WORKFORCE DEVELOPMENT INSTITUTE

SUFFOLK COUNTY INDUSTRIAL DEVELOPMENT AGENCY

Driving Long Island's Innovation Economy:

The Pharmaceutical/Nutraceutical Growth Factor

June 2019

A Joint Report in Partnership from the Suffolk County Industrial Development Agency and Workforce Development Institute

ABOUT THE SUFFOLK COUNTY INDUSTRIAL DEVELOPMENT AGENCY

The mission of the Suffolk County Industrial Development Agency (IDA) is to promote economic development in the county by helping businesses expand and grow, increase employment opportunities and add to the quality of life for the residents of Suffolk County. The Suffolk IDA works to achieve this mission by offering tax incentives and access to other financial and critical business resources and by providing thought leadership and technical assistance opportunities that leverage lasting and meaningful economic growth. As the lead agency attracting new investment in Suffolk County, the IDA is driving the region's innovation economy and job expansion efforts. Carrying out the work of the Suffolk County IDA is a team of experienced, highly skilled economic development professionals. They focus on attracting new business, supporting the expansion of existing industry, and mobilizing local and regional assets supporting regional long-term growth and economic development. To learn more about the Suffolk IDA, visit www.SuffolkIDA.org

ABOUT THE WORKFORCE DEVELOPMENT INSTITUTE

The Workforce Development Institute (WDI) is a statewide nonprofit that works to grow and keep good jobs in New York State. We use a range of tools—including ground-level information, workforce expertise, and funding—to facilitate projects that build skills and strengthen employers' ability to hire and promote workers. Our work, funded and supported by the New York State Senate, often fills gaps not covered by other organizations and is accomplished through partnerships and collaborations with businesses, unions, other non-profits, educational institutions, and government.

WDI helps to grow and keep industry and its jobs with workforce development and support. Our Regional Directors are in the field meeting with companies and scanning the workforce landscape for shifts and opportunities. These trends are shared with and analyzed on the state level in our Albany offices. Our workforce development initiatives respond to regional needs, identify growing sectors and provide resources and grant funding to remove barriers to employment and industry growth.

COUNTY OF SUFFOLK

OFFICE OF THE COUNTY EXECUTIVE

Steven Bellone
COUNTY EXECUTIVE

The life-sciences sector, including Pharmaceutical/Nutraceutical, has been a part of the Long Island economy for over five decades. So much so that the Regional Economic Development Council identified life sciences as the sector with the greatest potential for growth on Long Island. In the last ten to fifteen years, we've seen exponential growth in this sector to the point that it has become a driving force in the region's innovation economy and globalization. The manufacturing component of pharma and nutra is Long Island's largest manufacturing subsector, and with an estimated 9,833 employees, its importance to the region's economic strength is paramount.

In order for pharmaceutical manufacturing to maintain this steady growth, it is incumbent upon business and government leaders to work together to provide the resources necessary to support the sector's continued expansion. This includes educating and training a highly skilled workforce, investing in infrastructure, providing life-style choices and regional transportation access and establishing strategic industry connections that extend beyond the region.

Over the past several years, in an effort to better understand the needs of the life-sciences sector in Suffolk County and the region, my administration, in partnership with the Suffolk County IDA, has brought together senior executives from the major life sciences companies in the region. Together, we conducted round-table discussions focusing on the most pressing industry challenges today and preparing for the future. Most important, we convened these round-tables to listen and learn.

This white paper discusses the resources needed to best support the life-sciences sector and helps define the industry on Long Island by providing insights into its employment, history and recent growth. By examining our current assets and challenges, we are able to develop a clear picture of what a thriving life-sciences ecosystem should look like and set a path forward to help ensure we achieve that goal.

The county's Connect Long Island Economic Development Plan, a public/private collaboration, is another initiative that supports the long-term growth of the life-sciences sector. Connect Long Island targets regional transportation, housing and quality of life issues that are critical for sustainable economic growth and the attraction and retention of a diversified labor pool. You can find more information on the Connect Long Island plan on the Suffolk IDA website at www.suffolkida.org.

As our innovation economy grows, we must evolve and adapt to its changing needs. Creating opportunities for companies to grow and succeed in Suffolk County, creating jobs and a stronger economy, is our commitment to the residents and businesses of our county. The possibilities are boundless. I invite you to join us in this exciting journey into an ever brighter tomorrow.

Sincerely,

Steven Bellone
Suffolk County Executive

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Executive Summary

The days of Long Island having a dominant anchor industry such as aerospace and Northrop Grumman are likely over. In their place, a new regional identity has been forming, much of it out of view. The region's workforce and economic development ecosystem must help nurture a diverse array of promising sectors in order to create a more robust and resilient economic climate that offers quality opportunities for a spectrum of careers.

Although its presence here dates back over 50 years, Long Island's Pharmaceutical/Nutraceutical sector has largely flown under the radar, never gaining much fanfare or awareness for the role it plays in the region's larger economy. Without a concerted effort or strategic planning to foster its growth, and absent a Grumman-like behemoth to drive the sector, Pharmaceutical/Nutraceutical has nonetheless grown into a critical component of Long Island's economy.

- With an estimated 9,336 employees, Suffolk County's Pharmaceutical/Nutraceutical manufacturing sector employs more people than any other manufacturing sector in any other county throughout New York State.
- Since 2013, Long Island's Pharmaceutical/ Nutraceutical manufacturing sector has employed more people than the Pharmaceutical/Nutraceutical sector for the rest of New York State combined.
- While employment within manufacturing as a whole has decreased on Long Island over the past several decades (as it has across the country), Pharmaceutical/Nutraceutical manufacturing employment has grown by an estimated 64 percent on Long Island since 2004.

Interested in learning more about the nature of this growth, the Suffolk County Industrial Development Agency (SCIDA) and Suffolk County Executive Steven Bellone convened a roundtable of industry executives in March 2016 to hear first-hand about the opportunities and challenges for this sector on Long Island. While quality of life;

world-class educational institutions; proximity to New York City; and a strong, legacy manufacturing workforce all ranked high as regional assets for the industry, one of the recurring themes of the meeting was the trouble that industry executives faced in attracting and retaining qualified workers. The IDA and County Executive followed this meeting with another in November 2016. This second meeting surrounded the companies with representatives of the region's workforce development institutions in an effort to enrich the relationships and collaboration between the two.

SCIDA knew it would need to gather in-depth, first-hand information from Long Island's Pharmaceutical/Nutraceutical manufacturers. Gathering this type of information requires workforce expertise, extensive regional contacts, and an entrepreneurial spirit. SCIDA reached out to the Long Island Regional Office of the Workforce Development Institute (WDI) to get familiar with Long Island's Pharmaceutical/Nutraceutical companies first-hand and gain meaningful, practical ground-level information to position SCIDA and WDI to provide the support the sector needs.

WDI began working closely with the SCIDA to organize listening tours with area pharma and nutra manufacturers. The WDI-led team met with human resource and operations directors at twelve companies and conducted in-depth interviews focused on learning the industry needs according to the companies driving industry growth and innovation. From these discussions, WDI and SCIDA integrated labor market and economic data to identify the trends, strengths and vulnerabilities defining the sector's existence on Long Island. WDI and SCIDA also

identified elements of successful Pharmaceutical/Nutraceutical eco-systems from other areas around the globe.

Considering occupational composition, contributions to the local economy, compatibility with regional resources and industry-specified needs, the exploration of this sector was structured to answer these questions:

- What is the scope and makeup of the region's Pharmaceutical/Nutraceutical manufacturing sector?
- Is the Pharmaceutical/Nutraceutical Sector a "good flt" for us in terms of investment?
- Do we have the infrastructure, ecosystem (supply chain) and human capital to fuel its growth?
- Do the Pharmaceutical/Nutraceutical companies on Long Island offer the type of industry and broader economic beneflts that help Long Island communities grow?

There is an urgency to this inquiry. Technology and the related global economy have fanned competition among states and neighboring regions. While the sector has enjoyed remarkable growth over the past several years, past performance is no predictor of future success. These forces demand a proactive approach to tactical retention and acquisition of industries and businesses. Long Island's Pharmaceutical/ Nutraceutical manufacturing sector will have to address and overcome several challenges to reach its full potential here:

- Attraction and retention of qualifled workers was identifled by every company interviewed for this report as their greatest challenge. This echoes what industry observers hear from many manufacturing sectors nationwide.
- Vacancy rates for appropriate industrial buildings are at or near historic lows. Companies looking to relocate to or expand on Long Island face an extremely competitive market for limited stock.
- Many of these companies are expanding. Ensuring the region is positioned to facilitate and draw expansion on Long Island needs to be a priority.
- Companies are at a turning point where ownership in a large

sector is changing hands—often to new owners that are not located on Long Island. Mitigating ffiight risk requires intentional and collaborative work among business, education, government and community stakeholders.

- Competitor states are close and aggressive with their approach to lure Long Island's Pharmaceutical/ Nutraceutical manufacturers away.
- The funding support for economic development is regional and industry focused. To best leverage this resource, the industry needs to more effectively communicate its needs so the economic development community knows where to invest.

Other regions around the country and world where Pharmaceutical/Nutraceutical has flourished offer a few lessons for Long Island, including having an industry-led advisory group and a strategic plan for nurturing growth within the sector. Long Island has all the ingredients needed to foster the continued success of this sector. It is up to the industry, economic development community and government to come together in strategic and productive ways in order to make sure it happens.

Getting to Know Long Island's Pharmaceutical/Nutraceutical MFG Sector

"The US biopharmaceutical industry is a robust and vibrant component of the nation's economy, with a varied occupational base and extensive supply chain that yields significant impacts."[1]

Open a medicine cabinet in a typical home and you're likely to find Pharmaceutical/Nutraceutical products manufactured on Long Island by Long Islanders. These include facial creams, digestive aids, nutritional supplements, ophthalmology aids, immune-mediated disease treatments, hormonal products, steroids, antibiotics and scores of others. Some of these products belong to recognizable national brands headquartered in Nassau and Suffolk counties. Others are manufactured on Long Island and branded for pharmacies, national convenient store chains and other outlets.

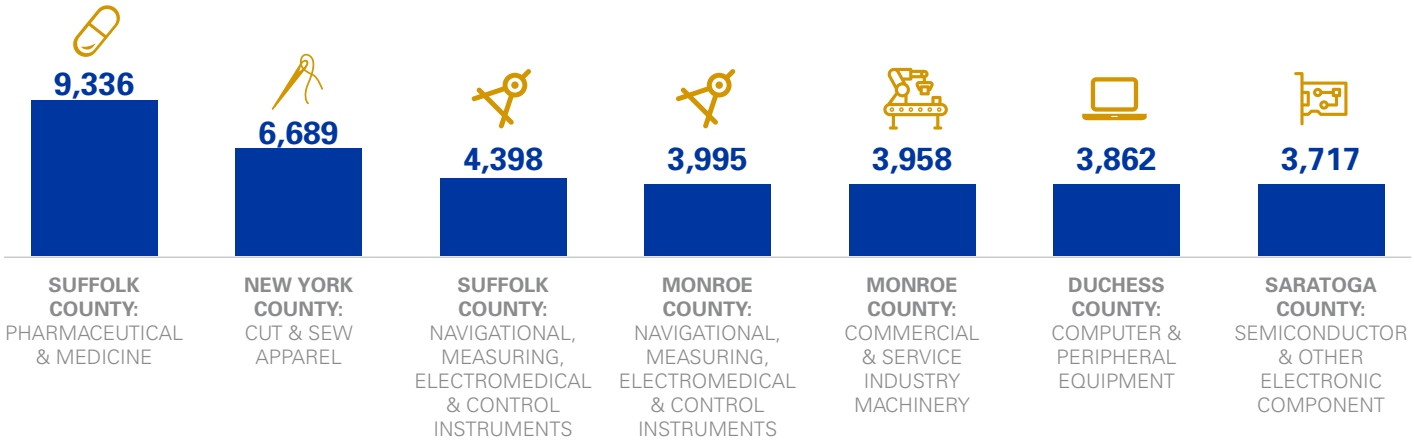
Pharmaceutical/Nutraceutical is the single largest manufacturing sector on Long Island (measured in both number of employees and payroll). The roughly 150 Long Island companies that make up the Pharmaceutical/Nutraceutical sector employ an estimated 9,833 workers in Nassau and Suffolk County.[3]

In fact, Suffolk County Pharmaceutical/Nutraceutical manufacturing boasts more employees than any other county's manufacturing sector in New York State. The sector's companies provide good jobs—including a high concentration using STEM[4] skills—to employees at every level of educational attainment, from high school to the doctoral level. In 2016, the sector generated over $500 million in payroll, placing it among the top of all tradable sections on the Island.

PHARMA/NUTRA MFG COMPANIES BY SUB-SECTOR Source: Dun & Bradstreet data by NAICS code (September 2018)	NASSAU COUNTY	SUFFOLK COUNTY
BIOLOGICAL PRODUCT (except Diagnostic) MANUFACTURING	5	5
MEDICINAL AND BOTANICAL MANUFACTURING	9	13
PHARMACEUTICAL PREPARATION MANUFACTURING	49	76

[1] Teconomy Partners & PhRMA, May 2016.
[2] Dun & Bradstreet, 2018.
[3] US Census, LEHD, 2017.
[4] STEM: science, technology, engineering, and math.

NYS COUNTY MFG SECTORS WITH HIGHEST EMPLOYMENT
US Census QWI; Q2 2017



Pharmaceutical/Nutraceutical manufacturers are innovating and entering new markets. And they are partnering with world-class research facilities such as the Feinstein Institute, Cold Spring Harbor Laboratory, Stony Brook University, and Brookhaven National Laboratory among others. The region's other sectors offer no shortage of connections and support to others doing early stage research which connects downstream to pharmaceutical MFG companies. Over the past decade and a half, Long Island Pharmaceutical/Nutraceutical companies have been growing their workforce, revenue, and physical footprint in Nassau and Suffolk counties. In short, they are driving workforce and economic growth for manufacturing on Long Island.

And yet, paradoxically, Pharmaceutical/Nutraceutical manufacturers suffer from a lack of understanding on the part of the general public and a weak integration with the region's educational and workforce institutions. As a result, the sector lacks a collaborative

ENZO BIOCHEM

Founded: 1976; Initial public offering in 1980, Enzo is the first biotechnology company to "go public"; Enzo's founder currently serves as the company's President and Chief Executive Officer.

Employees on Long Island: 328

Products: Products in areas ranging from bone disorders, diabetes, HIV infection, gastroenterology, and more.

Workforce Plans: Company plans on remaining "workforce neutral" in order to maintain competitiveness in the market; Executives estimate 10% growth in workforce over the next one to three years.

Challenges: Enzo sees transportation and affordable housing as areas where Long Island can improve services in order to connect workers with the sector's job opportunities.

"Keeping the current workforce up to date with skills and evolving technology requires ongoing investment. In addition, we find ourselves spending a lot of time orienting new hires to a manufacturing environment, which is significantly different from the research environment in the classroom."

strategic vision and struggles to communicate its short- and long- term needs to regional partners who could provide meaningful support. For Long Island to keep these Pharmaceutical/Nutraceutical companies in the region and for these companies to keep growing, they need help.

The purpose of this report is to raise awareness of this industry's significance, its history, its potential, and its needs among both the industry's businesses and Long Island's regional partners. In addition, this report is also intended to raise awareness among Long Island's general public about the quality job opportunities and meaningful economic impact Pharmaceutical/ Nutraceutical manufacturers have on Long Island.

The findings and insights contained in this report come directly from industry representatives. Their input is combined with broader regional field-level intelligence and labor market data to provide context and deepen understanding. This unique combination of ground-level information and labor market data represents a potent way to introduce the industry to its regional neighbors, to plan for the sector's future workforce, and to create intentional partnerships and pipelines that enable the full lifespan of Pharmaceutical/ Nutraceutical manufacturers to thrive and grow on Long Island.

DEFINING THE SECTOR

AMNEAL PHARMACEUTICAL

Founded: 2002; Opened facilities on Long Island in 2008

Employees on Long Island: 930

Products: Oral solids, softgels, high potency, hormonal, controlled substances as well as research and development

Common Job Titles: operators, quality & document control, scientists, engineers

Workforce Plans: Projecting to hire roughly 80 workers over the next one to three years.

Challenges: Availability of an appropriately skilled, local labor pool. While they continue to include Long Island in their recruiting and hiring efforts, for certain jobs they have begun to extend their reach into New York City. To find the right STEM skillsets, they have begun transporting workers from Brooklyn to fill open jobs.

"Amneal is in a growth mode, we are constantly innovating. As a result, the jobs are not static. As our product line evolves so does the work we do. Employees are hands on from bench scientists to production workers. We need people who are flexible"

What exactly is the Pharmaceutical/Nutraceutical manufacturing sector? For the purposes of this report, this sector is defined using the North American Industry Classification System (NAICS) hierarchy, specifically category 3254-pharmaceutical and medicine manufacturing. The 2017 NAICS Handbook defines pharmaceutical and medicine manufacturing as follows:

> *This industry comprises establishments primarily engaged in one or more of the following: (1) manufacturing biological and medicinal products; (2) processing (i.e., grading, grinding, and milling) botanical drugs and herbs; (3) isolating active medicinal principals from botanical drugs and herbs; and (4) manufacturing pharmaceutical products intended for internal and external consumption in such forms as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions.*[5]

Within pharmaceutical and medicine manufacturing exist the following sub-categories:

325411: MEDICAL & BOTANICAL MANUFACTURING
Example Long Island Companies:
Bio-Botanica, Country Life, Nature's Bounty

325412: PHARMACEUTICAL PREPARATION MANUFACTURING
Example Long Island Companies:
A & Z Pharmaceutical, Amneal Pharmaceuticals, Contract Pharmacal, Enzo Life Sciences, Novartis (formerly Fougera), Natural Organics, Nature's Bounty, Saptalis Pharmaceuticals, Sciegen Pharmaceuticals, Topiderm

325413 In-Vitro Diagnostic Substance Manufacturing
Example Long Island Companies:
Chembio Diagnostic Systems, Inc.

325414: Biological product (except diagnostic) manufacturing
Example Long Island Companies:
Nanoprobes

The category of pharmaceutical and medicine manufacturing lives

[5] From NAICS Handbook: Pharmaceutical and Medicine Manufacturing; https://www.census.gov/eos/www/naics/2017NAICS/2017_NAICS_Manual.pdf

within the chemical manufacturing (NAICS 325) category, which lives within the manufacturing industry (NAICS 31-33) grouping.[6]

On Long Island, Pharmaceutical/Nutraceutical manufacturing includes over-the-counter (OTC) medications, narcotics, injectables, topicals, and many other products. Long Island companies produce up to 4,500 products commercialized and in the market today, from Rolaids and Dramamine to prescription products to nutritional supplements to the CVS, Walgreens, and Rite-Aid brands of cold and pain relief.

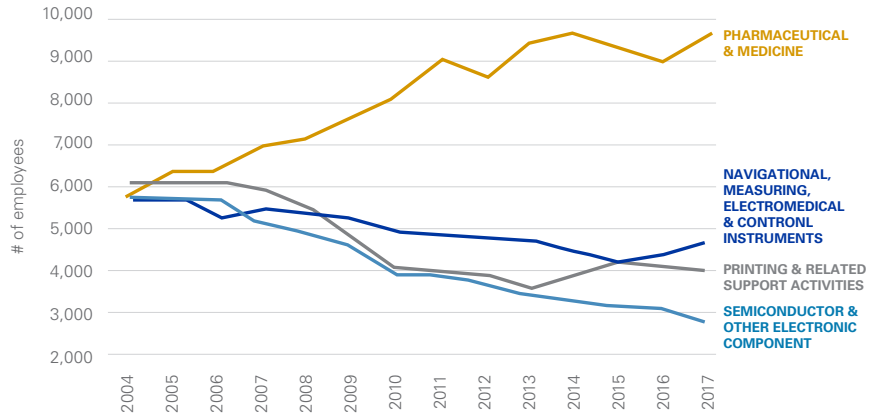
Pharmaceutical/Nutraceutical manufacturing represents roughly 15 percent of all manufacturing employment on Long Island and more than 12 percent of quarterly manufacturing payroll. It is the region's largest single manufacturing sub-sector with more than double the number of employees and a quarterly payroll 24 percent larger than the region's next largest sector.[7]

EMPLOYMENT & QUARTERLY PAYROLL BY LONG ISLAND MFG SECTOR Top 10 Sectors by Employment; US Census QWI; Q2 2017	# OF EMPLOYEES	QUARTERLY PAYROLL
PHARMACEUTICAL & MEDICINE	**9,833**	**$146,515,984**
NAVIGATIONAL, MEASURING, ELECTROMEDICAL, & CONTROL INSTRUMENTS	**4,905**	**$118,554,159**
PRINTING & RELATED SERVICES	**4,081**	**$60,300,462**
BAKERIES & TORTILLA	**3,390**	**$35,082,413**
OTHER MISCELLANEOUS	**3,269**	**$46,594,612**
SEMICONDUCTOR & OTHER ELECTRONIC COMPONENT	**2,914**	**$57,938,079**
ARCHITECTURAL & STRUCTURAL METALS	**2,627**	**$42,816,057**
AEROSPACE PRODUCT & PARTS	**2,584**	**$61,564,659**

[6] It is important to note that, while defining this sector using the NAICS hierarchy allows for ease of organization and a common understanding across regions, the NAICS system has its limitations. The NAICS hierarchy does not always reflect the most current markets for which companies produce goods and services. Companies frequently diversify into multiple categories or innovate in ways that blend categories or cannot be captured with the existing list of industry sectors. We employ the NAICS system to provide a general baseline of the makeup and scope of pharma/nutra manufacturing on Long Island, not to provide a flawless representation of the companies that make up this sector.

[7] US Census, LEHD, 2017.

LONG ISLAND'S TOP MANUFACTURING SECTORS BY ANNUAL EMPLOYMENT
Source: US Census Quarterly Workforce Indicators, LEHD



Between 2000 and 2017, no other manufacturing sub-sector[8] in the region registered as much growth in employment as Pharmaceutical/Nutraceutical manufacturing.[9] No other sector was even close to matching the roughly 4,000 employees added by Pharmaceutical/Nutraceutical. Of Long Island's top four manufacturing sectors, Pharmaceutical/Nutraceutical's is the only one to show an overall upward trend in payroll since 2004.

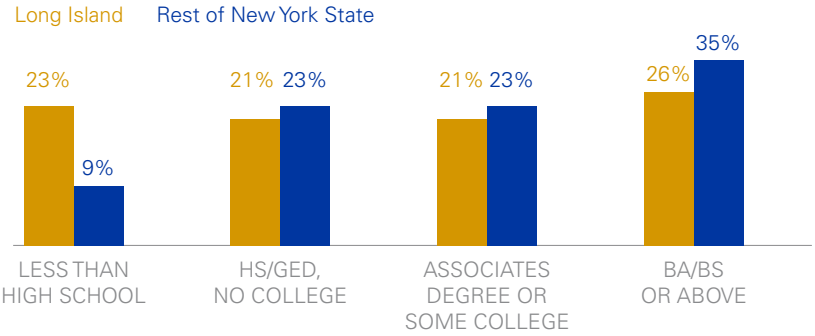
[8] US Census, LEHD, 2017.
[9] Using 4 digit NAICS sectors

"The biopharmaceutical industry offers the opportunity to create new firms, high-wage jobs and income while at the same time offering employment across a broad range of occupations, thereby providing jobs for people at a variety of skill levels—from researchers and scientists to technicians to production workers."[10]

NATURE OF PHARMACEUTICAL/NUTRACEUTICAL EMPLOYMENT ON LONG ISLAND

Employment on Long Island in this sector has grown by 64 percent since 2004.[11] The distribution of employment over each educational level has remained relatively stable even as overall employment in the sector grew. This strongly suggests that, even as the utilization of technology and automation within the sector increases, the sector continues to require employees from every educational attainment background.

SHARE OF EMPLOYMENT BY EDUCATION LEVEL: PHARMA/NUTRA MFG
US Census QWI; Q2 2017
NB: Figures may not total 100% due to rounding.



Employees holding a four-year degree or above constituted 26 percent of Long Island's Pharmaceutical/Nutraceutical manufacturing workforce in Q4 2016. Those with a two-year degree or some college attainment—often described as "middle skills jobs"—made up 21 percent. Workers with a high school or equivalent education accounted for 21 percent while those without a high school education were 23 percent of all employees.

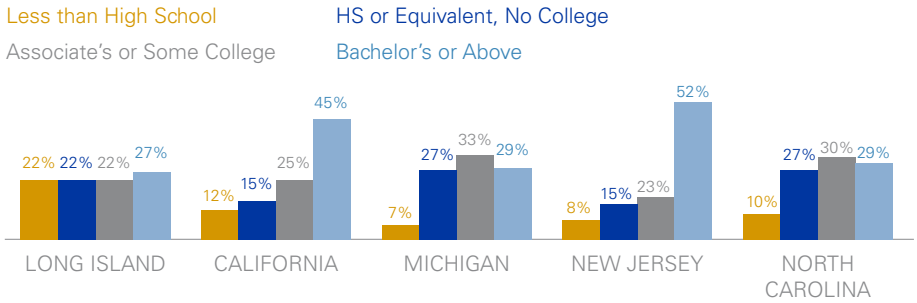
Long Island's educational patterns for the Pharmaceutical/Nutraceutical sector show a higher prevalence of workers with less than a high school education and lower concentration of workers at other levels when compared to the rest of New York State.

[10] Battelle Technology Partnership Practice, November 2010.
[11] US Census, LEHD, 2004-2017.

"An array of STEM-related jobs is required by this industry and can range from those requiring college degrees, such as advanced manufacturing jobs to blue-collar positions such as highly skilled technicians and other production personnel."[12]

Interviews with industry executives suggest that one factor influencing this could be a significant number of foreign-educated workers commuting to Nassau and Suffolk counties to work at Pharmaceutical/Nutraceutical manufacturers. These workers are recruited for their strong STEM skills, though they may not be recognized as having formal education credentials from the United States' system. This population may also help explain why the percentage of workers under age 24 with unknown education levels is roughly 7 percent for Long Island. This is slightly higher than the average of 3 percent to 5 percent for comparable states. More study is needed to fully understand these differences in share of employment by education level.

SHARE OF EMPLOYMENT BY EDUCATION LEVELS:
VARIOUS PHARMA/NUTRA MFG MARKETS
US Census QWI; Q2 2016



[12] Teconomy Partners & PhRMA, May 2016

FOUGERA/NOVARTIS

Founded: Fougera founded in 1849; acquired by Novartis in 2012

Employees on Long Island: 410

Products: Topical steroids, antibiotics, antifungals, dermatological aids, and others

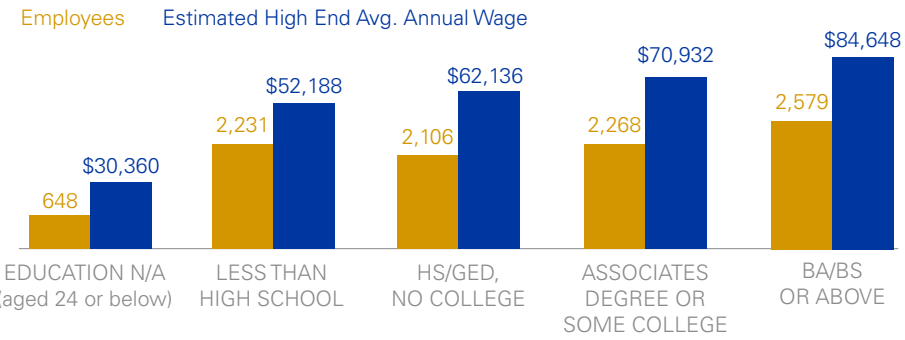
Common Job Titles: packagers, production technicians, chemists, associates, directors

Challenges: Attracting and training a qualified workforce to meet production and quality standards. Current management is also seeking to upgrade equipment and set expectations in line with the multiple globally competitive markets. Increased use of automation and robotics in their production lines has meant a higher demand for the skills to install and maintain these sophisticated systems.

"Our workforce is a key driver to sustain our growth therefore we need to be able to recruit local, trained workforce ready to meet the evolving capability demand to sustain efficiency and compliance."

NOVARTIS

EMPLOYEES & EST. AVG YEARLY WAGES BY EDUCATION:
LONG ISLAND PHARMA/NUTRA MFG
US Census QWI; Q2 2017



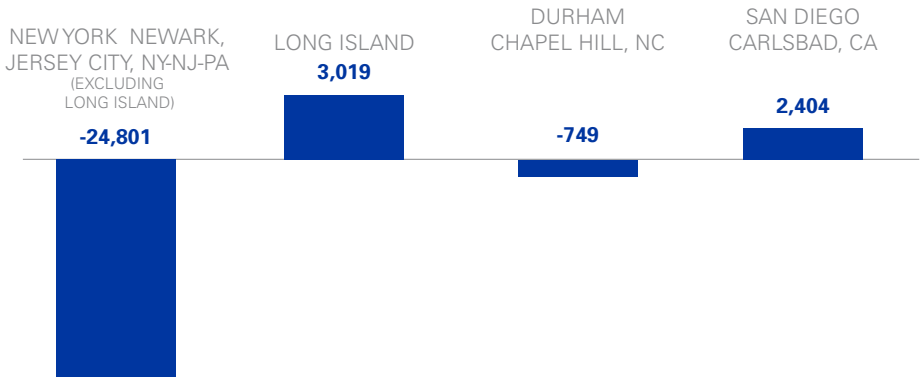
While the share of employment by education level has stayed relatively stable, there is a clear upward rise in wages as one moves in education level from "less than high school" through the middle skill level to BA/BS degrees and above. The higher the educational attainment, the higher the earning potential as illustrated in the chart above.

This underscores the widely held assertion that manufacturing—and Pharmaceutical/Nutraceutical especially—offers promising career opportunities and upward mobility for workers at every level of education. This factor should provide appeal to educational institutions considering an investment in Pharmaceutical/Nutraceutical manufacturing-related curricula as well as families pondering the potential for their children to find gainful, rewarding employment within the region. Indeed, one of the challenges facing the sector is the general lack of awareness about its career path opportunities within Long Island's primary school system and among the general public.

Pharmaceutical/Nutraceutical's manufacturing growth bucks the regional and national contraction of manufacturing employment over the last decade and a half. On Long Island alone, overall manufacturing employment has dropped from around 80,000 workers in 2004 to a total of roughly 67,000 in early 2017. Regionally, healthcare, retail, construction, and accommodation/food service saw overall employment growth during the same period, according

to US Census data.[13] Nationally, the Pharmaceutical/Nutraceutical industry sector has shown uneven employment growth between 2004 and 2017. California and Massachusetts saw the strongest employment growth, with each adding over 9,000 workers. Meanwhile, 16 different states lost jobs within the Pharmaceutical/Nutraceutical sector. New York and North Carolina both saw net losses of approximately 1,400 jobs, though regions within these

PHARMA/NUTRA MFG SECTOR CHANGE IN EMPLOYMENT: 2004 TO 2016
SOURCE: US CENSUS LEHD, QWI



states, including Long Island, have enjoyed robust activity. New Jersey's Pharmaceutical/Nutraceutical job losses between 2004 and 2017 are by far the largest, exceeding an estimated 22,000 workers. This fluctuation in Pharmaceutical/Nutraceutical employment levels among states, coupled with marginal overall loss in Pharmaceutical/Nutraceutical jobs nationwide suggests that the industry has remained "workforce neutral," i.e. didn't add or lose a substantial amount of jobs, but has been relocating within the country in response to market opportunities and other forces. Definitively substantiating this claim is beyond the scope of this report. However, it is worth taking note of the net change to employment in relation to Long Island for some very specific reasons.

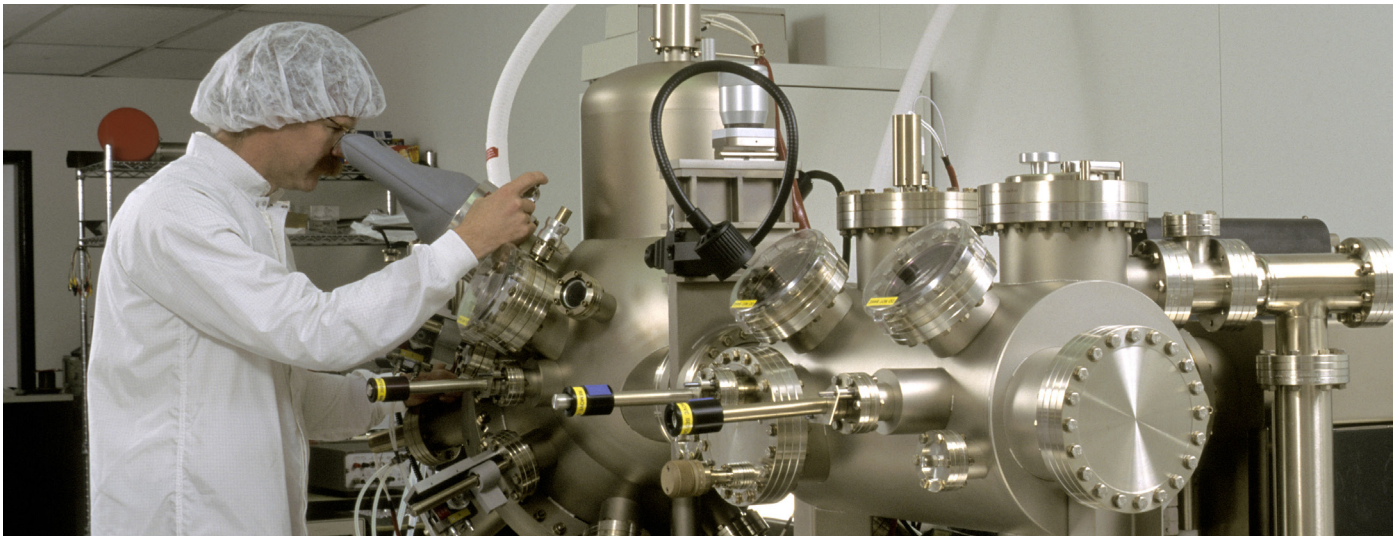
The SCIDA, Long Island Association's LIBio Committee, the Regional Economic Development Council and other organizations that study and support Long Island's economy share an understanding that there are inherent challenges to enticing companies to relocate to Long Island from outside the region. The remoteness of the

[13] US Census, LEHD, 2017.

"Biopharmaceutical clusters have tended to grow in close proximity to academic medical centers, universities, and nonprofit research institutions with strong biomedical R&D bases—organizations that make discoveries that can be turned into new products and treatments by the private sector.[14]

Island, the relatively high costs, and frequent misperceptions about the nature and health of modern manufacturing and its workforce dampen efforts to grow the economy through outside attraction. This is true on a statewide and national level, but it is especially acute for Long Island, a region surrounded on three sides by water. Focus naturally shifts to finding effective ways to support and grow the companies and industry sectors that have already found success in the region. Pharmaceutical/Nutraceutical manufacturing is a prime example of this success. The number of companies in this sector—their total employees, payroll, patents, and their innovations—have all risen over the past two decades. As a result, the physical footprint of their facilities has risen right alongside.

Many Pharmaceutical/Nutraceutical executives state plainly that their investments on Long Island are now so substantial that it is prohibitively expensive and complicated to relocate out of state. In no small part this is due to the complicated, costly and time-consuming process of gaining Federal Drug Administration (FDA) approval for pharma manufacturing facilities. However, these same executives also share that they receive relocation offers on a regular basis from competing regions and states, which underscores the importance of working with Pharmaceutical/Nutraceutical representatives to develop a regional strategy that champions the industry while finding effective ways to help them stay—and grow—on Long Island.



[14] Battelle Technology Partnership Practice, November 2010.

HISTORY

Pharmaceutical/Nutraceutical manufacturing is not often top of mind when considering the economy of Long Island. However, this is due to change.

Over the past three years, the Suffolk County IDA observed the sector's strong growth, coupled with a lack of deeper understanding about the makeup of its companies and the factors driving—or dampening—its expansion and hiring. More than 25 percent of the SCIDA's projects since 2014 have been with Pharmaceutical/Nutraceutical-related industries, more than any other industry sector. SCIDA's experience is directly reflective of Pharmaceutical/Nutraceutical's growth on Long Island. Since 2005, Pharmaceutical/Nutraceutical has been Long Island's largest manufacturing sector by employment.[15]

Other entities have taken notice, directing resources and attention to this manufacturing sector. Most notable are Empire State Development, which, through its Regional Economic Development Council identified life sciences as the sector with the greatest potential for growth on Long Island, and the Long Island Association, which formed the LI-Bio Committee. These constitute a strong foundation on which to expand support for Long Island's Pharmaceutical/Nutraceutical manufacturers.

CONTRACT PHARMACAL

Founded: 1971; company is still owned by the same family

Employees on Long Island: 1,300

Products: premium pharmaceuticals, over-the-counter drugs, and dietary supplements; To date, CPC has commercialized over 4,500 products, including many sold by nationally known brand names.

Common Job Titles: packagers, production workers, technicians, mechanics, engineers, managers, directors

Workforce Plans: Projecting to add an estimated 100 workers over the next one to three years to support new packaging lines. Company plans to engage incumbent staff to work on new lines and hire new workers to back fill existing production lines.

Challenges: A large portion of line and production workers come from areas with inadequate public transportation options. This makes it a challenge to recruit and retain that segment of their workforce. In addition, they stressed the importance of finding and hiring qualified mechanics to install, operate, and maintain the production line equipment. As the equipment improves over time, experience with programmable logic has become a vital skill area at Contract Pharmacal's facilities.

"A large portion of our production team comes from areas with inadequate public transportation. This makes it challenging to recruit and retain a critical segment of our workforce."

CONTRACT PHARMACAL CORP

[15] US Census, LEHD, 2005-2017.

A Growing Sector with Deep Regional Roots

Within the roughly 150 Pharmaceutical/Nutraceutical manufacturing companies operating on Long Island, there is a rich mix of legacy family-owned companies, those owned by national or international corporations and a percentage of private equity-owned. Whatever their ownership structure today, many Pharmaceutical/Nutraceutical companies began as small-scale or family ventures initially founded by innovators and leaders who located on Long Island for its lifestyle, proximity to prime customers and suppliers, and availability of a talented workforce. Many started in New York City and expanded to Nassau County and then Suffolk County as they needed more space. Some began and expanded within Suffolk. They set down roots both personally and professionally. They grew iteratively, organically, responding to industry shifts and taking on multiple facilities. The larger manufacturers have seven or eight separate buildings; smaller firms exist in one or two facilities.

"Translating discoveries from the "bench to the bedside" also requires access to specialized equipment and facilities, talent familiar with testing and regulatory requirements, entrepreneurs with experience in biopharmaceutical firm development, investors willing to invest at each stage in the development of a biopharmaceutical company and access to patients and physicians willing to participate in clinical trials."[16]

As the industry continues to grow, its jobs are more technological and require an understanding of and certification in national standards. At the same time, the dynamics are shifting. The incumbent workforce with historical knowledge and instinctual know-how gained over years of work experience is aging. The shortage of workers to fill current and future positions stresses the industry and has a very strong potential to slow growth. It is not unique to Long Island's Pharmaceutical/Nutraceutical manufacturers. This is the case with manufacturing overall. There are initiatives underway around New York State and nationwide to introduce a new generation of workers to the workforce opportunities available in advanced manufacturing. New York State recently announced it will invest $175 million in workforce development efforts through its consolidated funding application program. One of the focus areas will be the life science sector.

Within the industry, Long Island's Pharmaceutical/Nutraceutical

[16] Battelle Technology Partnership Practice, November 2010.

INVAGEN/CIPLA

Founded: 2003

Employees on Long Island: 711

Products: Generic prescription medicines including cardiovascular, anti-infection, CNS, anti-inflammatory, anti-diabetic, and anti-depressants.

Common Job Titles: operator, packager, quality assurance associate, chemist, director

Workforce Plans: Planning to grow by an estimated 100 workers in coming years.

Challenges: Company cites a lack of chemistry and manufacturing skillset available in region's workforce. English as a Second Language is also a high need training area for InvaGen.

"400 out of our 700 employees are non-native English speakers. A critical part of meeting increased FDA regulations and current good manufacturing practices (CGMP) requires strong verbal and written communication capability in English. We have been growing and investing in training our workforce to meet the ongoing changes in technology and regulation. Language and literacy skills are just as critical to our success."

Cipla

manufacturers are sought out for their superior quality and knowledgeable, skilled workforce. The region's companies are working hard to compete on price by improving efficiency and finding ways to reduce cost. Legacy companies are in the process of handing down the business to another generation or selling to large corporate entities, both competing in a rapidly changing and competitive environment. Where the family-owned and operated companies continue to grow, there is vertical integration: research and development, formulation, production, packaging, and warehousing all under one roof. They struggle to find talent and rely on state or federal workforce grants to subsidize training while focusing their own funds on keeping up with production and technology. Where they have been acquired by larger corporations, Long Island operations are remaining "workforce neutral" so they can bring legacy workers up to current manufacturing standards. Here they need heavy training investments in Current Good Manufacturing Practices (CGMP)—FDA regulations for production and documentation—as well as English as a Second Language (ESL) to ensure that workers can understand and write in new documentation standards.

Several have sought financial holding companies. In these cases, original leadership retains executive positions while the holding companies provide much-needed financial leverage to keep up with technological advancements and production requirements. Companies in this category grow via acquisition. Those interviewed in this category had a minimum of two acquisitions over the past three years and were planning to acquire more in the next three to five years.

Every executive team interviewed for this report acknowledged and lamented the high cost of doing business on Long Island. But companies interviewed attest that the cost of transitioning out of multiple properties—having to reapply for licensing, go through lengthy FDA facility approval processes, shutting down production, finding and training new people—and uprooting their families is not currently worth it. Executives, human resource professionals, and directors of operations shared that they have received generous

offers from entities enticing them to relocate out of New York State. These offers can reach millions of dollars in cash and incentives. Despite these offers, Long Island's Pharmaceutical/Nutraceutical companies remain committed to staying in the region both because it would be prohibitively expensive and complicated to relocate their multiple facilities and they have established meaningful roots on a personal and professional level. In short, they want to stay and grow on Long Island.

To grow on Long Island requires an organized, strategic, and regionally coordinated approach from business, education, workforce, and economic development partners. These partners, along with Long Island's elected officials and policymakers, must not take for granted that it will always be too expensive or complicated for these companies to leave the region. The market conditions of today may not apply several years down the road. To lose any of the Pharmaceutical/Nutraceutical companies operating in Suffolk and Nassau counties now would be a loss to the region's economy with painful long-term ramifications. Replacing a company's employment base, supply-chain connections, and physical facilities may prove too difficult, leaving a gap that may trigger a domino effect.

PHARMACEUTICAL/NUTRACEUTICAL'S JOB MARKET

The thriving Pharmaceutical/Nutraceutical industry on Long Island consistently has hundreds of jobs open and struggles to fill them. During the first six months of 2018, 38 different Pharmaceutical/Nutraceutical companies posted 238 job openings online within the region. This is the most of any of Long Island's manufacturing sectors.[17] On the other hand, several of the pharma execs interviewed shared that their near-term plans involve remaining "workforce-neutral," which means they have no plans to add staff while they implement improvements such as production and operational efficiencies and explore new product development. In the longer-term, if the improvements have the intended impact, they expect to

NATURE'S BOUNTY

Founded: 1971

Employees on Long Island: 1,502

Products: Nutritional supplements manufactured through a portfolio of brands including Nature's Bounty, Puritan's Pride, Solgar, Pure Protein, Body Fortress, Sundown Naturals, MET Rx, Osteo Bi Flex, and others.

Common Job Titles: bulk material handler, line runner, buyer, planner, managers (department, operations maintenance, etc.), engineers

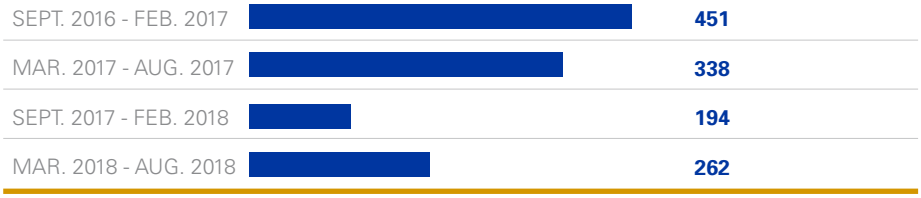
Challenges: Regulatory changes and competitive pressure from the market pose on-going challenges. Company is seeking to upskill its incumbent workforce in English-language proficiency, cultural competence, and other areas. The company is also in the process of transitioning work back to New York from California facilities that it recently closed.

"The industry is changing rapidly in terms of technology and organizational structure. People are working in cross-functional teams and expected to take ownership for product quality. This requires high level problem solving as well as more frequent and more complex communication. We want to keep our talented workforce – this means retraining hundreds of incumbent workers to become better communicators."

[17] Burning Glass Technologies: Labor Insight, 2018.

hire new staff at various levels of their respective companies. Looking back over the period of September 2016 to August 2018, online job postings from Long Island's Pharmaceutical/ Nutraceutical MFG sector totaled 1,245. A breakdown of each six-month period during these 24 months is shown below.

PHARMA/NUTRA MFG ONLINE JOB POSTINGS
FOR LONG ISLAND
Source: Burning Glass, Labor Insight; Nassau & Suffolk Counties, NY; NAICS 3254



The top five in-demand job titles for this sector were (in order of number of online jobs postings) quality assurance manager, mechanic/maintenance mechanic, operator/machine operator, sales representative/specialist and chemist. The table on page 26 cross-references the most common job titles (columns at the top) with the top skills (listed along the left side) listed for the associated job descriptions. The number of job postings are also shown below each title for the period September 2016 to August 2018. These in-demand skills reflect the combination of scientific and production competencies that Pharmaceutical/ Nutraceutical employers are looking for in their workforce. Worth noting is the occurrence of Current Good Manufacturing Processes or CGMP in job descriptions for chemist, operator/ machine operator, and quality assurance manager.

Due to the high level of industry regulation and quality standards, all Pharmaceutical/Nutraceutical employees are required to be certified in Current Good Manufacturing Practices (CGMP/GMP), an FDA certification. While our two- and four- year degree programs offer study of chemistry, engineering or manufacturing programs, they historically have not included industrial/business focused tracks that would include business process and production side of STEM. Incorporating CGMP instruction and certification into

STEM degree programs would expand career options for students beyond Pharmaceutical/Nutraceutical. The cosmetics and food production sectors, for example, also use similar practices.

IN-DEMAND SPECIALIZED SKILLS

TOP 5 TITLES FROM LONG ISLAND PHARMACEUTICAL/NUTRACEUTICAL MANUFACTURING ONLINE JOB POSTINGS[18]

	CHEMIST	MECHANIC/ MAINTENANCE MECHANIC	OPERATOR/ MACHINE OPERATOR	QUALITY ASSURANCE MANAGER	SALES REPRESENTATIVE /SPECIALIST
# OF ONLINE JOB POSTINGS (last 24 months)	24	42	38	64	37
BATCH RECORDS			●		
BUSINESS PLANNING					●
CURRENT GOOD MANUFACTURING PRACTICES (CGMP)	●		●	●	
CHEMISTRY	●			●	
DESCRIPTION & DEMONSTRATION OF PRODUCTS					●
HAND TOOLS		●			
LABORATORY TESTING	●			●	
MACHINE OPERATION			●		
MACHINERY		●	●		
MANUAL DEXTERITY	●				
MARKET STRATEGY					●
PACKAGING			●		
PHARMACEUTICAL INDUSTRY KNOWLEDGE				●	
PHARMACEUTICAL SALES					●
PREDICTIVE/PREVENTATIVE MAINTENANCE		●			
QUALITY ASSURANCE & CONTROL	●			●	
REPAIR		●			
SALES					●
SCHEMATIC DIAGRAMS		●			

[18] Burning Glass Technologies: Labor Insight, 2018.

It is common among manufacturers, both within the region and beyond, to use methods other than well-known internet platforms to recruit and hire workers, especially at the entry and middle skills levels. Our interviews with company representatives and WDI's ground-level workforce intelligence indicate that the job market for Long Island's Pharmaceutical/Nutraceutical manufacturing sector is greater than what online job posting data suggest. It is difficult to determine exactly how much of the manufacturing job market exists outside of common online hiring platforms. But it is critical to contextualize online job posting data as being only a partial representation of the total job market. There is a good deal of recruiting and hiring that happens as a result of other means, such as a sign in the yard, word-of-mouth, job fairs or on-site recruiting, referrals, temp or personnel agencies and online postings that appear only on a company's webpage. It is very likely that many of these jobs may not appear in public reporting tools and thus risk being lost in the story of industrial and workforce developments within the region. Establishing regular contact with company representatives and obtaining ground-level information on their workforce plans is essential to supporting the sector based on valid, real-time information in addition to large-scale data tools that often lose the nuances and dynamics at a regional or company level.

Assets and Challenges for the Industry and the Region

ASSETS

The Long Island region is home to several institutions, companies, and partnerships that constitute a significant competitive advantage for the Pharmaceutical/Nutraceutical manufacturing sector. Identifying the components of this advantage, studying them, and finding ways to maximize their value are all important steps if our region intends to nurture the growth of this sector. Doing so not only raises the profile and the prospects of Pharmaceutical/Nutraceutical's companies, it positions the region's assets to more effectively support the other critical industries we have.

"States' efforts to grow a biopharmaceutical cluster vary based on their individual circumstances—there is no single policy or strategy for growing a biopharmaceutical industry cluster. Each state must craft a distinctive approach based on its unique assets and relative strengths."[19]

Given the location and function of our region's assets, it is helpful to analyze them from the perspective of Long Islands' two counties. A 2017 region-by-region research report from Jones Lang Lasalle (JLL), an industrial real estate firm, summarizes each county's assets succinctly: "The life sciences industry in Nassau County is well positioned for growth as innovation-focused funding from the state solidifies groundbreaking bioscience initiatives and research projects. Nassau County serves as headquarters for Cold Spring Harbor Laboratory, a 125-year-old biomedical nonprofit laboratory, and is home to many lab-based companies such as Mirimus and Certerra. Great Neck-based Northwell Health, the largest private sector employer on Long Island, is expanding rapidly along with its research wing, The Feinstein Institute for Medical Research. The Nassau County life sciences market is mainly comprised of owner-occupied laboratory facilities."

"[A] complex research, innovation and commercialization ecosystem needs to be in place within a region to drive biopharmaceutical cluster."[20]

In terms of Suffolk County, the JLL report summarizes the county's strengths: "Stony Brook University serves as an integral part of the research corridor initiative of Long Island. The National Institutes of Health awarded Stony Brook University's Center for Biotechnology a three-year, $3 million grant to create the Long Island Bioscience Hub in collaboration with two key partner institutions. Suffolk County is also home to Brookhaven National Laboratory, a 4 million-square-foot

[19] Battelle Technology Partnership Practice, November 2010.
[20] Ibid.

multipurpose research lab facility funded by the US Department of Energy, founded in 1947. The majority of life sciences establishments are in owner-occupied facilities in a campus setting. In recent years, pharmaceutical companies have dominated commercial activity growth with the majority concentrated in western and central Suffolk."[21]

In addition to the advantages discussed in the JLL report, our region boasts some other noteworthy assets that either currently contribute to the growth and innovation of the Pharmaceutical/Nutraceutical sector or stand to contribute in new ways. Properly leveraged, these advantages represent opportunities to grow and retain Pharmaceutical/Nutraceutical's companies and workforce.

- *Workforce Development Ecosystem* – Long Island is home to 17 different educational institutions, three job centers/workforce development boards and STEM focused camps/extracurricular programs.
  - *STEM Graduates* - In 2017, Long Island's educational institutions produced over 4,400 STEM graduates, an increase of 30% since 2013 and the numbers continue to grow.[22]
- *Targeted Training Support* – Each of Long Island's educational institutions offers custom training to meet the unique needs of local industry. In addition there are regional manufacturing-focused training programs/resources and workforce training grants to help manufacturers shoulder
  the cost of training.
- *State and Local Incentives* – Combating the region's high costs are a host of incentive programs offered by the state, local municipalities and the region's utilities. Entities such as Empire State Development, its Long Island Regional Economic Development Council, the Long Island Association's LI-Bio Committee, the region's IDAs, and others work in concert with each other to ensure companies can remain competitive in the national and global marketplace.
- *Capability to Support Industry Innovation* – The region is home to several biotech and tech incubators with the capabilities to partner with Pharmaceutical/Nutraceutical companies to further

[21] JLL Research, 2017.
[22] Burning Glass Technologies: Labor Insight 2018

local research and development. These include the Long Island High Technology Incubator (LIHTI), Broad Hollow Bioscience Park, Inc. (BHBP), the Long Island Bioscience Hub (LIBH), Stony Brook Centers of Excellence and research centers.

- Pharmaceutical/Nutraceutical has expanded its footprint by signiflcantly acquiring new buildings and installing over dozens of new production lines in the past flve years. The region has a long history of well-trained and highly specialized workers that can install and maintain the high-tech equipment, electronics, heating/cooling systems and production lines that Pharmaceutical/Nutraceutical manufacturing uses.
- *Space that can be repurposed for training or development* - Pharmaceutical/Nutraceutical sites lost to acquisitions or moves can be transformed into a regional industry-led training facility. In addition, light industrial spaces can be converted to accommodate both incoming and home grown Pharmaceutical/Nutraceutical manufacturers

A & Z PHARMA

Founded: 1995

Employees on Long Island: 120

Products: Nutritional supplements such as chewable tablets for children

Common Job Titles: material handler, technical writer, it technician, chemists (r&d, quality control), managers, cost accountant

Challenges: Recruiting and retaining a skilled workforce for entry, mid and professional level positions. Regional pool of candidates is small. There is no manufacturing readiness program specifically for pharmaceutical and nutraceutical. The regulations for their foreign (China) markets are highly specific and rigorous.

"The regulations for the U.S. are strict and for foreign markets even more specific and rigorous. This requires candidates to enter with pharmaceutical-specific knowledge and skills."

A&Z Pharmaceutical, Inc.
Advancing Healthier Lives

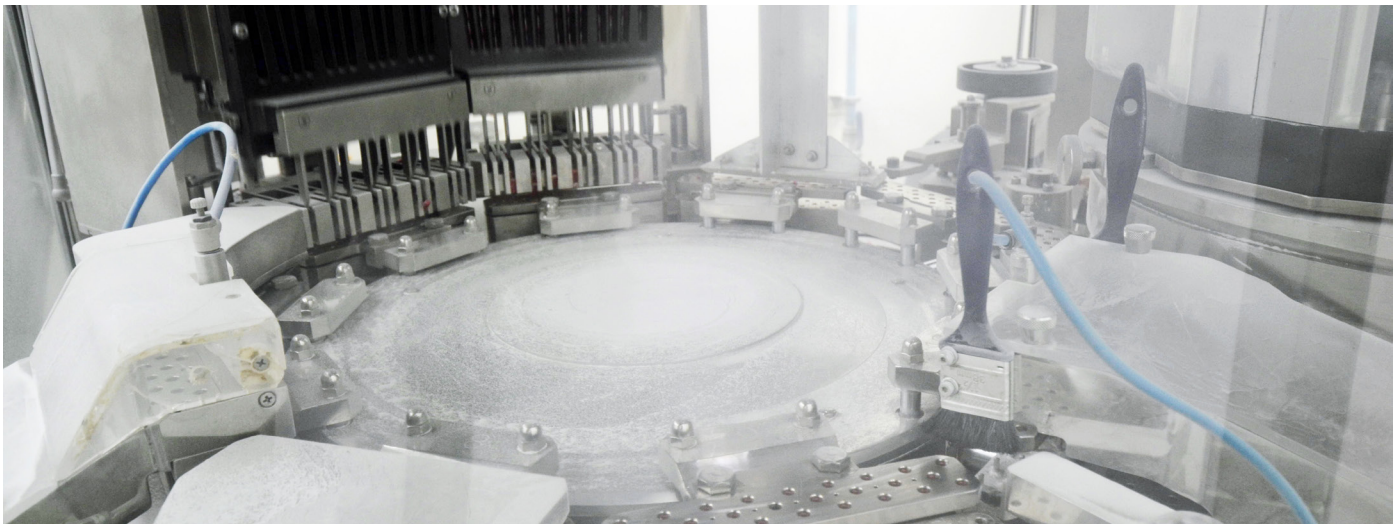
CHALLENGES

Long Island's Pharmaceutical/Nutraceutical manufacturing sector is not without its challenges. Through this report and on-going outreach efforts, SCIDA and WDI seek to deepen the region's understanding of these challenges in order to find the partners, tools, and resources to overcome them. Many of the challenges identified by Pharmaceutical/Nutraceutical manufacturing—housing, transit, child care, etc.—are shared by other industry sectors and are well known to policymakers and Long Island residents. Addressing the challenges and needs of the Pharmaceutical/Nutraceutical manufacturing sector has a strong potential to help us design and implement solutions for the region's other sectors and workforce populations.

Understanding that myriad complex factors impact each, the main challenges faced by the Long Island Region's Pharmaceutical/ Nutraceutical can broadly be defined as:

- The industry doesn't communicate and collaborate effectively. There are a few larger companies here, but most of the sector comprises small- to medium-size businesses. As such, the industry has a difflcult time representing itself and its interests to policymakers, academia and the general public. The lack of awareness that ffiows from this results in the public, government, and academia under appreciating the role the sector plays in the region's economy and the employment opportunities it offers.
- The industry struggles for workers. While this is an issue nationally, it's particularly acute and complex on Long Island. One of the underpinnings of this challenge in the region is the lack of affordability and diversity in its housing stock. While approximately 35 percent of the housing stock in other metropolitan suburbs is rental or multi-family, only

  19 percent of Long Island's housing stock flts that description. [23] The



dearth of such housing limits both the attractiveness and flnancial viability for many workers to either relocate to or stay on Long Island. Similarly, transportation presents a challenge to many, especially those in the vital entry-level manufacturing positions. While the Long Island Rail Road is the nation's busiest commuter rail system, it only services east to west routes and, while they may reside along one of the Island's busy commercial corridors, most companies are accessible only via car or an extremely time-consuming bus line. Inaccessibility creates a real challenge for employers trying to flll jobs.

- This is a high-cost region. The costs associated with doing business on Long Island can place our local manufacturers at a competitive disadvantage in the national and global market place. They can also hamper company efforts to attract and retain talent, as housing and other costs may drive talent away. Incentives offered by the State, local IDAs, and utilities help offset some of these business costs, but are incapable of leveling the playing fleld entirely and oft times are not structured in a manner ffiexible enough to suit business needs.

[23] http://www.longislandindex.org/

Elements of a Successful Pharmaceutical/ Nutraceutical Manufacturing Eco-System

REGIONS WORTH STUDYING

Michigan

MichBio:
www.michbio.org

Michigan Chemistry Council:
www.michiganchemistry.com

Puerto Rico

Pharmaceutical Industry Association of Puerto Rico:
www.piapr.org

North Carolina

North Carolina BioSciences Organization:
www.ncbioscience.net

North Carolina Biotechnology Center (NCBiotech):
www.ncbiotech.org

California

Biocom:
www.biocom.org

California Life Sciences Association:
www.califesciences.org

Taiwan

Taiwan Generic Pharmaceutical Association:
www.tgpa.org.tw

"More than perhaps any other industry," states a 2018 report from The Information Technology and Innovation Fund (ITIF), "the life-sciences sector requires a unique ecosystem in order to thrive. The presence of this ecosystem provides a strong competitive advantage to a state." With Pharmaceutical/Nutraceutical being a central component of the Life Science sector, the primary purpose of this joint-effort between SCIDA and WDI is to elevate awareness of the industry's importance, its history, and its current challenges in order to build consensus around the importance of developing a regional sector strategy to support its continued growth. With this in mind, we turned to other regions and states that have successfully developed support structures for their general life sciences and specific Pharmaceutical/Nutraceutical manufacturing sectors. When asked what other geographic areas are "doing things right" when it comes to supporting the Pharmaceutical/Nutraceutical manufacturing sector, Long Island industry representatives named Puerto Rico; Ann Arbor, Michigan; North Carolina; San Diego, California; and Taiwan as examples.

This section lays out the chief elements of a regional strategy to support Pharmaceutical/Nutraceutical manufacturing. "Successful life-science clusters," continues the ITIF report, "normally have a number of key enablers, including world-class universities focused on technology commercialization; an environment that is attractive for highly skilled life-sciences workers; a robust start-up support system, including venture capital and entrepreneurial support networks; and larger "anchor" life-sciences firms."[24]

Current research affirms that each area home to Pharmaceutical/ Nutraceutical manufacturing cluster has its own unique characteristics, market advantages, and partnerships. While there is no single, guaranteed approach to supporting this sector, research identifies the following as the commonly found, core elements of a successful Pharmaceutical/Nutraceutical manufacturing eco-system:

[24] ITIF, February 2018.

- A collaborative, practical industry-led organization and a strategy for the region that functions as a validated guiding document intended to help support companies and provide good jobs to the region.
- Existing research capacity and infrastructure focused on the life sciences, manufacturing, and health care and integrated with the public and private sectors.
- Robust workforce and educational programs for incumbent workers, primary and secondary students, workers in transferable industries, the under- and unemployed, and recent graduates.
- Access to capital in the form of grants, loans and incentives from both public and private sources based on the needs of individual companies and the strengths of the region.
- Manufacturing capacity in the form of physical space that is up to date, available, and able to accommodate current and future manufacturing technologies and work environments.
- Specialized business incentives that encourage innovation and risk while also supporting the public good and the long-term health of the industry within the region.
- Industry representation to advocate and pursue grant opportunities.
- Targeted, favorable state and regional policies that support existing businesses and creation of new ones.
- Public recognition of industry's importance to the region and to the fleld of health care.
- Formal and informal mechanisms that build community and promote collaboration and networking.

Conclusion & Next Steps

"The future of the sector will depend, in large part, on how the health care sector evolves over time and how policymakers' decisions—particularly those in the states—affect companies' ability to attract sufficient capital and talent."[25]

Pharmaceutical/Nutraceutical's remarkable but uncelebrated growth over the past decade or more has brought the sector to a critical point in terms of regional recognition and alignment. Our institutions of economic development, workforce development, education, and the industry itself are all well positioned to build on this success and ensure the sector develops into a sustainable economic force for years to come. This likely will not happen, however, unless the various regional players come together around a plan to make it so. In a region, and within a sector, as highly siloed as ours; coming together to develop such a plan does not happen by itself.

The Pharmaceutical/Nutraceutical sector requires a unique ecosystem in order to succeed. Every region in the country that has a thriving Pharmaceutical/ Nutraceutical sector has taken its own path to success based on the individual assets and strengths inherent to it. What that plan looks like on Long Island is as yet unclear, and that is likely due to the lack of an industry-led trade organization representing the sector, the one common ingredient found in every region studied as part of this report.

These organizations serve to convene the sector, assess its needs, devise plans for addressing them and work with various constituency groups toward implementation. It is this report's principal recommendation that such an organization be formed to support Long Island's Pharmaceutical/Nutraceutical sector.

Despite the lack of such an organization at present, we can already see the progress made possible when the region intentionally and proactively works toward addressing the specific needs of the sector. Just through the process of developing this report, the following have already been initiated:

- *Education & Industry Connection* - Representatives from Long Island BOCES, Community Colleges and Four-Year institutions toured

[25] Battelle Technology Partnership Practice, November 2010.

and met with CEOs, Site Heads and Human Resources for flve Pharmaceutical/Nutraceutical companies to understand the current and near-term in demand occupations and skills.

- *Curriculum Enhancement* - Suffolk County Community College Advanced Manufacturing Center added CGMP into the Introduction to Manufacturing Course work to both build awareness and build capacity for Pharmaceutical/Nutraceutical workforce. Nassau BOCES has incorporated manufacturing and Pharmaceutical/ Nutraceutical production mechanics awareness and introduction into their automotive program.
- A NYS Registered Manufacturing Apprenticeship in the Chemical sector is being launched. This will focus on the Industrial Mechanical Technician role, which is in-demand across the Pharmaceutical/ Nutraceutical industry. Once piloted, this can be expanded to all Pharmaceutical/ Nutraceutical companies.
- Partnerships between industry and local school districts are being developed to provide career awareness, exposure and experience. High school teachers, guidance counselors and students have already toured Pharmaceutical/Nutraceutical manufacturers and are in discussion with faculty regarding industry related school projects.

While developing this report, we heard from company after company that their extensive Long Island facility investments make it highly undesirable to relocate, although this may not always be the case. Further, they are struggling to find an adequate supply of qualified, available workers to help them grow and stay competitive. Many of these workers struggle to find the affordable housing and public transportation necessary to take advantage of Pharmaceutical/ Nutraceutical manufacturing's job opportunities. A centralized organization that facilitates cooperation among regional assets to address these unique issues facing the industry would be a great benefit in ensuring its continued success and growth. The challenges currently facing Long Island's Pharmaceutical/Nutraceutical manufacturing sector can be overcome with the right alliances and resources.

We as a region have the tools to help this industry continue to be a significant economic engine and to become a cornerstone of the region's industrial identity, but the region needs to create a framework ensuring a whole that is greater than the sum of

its parts. We invite our regional partners to join us in our effort to acknowledge the workforce and economic importance of this manufacturing sector and work together to support its continued growth, cementing itself as one of the critical economic engines of Long Island's economy.

Thanks & Acknowledgements

Steven Bellone,
Suffolk County Executive

Legislator William Lindsay III

Suffolk County IDA
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Kelly Morris, Deputy Executive Director
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Long Island Regional Economic Development Council (LIREDC)
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Western Suffolk BOCES
Nancy Kelsey, Executive Director, Career & Technical Education

Companies that Participated in Interviews and Round-table Discussions

A&Z Pharmaceutical, Inc.

Ajes Pharmaceuticals

Amneal Pharmaceuticals

Applied DNA Sciences, Inc.

Biochemical Diagnostics, Inc.

Certified Labs

Chembio

Citation Clinical Labs

Cipla

Contract Pharmacal

Country Life, LLC

Enzo Biochem

Estee Lauder

Invagen Pharmaceuticals, Inc.

Jerome Stevens Pharmaceuticals

LNK International

Luiptold Pharmaceuticals, Inc.

MitoGenetics

Nature's Bounty

Novartis

Rechler Equities

Rochem International

Topiderm Inc.

Velocity Pharmaceutical Development

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Department of Labor, Licensing & Consumer Affairs

Vanessa Pugh
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Appendix A

Estimated 2016 Annual Employment & Payroll NAICS 4 Digit Industry Sectors on Long Island

Source: US Census Bureau, Quarterly Workforce Indicators: 1998-2017 (2018), Washington, DC: US Census Bureau, Longitudinal-Employer Household Dynamics Program, https://ledextract.ces.census.gov.

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	13,275	$1,029,205,193
Activities Related to Credit Intermediation	4,889	$474,653,051
Activities Related to Real Estate	5,389	$383,454,891
Administration of Economic Programs	1,502	$103,016,750
Administration of Environmental Quality Programs	602	$30,764,530
Administration of Housing Programs, Urban Planning, and Community Development	117	$6,662,938
Administration of Human Resource Programs	603	$38,775,169
Advertising, Public Relations, and Related Services	3,926	$234,851,517
Aerospace Product and Parts Manufacturing	2,857	$258,664,641
Agencies, Brokerages, and Other Insurance Related Activities	14,202	$1,147,951,296
Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	88	$7,248,131
Amusement Parks and Arcades	679	$8,710,811
Animal Food Manufacturing	13	$843,133
Animal Slaughtering and Processing	128	$7,111,134
Apparel Accessories and Other Apparel Manufacturing	41	$1,831,080
Apparel Knitting Mills	83	$3,513,681
Apparel, Piece Goods, and Notions Merchant Wholesalers	2,680	$173,421,834
Aquaculture	99	$4,860,425
Architectural and Structural Metals Manufacturing	2,869	$177,624,873
Architectural, Engineering, and Related Services	8,906	$769,442,403
Audio and Video Equipment Manufacturing	222	$42,451,400
Automobile Dealers	11,967	$841,296,145
Automotive Equipment Rental and Leasing	1,311	$68,191,676
Automotive Parts, Accessories, and Tire Stores	2,975	$106,031,693
Automotive Repair and Maintenance	10,675	$437,105,571
Bakeries and Tortilla Manufacturing	3,705	$139,200,978
Basic Chemical Manufacturing	37	$1,845,154
Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	1,818	$173,002,435

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Beer, Wine, and Liquor Stores	2,030	$60,312,702
Beverage Manufacturing	707	$33,956,165
Boiler, Tank, and Shipping Container Manufacturing	271	$20,147,953
Book Stores and News Dealers	670	$14,342,018
Building Equipment Contractors	24,762	$1,807,763,753
Building Finishing Contractors	10,760	$701,981,618
Building Material and Supplies Dealers	11,563	$446,899,666
Business Schools and Computer and Management Training	912	$64,825,725
Business Support Services	6,161	$332,502,925
Business, Professional, Labor, Political, and Similar Organizations	2,832	$165,671,016
Cable and Other Subscription Programming	576	$71,517,152
Cattle Ranching and Farming	-	$50,554
Cement and Concrete Product Manufacturing	821	$50,983,012
Charter Bus Industry	230	$6,182,444
Chemical and Allied Products Merchant Wholesalers	1,181	$122,088,080
Child Day Care Services	9,860	$222,815,168
Civic and Social Organizations	2,946	$52,501,753
Clothing Stores	15,662	$400,662,403
Coating, Engraving, Heat Treating, and Allied Activities	824	$55,632,671
Colleges, Universities, and Professional Schools	24,302	$1,379,261,733
Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	1,395	$88,083,794
Commercial and Industrial Machinery and Equipment Rental and Leasing	987	$76,294,045
Commercial and Service Industry Machinery Manufacturing	454	$26,992,312
Communications Equipment Manufacturing	2,174	$269,994,567
Community Food and Housing, and Emergency and Other Relief Services	1,499	$56,980,277
Computer and Peripheral Equipment Manufacturing	984	$131,426,176
Computer Systems Design and Related Services	12,285	$1,275,073,284
Consumer Goods Rental	997	$45,070,318
Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	5,312	$167,367,023
Converted Paper Product Manufacturing	1,660	$112,362,273
Couriers and Express Delivery Services	4,712	$253,308,949
Cut and Sew Apparel Manufacturing	407	$18,347,141
Cutlery and Handtool Manufacturing	300	$14,633,717
Dairy Product Manufacturing	275	$9,052,609
Data Processing, Hosting, and Related Services	1,935	$272,011,583
Death Care Services	1,589	$86,692,565
Deep Sea, Coastal, and Great Lakes Water Transportation	763	$93,377,408
Department Stores	18,962	$460,642,636
Depository Credit Intermediation	10,138	$1,092,870,296
Direct Selling Establishments	2,825	$181,559,477

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Drinking Places (Alcoholic Beverages)	1,772	$36,050,868
Drugs and Druggists' Sundries Merchant Wholesalers	5,197	$386,258,772
Drycleaning and Laundry Services	4,966	$158,511,945
Educational Support Services	2,660	$70,853,692
Electric Lighting Equipment Manufacturing	517	$37,477,980
Electric Power Generation, Transmission and Distribution	625	$77,525,662
Electrical Equipment Manufacturing	488	$32,200,597
Electronic and Precision Equipment Repair and Maintenance	819	$54,798,811
Electronic Shopping and Mail-Order Houses	4,116	$289,441,308
Electronics and Appliance Stores	6,260	$325,529,510
Elementary and Secondary Schools	96,376	$6,645,616,242
Employment Services	19,544	$771,870,490
Engine, Turbine, and Power Transmission Equipment Manufacturing	381	$22,676,872
Executive, Legislative, and Other General Government Support	37,979	$2,876,749,249
Fabric Mills	609	$23,809,644
Facilities Support Services	246	$11,927,124
Farm Product Raw Material Merchant Wholesalers	47	$3,304,835
Fishing	39	$1,211,123
Florists	781	$20,926,747
Forging and Stamping	453	$19,939,151
Foundation, Structure, and Building Exterior Contractors	10,955	$729,185,460
Foundries	96	$4,252,907
Freight Transportation Arrangement	3,156	$237,257,441
Fruit and Tree Nut Farming	179	$4,700,773
Fruit and Vegetable Preserving and Specialty Food Manufacturing	366	$19,824,301
Furniture and Home Furnishing Merchant Wholesalers	1,982	$202,979,979
Furniture Stores	1,929	$105,606,360
Gambling Industries	285	$12,229,056
Gasoline Stations	3,550	$93,676,652
General Freight Trucking	3,161	$168,287,632
General Medical and Surgical Hospitals	73,966	$5,981,523,916
General Merchandise Stores, including Warehouse Clubs and Supercenters	7,006	$195,572,715
General Rental Centers	128	$5,468,386
Glass and Glass Product Manufacturing	227	$12,151,528
Grantmaking and Giving Services	882	$60,873,227
Greenhouse, Nursery, and Floriculture Production	1,727	$71,309,460
Grocery and Related Product Merchant Wholesalers	8,810	$546,182,990
Grocery Stores	30,956	$852,312,656
Hardware Manufacturing	29	$3,939,131
Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	3,339	$308,711,266
Health and Personal Care Stores	12,637	$511,765,990

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Highway, Street, and Bridge Construction	1,745	$165,694,619
Home Furnishings Stores	4,209	$117,918,824
Home Health Care Services	18,060	$538,464,061
Household and Institutional Furniture and Kitchen Cabinet Manufacturing	1,181	$61,675,643
Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	6,102	$506,430,429
Independent Artists, Writers, and Performers	566	$99,516,374
Individual and Family Services	20,682	$594,073,934
Industrial Machinery Manufacturing	562	$69,964,898
Inland Water Transportation	499	$24,752,774
Insurance and Employee Benefit Funds	94	$5,143,644
Insurance Carriers	11,375	$1,013,140,816
Interurban and Rural Bus Transportation	25	$1,163,374
Investigation and Security Services	9,633	$348,505,942
Jewelry, Luggage, and Leather Goods Stores	1,700	$64,489,612
Junior Colleges	3,209	$439,125,337
Justice, Public Order, and Safety Activities	4,740	$265,632,833
Land Subdivision	43	$2,620,315
Lawn and Garden Equipment and Supplies Stores	1,283	$50,696,595
Legal Services	18,848	$1,483,249,495
Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	204	$17,151,068
Lessors of Real Estate	6,013	$381,956,386
Lime and Gypsum Product Manufacturing	80	$5,456,344
Local Messengers and Local Delivery	763	$25,796,972
Lumber and Other Construction Materials Merchant Wholesalers	2,042	$140,594,713
Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	2,050	$114,442,404
Machinery, Equipment, and Supplies Merchant Wholesalers	4,277	$333,945,699
Management of Companies and Enterprises	16,580	$1,537,614,961
Management, Scientific, and Technical Consulting Services	8,090	$669,600,730
Manufacturing and Reproducing Magnetic and Optical Media	15	$2,286,521
Medical and Diagnostic Laboratories	4,694	$337,407,053
Medical Equipment and Supplies Manufacturing	2,561	$146,808,700
Metal and Mineral (except Petroleum) Merchant Wholesalers	626	$46,456,741
Metalworking Machinery Manufacturing	495	$35,793,122
Miscellaneous Durable Goods Merchant Wholesalers	3,062	$189,423,895
Miscellaneous Nondurable Goods Merchant Wholesalers	3,275	$167,660,221
Motion Picture and Video Industries	3,083	$104,878,586
Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	2,485	$152,299,720
Motor Vehicle Body and Trailer Manufacturing	38	$2,529,997
Motor Vehicle Parts Manufacturing	518	$27,402,111
Museums, Historical Sites, and Similar Institutions	2,101	$99,733,764
National Security and International Affairs	57	$3,701,499

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Natural Gas Distribution	3,780	$457,263,292
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	4,737	$450,557,943
Newspaper, Periodical, Book, and Directory Publishers	3,613	$260,043,360
Nondepository Credit Intermediation	3,343	$435,795,446
Nonferrous Metal (except Aluminum) Production and Processing	89	$7,073,193
Nonmetallic Mineral Mining and Quarrying	189	$17,996,836
Nonresidential Building Construction	5,994	$507,117,125
Nonscheduled Air Transportation	543	$53,554,284
Nursing Care Facilities (Skilled Nursing Facilities)	19,651	$891,667,194
Office Administrative Services	5,729	$489,461,614
Office Furniture (including Fixtures) Manufacturing	1,392	$72,070,539
Office Supplies, Stationery, and Gift Stores	2,733	$61,486,100
Offices of Dentists	10,659	$504,195,449
Offices of Other Health Practitioners	10,553	$388,682,285
Offices of Physicians	31,621	$2,708,352,760
Offices of Real Estate Agents and Brokers	2,787	$178,929,964
Other Ambulatory Health Care Services	2,203	$88,743,656
Other Amusement and Recreation Industries	17,075	$514,294,393
Other Animal Production	21	$1,138,357
Other Chemical Product and Preparation Manufacturing	191	$10,126,079
Other Electrical Equipment and Component Manufacturing	1,418	$143,974,211
Other Fabricated Metal Product Manufacturing	910	$89,259,868
Other Financial Investment Activities	2,682	$1,545,508,872
Other Food Manufacturing	891	$56,885,859
Other Furniture Related Product Manufacturing	123	$7,103,571
Other General Purpose Machinery Manufacturing	1,503	$129,728,287
Other Heavy and Civil Engineering Construction	668	$55,666,199
Other Information Services	5,651	$204,590,936
Other Investment Pools and Funds	29	$2,521,482
Other Miscellaneous Manufacturing	3,561	$186,104,963
Other Miscellaneous Store Retailers	3,220	$107,579,798
Other Motor Vehicle Dealers	851	$42,136,175
Other Nonmetallic Mineral Product Manufacturing	601	$31,848,405
Other Personal Services	2,712	$68,370,214
Other Professional, Scientific, and Technical Services	6,353	$362,552,953
Other Residential Care Facilities	1,193	$43,924,726
Other Schools and Instruction	6,217	$124,580,766
Other Specialty Trade Contractors	6,003	$419,919,910
Other Support Activities for Transportation	85	$2,990,095
Other Support Services	2,738	$127,795,502
Other Telecommunications	280	$20,328,415

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Other Textile Product Mills	607	$37,377,343
Other Transit and Ground Passenger Transportation	1,546	$52,266,818
Other Wood Product Manufacturing	656	$37,631,214
Outpatient Care Centers	6,411	$422,037,856
Paint, Coating, and Adhesive Manufacturing	259	$23,826,922
Paper and Paper Product Merchant Wholesalers	1,669	$119,849,972
Performing Arts Companies	1,007	$28,284,974
Personal and Household Goods Repair and Maintenance	1,154	$45,530,725
Personal Care Services	13,610	$288,524,929
Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	97	$5,463,258
Petroleum and Coal Products Manufacturing	154	$11,497,166
Petroleum and Petroleum Products Merchant Wholesalers	664	$138,305,488
Pharmaceutical and Medicine Manufacturing	9,886	$550,806,366
Plastics Product Manufacturing	2,437	$116,910,224
Poultry and Egg Production	27	$1,546,482
Printing and Related Support Activities	4,619	$239,272,342
Private Households	2,479	$97,328,379
Professional and Commercial Equipment and Supplies Merchant Wholesalers	9,363	$908,874,619
Promoters of Performing Arts, Sports, and Similar Events	285	$13,557,157
Psychiatric and Substance Abuse Hospitals	3,177	$184,093,914
Pulp, Paper, and Paperboard Mills	279	$13,562,987
Radio and Television Broadcasting	275	$20,383,158
Religious Organizations	7,291	$184,602,839
Remediation and Other Waste Management Services	1,461	$88,240,784
Residential Building Construction	11,612	$673,294,093
Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	9,091	$372,492,911
Restaurants and Other Eating Places	79,010	$1,833,079,045
Rubber Product Manufacturing	129	$9,036,246
RV (Recreational Vehicle) Parks and Recreational Camps	202	$15,293,772
Satellite Telecommunications	43	$4,284,682
Sawmills and Wood Preservation	17	$1,641,144
Scenic and Sightseeing Transportation, Land	48	$1,290,081
Scenic and Sightseeing Transportation, Water	101	$2,700,676
Scheduled Air Transportation	758	$46,719,508
School and Employee Bus Transportation	10,236	$331,494,846
Scientific Research and Development Services	8,842	$661,405,436
Securities and Commodity Contracts Intermediation and Brokerage	3,864	$804,298,347
Semiconductor and Other Electronic Component Manufacturing	3,431	$276,662,403
Services to Buildings and Dwellings	25,899	$969,944,503
Ship and Boat Building	63	$2,794,501

NAICS 4 DIGIT INDUSTRY SECTOR	ESTIMATED LONG ISLAND EMPLOYMENT (2016)	ESTIMATED LONG ISLAND PAYROLL (2016)
Shoe Stores	2,416	$70,521,405
Soap, Cleaning Compound, and Toilet Preparation Manufacturing	1,828	$229,211,133
Social Advocacy Organizations	1,422	$58,417,494
Software Publishers	648	$72,596,294
Sound Recording Industries	111	$4,722,986
Special Food Services	10,188	$253,387,009
Specialized Design Services	1,308	$74,786,470
Specialized Freight Trucking	2,680	$147,969,934
Specialty (except Psychiatric and Substance Abuse) Hospitals	770	$64,460,469
Specialty Food Stores	3,897	$104,329,549
Spectator Sports	2,545	$139,370,736
Sporting Goods, Hobby, and Musical Instrument Stores	6,098	$147,010,951
Spring and Wire Product Manufacturing	87	$4,371,868
Sugar and Confectionery Product Manufacturing	711	$36,140,920
Support Activities for Air Transportation	671	$43,131,757
Support Activities for Animal Production	214	$7,224,565
Support Activities for Crop Production	8	$293,696
Support Activities for Road Transportation	473	$20,816,642
Support Activities for Water Transportation	221	$7,085,070
Taxi and Limousine Service	1,485	$42,291,712
Technical and Trade Schools	936	$36,976,125
Textile and Fabric Finishing and Fabric Coating Mills	94	$5,968,765
Textile Furnishings Mills	295	$21,486,052
Travel Arrangement and Reservation Services	1,685	$93,994,960
Traveler Accommodation	5,474	$192,041,071
Urban Transit Systems	1,853	$107,935,555
Used Merchandise Stores	691	$18,384,985
Utility System Construction	3,155	$382,383,473
Vegetable and Melon Farming	384	$12,903,769
Vending Machine Operators	453	$15,425,088
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	403	$26,660,604
Vocational Rehabilitation Services	1,007	$42,376,689
Warehousing and Storage	1,854	$114,193,000
Waste Collection	2,549	$151,374,350
Waste Treatment and Disposal	839	$54,068,525
Water, Sewage and Other Systems	1,086	$82,955,275
Wholesale Electronic Markets and Agents and Brokers	7,964	$907,154,091
Wired and Wireless Telecommunications Carriers	5,984	$1,230,954,939

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