the Southern Tier and the Finger Lakes regions. Manufacturing wages in these counties account for a significant portion of private sector wages—ranging from 26 percent to as much as 72 percent of private sector wages.

The concentration of manufacturing jobs varies by region, and so too does the type of manufacturing. The Upstate New York workforce is specialized regionally.



Upstate New York Manufacturing Subsectors



Source: New York State Department of Labor

Finger Lakes

The largest numbers of manufacturing jobs are located in the Finger Lakes Region, where machinery manufacturing is the most prominent type of manufacturing job. Machinery employment has declined by approximately 11 percent since 2004, while the computer and electronics industry has grown. Jobs in this subsector have increased by 17 percent since 2004. While this growth represents a positive development for the region, much of it can be attributed to defense contract manufacturing of radios and batteries. As such, future growth may depend on continued defense spending.

Western New York

With over 75,000 manufacturing jobs in 2008, Western New York is the second largest region in terms of manufacturing employment. As with the Finger Lakes Region, the manufacturing industry there has also declined by over 11 percent since 2004, losing another 9,000 jobs. In Western New York, however, the decrease has been largely driven by declines in the auto industry. As a result, transportation equipment manufacturing declined by 44 percent since 2004. On the positive side, the region has experienced some growth in machinery manufacturing.

Southern Tier

This is the only labor market region to experience a gain in manufacturing employment since 2004, with the number one product being computers and electronics. Computer production accounts for approximately one-third of the manufacturing employment in the region, and the industry has grown by nearly 12 percent since 2004. Transportation equipment and machinery manufacturing have also increased employment in recent years, while employment in metal production and food production has declined.

Central New York

Manufacturing declined by 4 percent in this region since 2004. Computer manufacturing increased by almost 13 percent, but the increase was offset by declines in other areas, namely machinery and auto manufacturing.

Capital Region

Manufacturing declined by 3 percent since 2004. However, the overall decline was offset by increases in three other areas: machinery, chemical manufacturing and fabricated metals. These jobs carry an average salary of over \$72,000 (nearly \$82,000 for machinery and chemical manufacturing and \$53,000 for fabricated metal manufacturing), indicating that the employment increases are in the high-tech components of the manufacturing industry. The increased investment in the nanotechnology industry in the City of Albany and the construction of the Malta Technology Park, which have each brought more advanced manufacturing employment to the Capital Region, are recent examples of this trend.

Finger Lakes			
Percentage Of Upstate Manufacturing Jobs = 26.0%			
Manufacturing as a Percentage of Private Sector = 16.9%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	77,498	-11.2%	\$57,609
Top Five Subsectors			
Machinery	15,122	-10.6%	\$68,558
Chemical	9,711	-44.4%	\$76,861
Computer and Electronic Products	9,218	16.9%	\$68,862
Fabricated Metal Products	9,075	2.4%	\$45,588
Food	5,793	-3.8%	\$41,427

Western New York			
Percentage Of Upstate Manufacturing Jobs = 25.4%			
Manufacturing as a Percentage of Private Sector = 14.6%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	75,653	-11.1%	\$54,152
Top Five Subsectors			
Fabricated Metal Products	12,442	0.2%	\$51,523
Machinery	9,374	15.3%	\$56,061
Food	8,830	-11.8%	\$46,929
Transportation Equipment	6,632	-44.4%	\$80,246
Chemical	5,364	-9.7%	\$73,779

Southern Tier			
Percentage Of Upstate Manufacturing Jobs = 14.4%			
Manufacturing as a Percentage of Private Sector = 19.6%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	43,038	1.8%	\$54,894
Top Five Subsectors			
Computer and Electronic Products	13,788	11.6%	\$70,107
Transportation Equipment	5,503	18.4%	\$51,364
Machinery	4,629	10.4%	\$53,394
Fabricated Metal Products	3,093	-5.0%	\$43,066
Food	2,522	-11.9%	\$41,001

Central Region			
Percentage Of Upstate Manufacturing Jobs = 12.6%			
Manufacturing as a Percentage of Private Sector = 13.1%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	37,461	-4.3%	\$56,416
Top Five Subsectors			
Computer and Electronic Products	5,651	12.8%	\$69,613
Machinery	4,473	-11.4%	\$61,215
Fabricated Metal Product	3,843	-2.3%	\$47,194
Transportation Equipment	3,335	-14.9%	\$64,753
Primary Metal	3,087	4.8%	\$59,874

Capital Region			
Percentage Of Upstate Manufacturing Jobs = 10.6%			
Manufacturing as a Percentage of Private Sector = 8.1%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	31,483	-2.9%	\$57,348
Top Five Subsectors			
Machinery	4,657	14.1%	\$81,790
Chemical	3,193	10.1%	\$81,838
Paper	3,166	-3.6%	\$59,098
Miscellaneous	2,979	-4.5%	\$42,921
Fabricated Metal Products	2,579	4.7%	\$53,454

Mohawk Valley			
Percentage Of Upstate Manufacturing Jobs = 6.6%			
Manufacturing as a Percentage of Private Sector = 13.2%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	19,667	-12.6%	\$39,889
Top Five Subsectors			
Fabricated Metal Products	2,672	-24.9%	\$40,416
Primary Metals	2,393	6.8%	\$54,264
Food	2,247	16.6%	\$38,391
Computer and Electronic Products	1,607	-18.0%	\$39,909
Machinery	1,420	1.8%	\$42,780

North Country Region			
Percentage Of Upstate Manufacturing Jobs = 4.4%			
Manufacturing as a Percentage of Private Sector = 12.0%			
	Emp 2008	Ch 2004-08	Avg Sal. 2008
Manufacturing	13,104	-11.6%	\$47,991
Top Five Subsectors			
Paper	2,443	-3.7%	\$52,389
Chemical	1,767	-20.8%	\$57,164
Primary Metals	1,573	-12.9%	\$74,022
Food	1,252	-12.6%	\$37,497
Miscellaneous	918	28.4%	\$35,544

Source: Quarterly Census of Employment and Wages, New York State Department of Labor

Note: In 2008 the Labor Department modified the labor market regions. Three upstate regions were affected by this change. The Mohawk Valley Region lost Madison County, but gained Otsego County. The Southern Tier lost Otsego County, and the Central New York Region gained Madison County.

Assessing Upstate New York's Growth in High-Tech Manufacturing

While the manufacturing workforce has steadily declined, the manufacturing components that have remained in Upstate New York have tended to be more highly technical and higher paying. In a study of skill-upgrading within the manufacturing workforce, researchers at the Federal Reserve Bank found that virtually all manufacturing industries have become higher-skilled industries.³ For some industries, this occurred through a decrease in the number of lower-skilled workers, and for other industries, this occurred through the addition of higher-skilled jobs. Researchers also noted that every region of the United States has undergone skill upgrading—even in areas where manufacturing job losses have been significant.

Unlike the traditional machinery and metal production industries, employment in high-tech production industries requires significant investment in education. For example, if we compare the occupational mix of the machinery subsector to that of the computer subsector, we find that many of the typical occupations held by individuals in the computer manufacturing sector require less on-the-job training, but more formal education beyond high school. To qualify for these jobs, candidates typically must possess a minimum of a bachelor's degree in engineering or mathematics. As a result, the level of pay associated with these jobs tends to be much higher.

Even within the machinery production subsector, some areas of growth (such as that in the Capital Region) have brought jobs that are higher skilled and therefore carry significantly higher salaries.

Top Occupations for the Machinery and Computer Manufacturing Sectors in Upstate New York			
Machinery Manufacturing	Percentage of Industry	Median Wage	Training/Education/Experience Required
Team Assemblers	9.8%	\$23,710	Moderate-Term, On-the-job Training
Machinists	5.9%	\$37,690	Long-Term, On-the-job Training
Welders, Cutters, Solderers and Brazers	4.2%	\$35,750	Long-Term, On-the-job Training
Mechanical Engineers	3.6%	\$74,540	Bachelor's Degree
First-Line Supervisors/Managers of Production	3.1%	\$54,780	Work Experience in Related Field
Inspectors, Testers, Sorters, Samplers and Weighers	2.7%	\$32,610	Moderate-Term, On-the-job Training
Computer-Controlled Machine Tool Operators	2.3%	\$33,060	Moderate-Term, On-the-job Training
Bookkeeping, Accounting and Auditing Clerks	2.0%	\$36,710	Moderate-Term, On-the-job Training
Tool and Die Makers	1.9%	\$48,080	Long-Term, On-the-job Training

Computer Manufacturing	Percentage of Industry	Median Wage	Training/Education/Experience Required
Electrical and Electronic Equipment Assemblers	11.4%	\$28,110	Short-Term, On-the-job Training
Team Assemblers	5.2%	\$23,710	Moderate-Term, On-the-job Training
Computer Software Engineers	4.2%	\$97,130	Bachelor's Degree
Electrical Engineers	4.2%	\$83,120	Bachelor's Degree
Inspectors, Testers, Sorters, Samplers and Weighers	3.5%	\$32,610	Moderate-Term, On-the-job Training
Electronics Engineers	3.0%	\$89,950	Bachelor's Degree
Electro-mechanical Equipment Assemblers	2.9%	\$29,060	Short-Term, On-the-job Training
Industrial Engineers	2.9%	\$75,860	Bachelor's Degree
Accountants and Auditors	2.2%	\$72,010	Bachelor's Degree
Electrical and Electronic Engineering Technicians	2.2%	\$55,980	Associate's Degree

Source: New York State Department of Labor, Staffing Patterns and Employment Prospects Program

In order to attract and retain high-tech production firms, a region must possess an employment base that can attract or create highly skilled workers. High-tech firms who have established themselves in Upstate New York cannot grow if they are unable to find qualified individuals to work in their establishments. This is where New York State has a competitive advantage: Upstate New York has some of the best colleges and universities for these expanding high-tech fields.

New York is well situated to seize employment opportunities for engineering, scientific and professional program graduates. College enrollments have soared: from 2000 to 2008, undergraduate and graduate enrollment increased by 16 percent, while enrollment in first professional degree programs increased by nearly 18 percent. As of 2008, there were 1.2 million students enrolled in degree-credit programs in New York State’s 270 colleges and universities.⁴ There are over 180,000 students enrolled in four-year SUNY university centers and colleges, and another 30,000 students enrolled in engineering and technical programs in independent four-year colleges and universities. Clearly, New York State is heavily involved in the production of college graduates and can provide skilled workers.

High-Tech Employment

In order to assess the extent to which high-tech jobs have increased in Upstate New York, we need a working definition of high-technology employment. For this analysis, we used a framework that was developed by economists at the U.S. Department of Labor.⁵ According to this framework, high technology industries are those that “devote a high proportion of expenditures on research and development and employ a high proportion of scientific, technical and engineering personnel.”

Researchers focused on the types of occupations that exist within each industry, and calculated the proportion of high-tech occupations that are present within each industry. They considered an industry to be high-tech if the proportion of high-tech occupations was at least twice the 4.9 percent average for all industries. Thus, any industry that has at least 9.8 percent of its employees in high-tech occupations was classified as a high-tech industry.

Summary of High-Technology Industry Levels		
High-Tech Industry Level	Percentage of Employment in High Tech Occupations	Sample Industries Included
1	24.7% or More	Semiconductor and other electronic component manufacturing Pharmaceutical and medicine manufacturing Computer systems design and related services Scientific research and development services
2	14.7% to 24.7%	Manufacturing and reproducing magnetic and optical media Basic chemical manufacturing Oil and gas extraction Management, scientific and technical consulting services
3	9.8% to 14.7%	Wired telecommunications carriers Satellite telecommunications Management of companies and enterprises Paint, coating and adhesive manufacturing

Using this method, 46 industries were classified as high-tech, and these 46 industries were then further divided into levels based on the proportion of high-tech occupations present. Level one industries are those with the highest concentration of high-tech employment. For these industries, high tech occupations represent 24.7 percent or more of total employment. The proportion of high-tech occupations in level two industries ranges from 14.8 percent to 24.7 percent, and for the level three high-tech industries, the proportion ranges from 9.8 percent to 14.8 percent. The analysis that follows represents our examination of Upstate New York’s workforce utilizing this framework.⁶

Across all levels of high-tech employment, there were over 250,000 jobs in high-tech industries in 2008. This represents nearly 12 percent of the Upstate private sector workforce, indicating that high-tech industries are an important part of the Upstate economy.

Focusing on level one industries (the most technically intense industries and those with the highest average salaries), there were over 102,000 jobs in 2004, and by 2008, there were nearly 110,000 jobs—a net increase of over 7,000 jobs. In the high-tech industry groups at levels two and three, there was a net loss of 5,700 jobs Upstate, but most of this loss can be attributed to the Finger Lakes Region, where the downsizing of Eastman Kodak has negatively affected the Region’s employment mix. If we were to exclude the Finger Lakes Region, the rest of Upstate New York added another 2,600 jobs in level two and three high technology industries combined.

Within the three intensity levels, Upstate added 12,460 jobs from 2004 to 2008. However, much of this increase was offset by declines that totaled 10,825. As a result, the Upstate Region experienced a net increase in high-tech industry employment of 1,600 jobs. Again, because the Finger Lakes Region accounts for the bulk of the decline, it is clear that, on a region-by-region basis, high-tech industry employment has been growing. Even in the Finger Lakes Region, New York has managed to hold on to the most intense high-tech industries—the level one industries in the Finger Lake declined by less than 1 percent, much of which is linked to a single large employer (Eastman Kodak).

Upstate Employment in High-Tech Industries by Level and Region (2004 to 2008)				
	Employment		Change	
	2004	2008	% Change	Difference
Level 1				
Capital District	21,042	22,660	7.7%	1,618
Central NY	14,403	15,480	7.5%	1,077
Finger Lakes	19,722	19,570	-0.8%	-152
Mohawk Valley	5,276	5,255	-0.4%	-21
North Country	3,195	2,643	-17.3%	-552
Southern Tier	20,192	23,112	14.5%	2,920
Western NY	18,467	20,926	13.3%	2,459
Level 1 Total	102,297	109,646	7.2%	7,349
Level 2				
Capital District	7,789	8,760	12.5%	971
Central NY	7,722	7,549	-2.2%	-173
Finger Lakes	17,712	16,140	-8.9%	-1,572
Mohawk Valley	2,388	2,254	-5.6%	-134
North Country	1,530	1,345	-12.1%	-185
Southern Tier	3,239	3,229	-0.3%	-10
Western NY	12,643	11,950	-5.5%	-693
Level 2 Total	53,023	51,227	-3.4%	-1,796
Level 3				
Capital District	14,422	15,881	10.1%	1,459
Central NY	8,955	8,977	0.2%	22
Finger Lakes	35,431	28,703	-19.0%	-6,728
Mohawk Valley	3,447	2,842	-17.6%	-605
North Country	1,807	2,050	13.4%	243
Southern Tier	7,873	7,889	0.2%	16
Western NY	21,626	23,301	7.7%	1,675
Level 3 Total	93,561	89,643	-4.2%	-3,918
All Levels				
Capital District	43,253	47,301	9.4%	4,048
Central NY	31,080	32,006	3.0%	926
Finger Lakes	72,865	64,413	-11.6%	-8,452
Mohawk Valley	11,111	10,351	-6.8%	-760
North Country	6,532	6,038	-7.6%	-494
Southern Tier	31,304	34,230	9.3%	2,926
Western NY	52,736	56,177	6.5%	3,441
All Levels Total	248,881	250,516	0.7%	1,635

For the Capital Region, over 4,000 jobs were added in high-tech industries and 1,600 were in the level one group. As a result of growth at all three levels, employment increased by 9.4 percent in these high-tech areas. The Southern Tier added nearly 3,000 high-tech jobs, almost all of which were in level one industries. Even Western New York—the region impacted most heavily by manufacturing decline—has seen growth in high-tech industry employment of almost 7 percent, adding over 3,400 jobs since 2004.

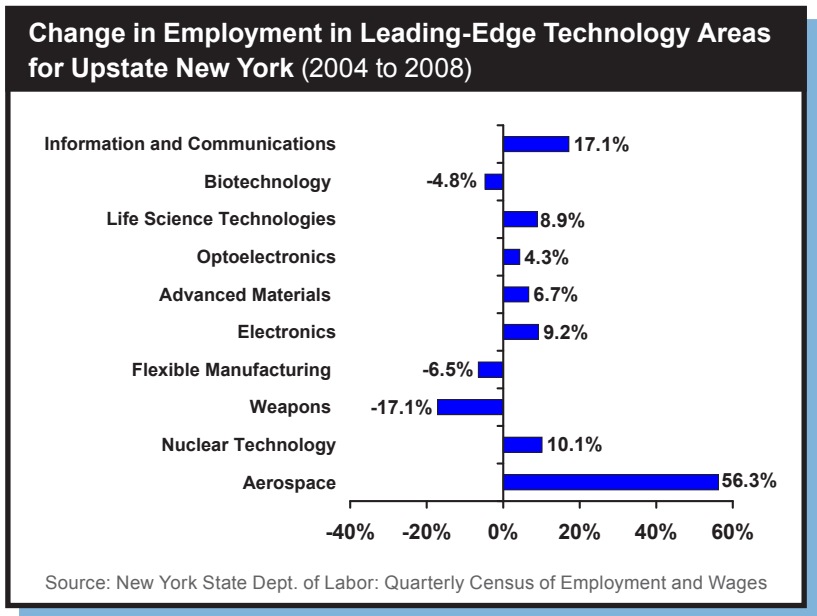
The Finger Lakes, North Country, and Mohawk Valley have experienced overall declines in high-tech industry employment, with the Finger Lakes Region accounting for the largest piece of this loss, declining by 8,400 jobs since 2004.

It is clear that the manufacturing workforce mix is continuing to evolve, and that growth is occurring in the more technically advanced subsectors of the manufacturing industry, as well as in other scientific and computer-based industries. These industries will be the likely candidates to fill the “manufacturing gap” in future decades.

Leading-Edge Technology Areas

Another method for examining high-tech employment is to focus on industries using a product-based approach: for example, determining which industries produce optoelectronics (semiconductors and other electronic components). For this analysis, we examined changes in the Upstate workforce based on industries that manufacture products in 10 “new or leading-edge technology areas.”⁷

With a few exceptions, these industries have all increased their employment in Upstate New York from 2004 to 2008. Information and communications is the largest of the ten leading-edge production areas, with over 42,000 jobs Upstate. This area has also grown significantly from 2004 to 2008 and has added over 6,000 jobs to the Upstate workforce. Like most high technology employment, these jobs carry a highly competitive salary which averages nearly \$74,000 annually.



Employment in the area of life science technologies—jobs which carry an average salary of \$71,000—increased by 1,800 jobs. While weapons manufacturing and flexible product manufacturing (industrial machinery manufacturing) have declined in recent years, these industries make up a much smaller share of the workforce.

Biotechnology, which decreased by nearly 5 percent overall, actually increased by 25 percent in the Southern Tier Region—adding over 800 jobs. The Capital Region also added nearly 300 more biotechnology jobs and Western New York increased slightly. The Finger Lakes region was responsible for the largest portion of the decline in the biotech industry’s employment Upstate, and lost over 1,500 biotech jobs representing a 60 percent decline.

	2008 Employment	Salary
Information and Comm.	42,106	\$73,777
Biotechnology	26,823	\$66,203
Life Science Technologies	22,135	\$71,328
Optoelectronics	15,011	\$58,321
Advanced Materials	11,731	\$49,781
Electronics	11,612	\$49,879
Flexible Manufacturing	9,325	\$55,759
Weapons	4,707	\$51,540
Nuclear Technology	3,532	\$57,461
Aerospace	2,419	\$47,923

In terms of both employment in high-tech industries and employment in leading-edge technology areas, Upstate has shown job growth. As expected, much of the growth has been regionally specific. In some cases, the overall improvement has been offset by declines that have occurred in specific areas—namely the Finger Lakes Region. Thus, most regions Upstate have experienced net gains in high technology employment—even in the face of rapid declines in other manufacturing industries.

These changing industrial patterns are also changing the occupational mix of the Upstate workforce. From 2005 to 2008, metro areas located Upstate added over 19,000 jobs. While production occupations have declined, Upstate added over 1,500 jobs in computer and mathematical occupations, and nearly 7,000 jobs in architecture and engineering. Additionally, Upstate added nearly 10,000 healthcare practitioners—indicating the strong investment of Upstate in healthcare and other technical fields.

Conclusion

Despite significant declines in manufacturing in Upstate New York, there is evidence that the sector is transforming itself, with some of the changes indicating the emergence of a high-tech economy in pockets around the State.

The ability of the State to attract and retain these kinds of employers is critical for the economic prosperity of Upstate. First, every job gained brings 1.3 people to the area.⁸ The effect on population change is substantial because workers often bring family members along with them. This pattern is critical for Upstate to stem the population losses it has suffered over the last several decades. Second, there is also a multiplier effect for high-tech jobs. In a study commissioned by the Empire State Development Corporation (ESDC), researchers found that each innovation economy job can be expected to generate an additional 3.5 jobs.⁹ These jobs tend to fuel economic growth as a result of their reliance on a broader supporting network of suppliers, partners, and customers.

For Upstate to compete effectively in the global manufacturing marketplace, and expand these pockets of strength, a host of challenges must be overcome:

- Upstate communities must be attractive places to locate and grow high-tech businesses. Many already offer close proximity to major urban centers, major recreational areas, and high-quality public schools, colleges and universities. But there are gaps in the transportation system. Housing costs are reasonable, but property taxes are high. Upstate communities need to focus on the amenities and services that high-tech companies and their educated employees seek.
- New York must retain its skilled workforce. The SUNY 2010 strategic plan reported that, while 43 percent of start-up entrepreneurs created firms within the state where they received their college degree, only half as many of New York State's graduates choose to establish their new firms in New York.¹⁰ To address the goal of keeping the “start-ups” in New York State, the report suggests strategies to strengthen linkages between entrepreneurs and professors, provide incentives for starting new companies in New York, and create a pipeline for the streamlined development of ideas. These approaches could prove to be effective for building New York's new industries from within and help lead to greater retention of graduates.

The bright spots highlighted in this report make it clear that many Upstate regions have begun this transformation. Indeed, the research suggests that a “grow our own” strategy may be one of the most effective approaches to spurring high-tech industrialization Upstate. The businesses that are leading this growth are already located here; their employees and families have ties in our communities; and they are already benefiting from Upstate's competitive advantage in specific areas. The key to maintaining and expanding the presence of these businesses may well be to provide attractive communities, a more business-friendly environment and additional capital investment in companies that are already committed to New York.

It is critical that State and local policy makers focus precious economic investments in those areas that can help drive this transformation. The unique needs of each region demand tailored, targeted policies—especially in a time when funds are limited. Policy makers must focus on the high-tech industry potential of each region, and support initiatives that foster high-technology development and innovation.

At the same time, local businesses and business development organizations must work with academia and the local entrepreneur to create an environment whereby these businesses, these bright spots, can succeed. Through such a coordinated effort, Upstate New York has an opportunity to compete in a technology age.

Appendix

Occupational Mix of Upstate New York Metropolitan Areas (2005 to 2008)

	Employment				Employment Change		Wages
	2005	2008	Rank in 2005	Rank in 2008	Change	% Change	Median Annual Salary (2008)
Office and Administrative Support	386,280	395,540	1	1	9,260	2.4%	\$29,000
Sales and Related Occupations	224,910	213,250	2	2	-11,660	-5.2%	\$22,440
Education, Training, and Library	177,210	174,950	3	3	-2,260	-1.3%	\$42,610
Food Preparation and Serving Related	159,360	168,450	5	4	9,090	5.7%	\$17,860
Production	166,400	151,350	4	5	-15,050	-9.0%	\$29,420
Healthcare Practitioners and Technical	114,020	123,570	7	6	9,550	8.4%	\$51,580
Transportation and Material Moving	125,210	117,540	6	7	-7,670	-6.1%	\$26,570
Management	86,020	87,730	8	8	1,710	2.0%	\$82,890
Installation, Maintenance, and Repair	85,920	85,640	9	9	-280	-0.3%	\$36,600
Business and Financial Operations	78,830	85,320	11	10	6,490	8.2%	\$54,670
Construction and Extraction	84,690	83,690	10	11	-1,000	-1.2%	\$38,300
Building and Grounds Cleaning and Maintenance	69,950	72,690	12	12	2,740	3.9%	\$22,470
Healthcare Support	64,470	71,520	13	13	7,050	10.9%	\$24,970
Protective Service	48,530	47,820	14	14	-710	-1.5%	\$46,870
Architecture and Engineering	38,230	44,860	17	15	6,630	17.3%	\$61,500
Computer and Mathematical	43,110	44,670	15	16	1,560	3.6%	\$60,230
Personal Care and Service	43,100	40,770	16	17	-2,330	-5.4%	\$19,980
Community and Social Services	31,670	36,010	18	18	4,340	13.7%	\$38,930
Arts, Design, Entertainment, Sports, and Media	24,870	24,970	19	19	100	0.4%	\$37,090
Life, Physical, and Social Science	21,430	23,560	20	20	2,130	9.9%	\$51,910
Legal	17,380	16,440	21	21	-940	-5.4%	\$74,985
Farming, Fishing, and Forestry	3,210	1,850	22	22	-1,360	-42.4%	\$21,710
All Occupations	2,152,050	2,171,370			19,320	0.9%	\$31,860

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics

Note: Employment counts are a summation for the Upstate MSAs. Only MSAs with data available for both years were included in occupational totals. OES data does not include self-employed workers.

Industrial Mix of the Upstate New York Workforce (2000 to 2008)

	Employment					Employment Change		Wages	
	2000	2008	% of Wkfce	Rank 2000	Rank 2008	Change	% Change	Annual Wage 2008	% Ch in Wage (inflation adjst)
Total, All Industries	2,675,725	2,668,555	--			-7,170	-0.3%	\$39,398	1.0%
Total, All Private	2,164,793	2,129,110	79.8%			-35,683	-1.6%	\$38,430	1.0%
Health Care and Social Assistance	325,429	363,687	13.6%	3	1	38,258	11.8%	\$36,013	8.5%
Retail Trade	321,989	316,298	11.9%	4	3	-5,691	-1.8%	\$23,366	2.4%
Manufacturing	402,880	297,904	11.2%	1	4	-104,976	-26.1%	\$54,568	0.7%
Accommodation and Food Services	188,082	196,529	7.4%	5	5	8,447	4.5%	\$14,248	1.4%
Administrative and Waste Services	118,033	118,684	4.4%	7	7	651	0.6%	\$29,167	10.9%
Professional and Technical Services	106,994	117,581	4.4%	8	8	10,587	9.9%	\$57,800	3.7%
Finance and Insurance	95,799	98,979	3.7%	9	9	3,180	3.3%	\$56,521	8.3%
Construction	95,157	98,878	3.7%	10	10	3,721	3.9%	\$46,697	5.4%
Educational Services*	56,772	91,648	3.4%	15	11	34,876	61.4%	\$43,338	5.1%
Other Services	89,815	90,516	3.4%	12	12	701	0.8%	\$23,557	2.5%
Wholesale Trade	93,529	87,895	3.3%	11	13	-5,634	-6.0%	\$52,312	4.5%
Transportation and Warehousing	62,931	64,771	2.4%	13	14	1,840	2.9%	\$35,881	-0.9%
Information	58,736	45,878	1.7%	14	15	-12,858	-21.9%	\$50,179	-3.5%
Management of Companies/Ent	34,537	39,088	1.5%	17	17	4,551	13.2%	\$72,615	-8.0%
Arts, Entertainment, and Recreation	30,730	35,125	1.3%	18	18	4,395	14.3%	\$22,974	-5.6%
Real Estate and Rental and Leasing	29,791	30,589	1.1%	19	19	798	2.7%	\$30,873	2.3%
Agric. Forestry, Fishing & Hunting	15,287	16,247	0.6%	21	20	960	6.3%	\$26,653	7.3%
Utilities	16,333	12,679	0.5%	20	21	-3,654	-22.4%	\$92,708	12.1%
Mining	3,298	4,310	0.2%	22	22	1,012	30.7%	\$55,754	16.3%
Unclassified	1,409	1,830	0.1%	23	23	421	29.9%	\$22,522	4.2%
Public Sector									
Federal Government	39,253	39,825	1.5%	16	16	572	1.5%	\$54,813	7.5%
State Government	144,399	144,243	5.4%	6	6	-156	-0.1%	\$50,465	-4.8%
Local Government	327,280	355,377	13.3%	2	2	28,097	8.6%	\$38,978	3.7%

Source: New York State Department of Labor, Quarterly Census of Employment and Wages

* Data missing for one region in 2000

Endnotes

- ¹ For the analysis in this report, the term Upstate refers to the regions north of New York City and the Hudson Valley regions (48 counties).
- ² GDP is a measure of production. It measures the market value of goods and services produced by labor and property in a geographic region.
- ³ Dietz, R and Orr, J. *A Leaner, More Highly Skilled U.S. Manufacturing Workforce*, Current Issues in Economics and Finance. Federal Reserve Bank of New York, March 2006.
- ⁴ New York State Education Department, Office of Higher Education. *College and University Preliminary Degree-Credit Enrollment*. November 2008.
- ⁵ Daniel E. Hecker, *High Technology Employment: A NAICS-based Update*, Monthly Labor Review, US Bureau of Labor Statistics, July 2005.
- ⁶ Data were provided in summary form by level and region for the 46 industry codes defined as high-tech as a special tabulation by the New York State Department of Labor. Confidentiality rules prohibited data from being provided at the 4-digit industry code level.
- ⁷ For this analysis, we used the industry codes provided by Hecker, which are based on a list generated by the Census Bureau. See the previously cited article for a description of these industry codes.
- ⁸ Based on an OSC county-level regression analysis, controlling for upstate/downstate location. Richard Dietz also noted a positive and statistically significant relationship between employment growth and in-migration rates on a state-by-state basis. *Upstate New York at a Glance: A Brain Drain or an Insufficient Brain Gain*. Federal Reserve Bank of New York, Buffalo Branch. August 2007.
- ⁹ Delivering on the Promise of New York State: A Strategy for Economic Growth and Revitalization. A Report prepared for the Empire State Development Corporation. ATKearney: Author. (2007)
- ¹⁰ The State University of New York. *Strategic Plan 2010 and Beyond*.

2009 Update



Just prior to publication of this report, preliminary 2009 data became available. Because of the potential impact of the recession on labor market changes, the preliminary data were evaluated to determine the extent to which any findings in this report might change.

Preliminary numbers indicate that from 2008 to 2009 Upstate lost over 72,000 private sector jobs and nearly 32,000 of these jobs were in the manufacturing sector, bringing Upstate's total manufacturing loss to 136,642 jobs since 2000. Most of the gains that have been made in computer and electronic product manufacturing have been eroded, but employment in this subsector remains above the 2004 level and the decline was less severe compared to other sectors. The relative importance of manufacturing subsectors remains the same.

Computer and Mathematical occupations showed additional improvement into 2009, while some of the growth in architectural and engineering jobs has also eroded. Despite the reduction, there were still nearly 4,000 more architects/engineers in 2009 compared to 2005.

In leading edge technology areas, significant growth occurred from 2004 to 2008 in the areas of information and communications, as well as life science technologies. Both areas experienced slight declines into 2009 but remain well above their 2004 levels. In the most advanced high-tech employment industries, some of the gains have been offset, but in 2009 there were still 3,900 more of these high-tech jobs than in 2004.

In summary, the preliminary 2009 data suggests that while some of Upstate's gains have been affected by the recession, many subsectors have shown resiliency and the important direction toward high-tech manufacturing and high skill jobs has been sustained.



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