



AN ECONOMIC EVALUATION OF EMPLOYMENT IN THE CONNECTICUT GREEN INDUSTRY



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This report was generated at the request of the Connecticut Nursery and Landscape Association (CNLA). It was conducted in cooperation with the Department of Agricultural and Resource Economics of the University of Connecticut, UConn Extension, CNLA, and Farm Credit East. Comments by Dustyn Nelson, Bonnie Burr, and Laura Brown for improving this report are greatly appreciated.

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An Economic Evaluation of Employment in the Connecticut Green Industry

EXECUTIVE SUMMARY

Objectives and Scope

The Connecticut green industry, defined here as the ornamental horticulture industry, is the leading agricultural sector in sales and employment in the state, accounting for 51 percent of total farm cash receipts in 2017. The industry comprises a diverse group of business enterprises involved in producing ornamental plants as well as constructing and maintaining the lawns and gardens of residential, commercial, and public landscapes. Specifically, the industry comprises wholesale and retail nursery, greenhouse, turfgrass and sod producers; landscape architecture, design, construction, and maintenance firms; distributors of lawn and garden products at wholesale and retail, including landscape distribution centers, garden centers, home improvement stores, and suppliers of inputs and equipment to these industry sectors. The industry thus includes a set of vertically related industries beyond the farm gate, including utilization of products through landscape design, plant installation and management services, and retail marketing and distribution of plants and horticultural products to the consumer.

The objective of this study is to evaluate employment and wages in the Connecticut green industry. To this end, three specific objectives were pursued:

- Identify constraints in the labor market that may adversely impact growth in the green industry in Connecticut.
- Identify employment and salary trends within the green industry and relative to other relevant sectors of the state economy, broken down by skill levels, occupation codes, and employment location quotients in relation to national levels.
- Provide policy recommendations for mitigating bottlenecks in the state green industry labor market.

This study was initiated at the request of the Connecticut Nursery and Landscape Association (CNLA) and executed with collaboration and/or funding from Farm Credit East, and the Departments of Extension and Agricultural and Resource Economics at the University of Connecticut.

Major Findings

From a qualitative analysis of the existing literature on employment and salaries in the green industry in Connecticut and elsewhere, the major findings are:

- Nursery production requires specific skills and basic education that are complex relative to other agricultural sectors. This affects labor entry into the industry.
- The lack of availability of skilled workers in the industry was experienced elsewhere in the United States and Canada even before the COVID pandemic and has possibly resulted in a lower growth of output of the industry.

- Wages in the horticultural industry are generally lower than for other jobs requiring comparable skills and education such as those in construction. In Connecticut, even though wages in horticulture exceed those in other agricultural sectors, they fall below the median income of construction workers and the median income for the state.
- In addition to comparatively low wages, the reputation of horticultural work is a second-order barrier to enticing potential workers into green careers.

From an analysis of the employment, skills, and wages utilizing the latest IMPLAN Occupational Study database for 2019 and 2020, the major findings are:

- The Connecticut green industry output (e.g., sales) grew by just over 4 percent between 2019 and 2020. Except for Lawn and Garden Equipment Retailing, the wholesaling and retailing sectors contracted. In contrast, the two leading sectors in output growth were the Floriculture, Nursery, and Sod (11 percent) and Landscape and Construction Services (5.5 percent).
- Connecticut green industry employment remained flat between 2019 and 2020. The only two components with modest growth in employment were Floriculture, Nursery and Sod (5.41 percent) and Lawn and Garden Equipment and Retailing (1 percent).
- While output expanded robustly between 2019 and 2020 in the Floriculture, Nursery, and Sod sector, employment grew by only half as much as output. That means employers experienced major pressure to produce more with fewer employees. This was particularly acute in the Landscape and Construction Services sector, where output grew by a healthy 5.5 percent, but employment declined by 0.39 percent.
- The Connecticut green industry location quotients for 2019 and 2020, comparing Connecticut's employment to the national concentration of employment in the industry, indicate that the green industry is relatively more important in employment in Connecticut than in the U.S. as a whole, and that its importance grew between 2019 and 2020. This suggests that the green industry represents a significant contribution to employment in the Connecticut economy.
- Comparison of annual earnings for employees in the green industry between 2019 and 2020 indicates that wages grew in this industry by approximately 2 percent while overall Connecticut wages increased by an average of 5.5 percent. A significant wage decrease is estimated for the Floriculture, Nursery, and Sod sector, while the Landscape and Maintenance Services sector experienced an approximately 4.7 percent increase in wages, perhaps due to differences in the seasonal duration of employment and in the hourly rate of pay.
- From the current employment pool, the education required of 69 percent of the employees in the green industry is either high school or less than high school (51 percent) or post-secondary certificate (18 percent). Another 20 percent had associate's or bachelor's degrees, with the remaining 11 percent having more advanced degrees. This profile reflects a lower level of educational attainment than is required by many other industries in the state.
- The work experience of the current green industry labor pool indicates a general lack of experience, short duration, or high turnover in employment. For instance, more than 77 percent of employees in the sector have less than two years of experience, a rate somewhat below the state average across all employers.

- Not surprisingly, 85 percent of current employees required less than a year of on-the-job training, with 58 percent requiring either no job training or less than three months of training.
- The knowledge, skills, and abilities typically required for advancement in the industry are broad and varied. Top knowledge required for higher-level positions in the industry includes customer service and English language skills, with experience with computers and electronics, mathematics, clerical tasks, education and training, and administration and management being of nearly equal importance.
- Top abilities and skills required include good communication skills (oral, written, and listening), near vision, organizational skills, critical thinking, problem solving, and some physical strength, although many other skills are almost equally important.

Recommendations

To foster green industry activity in Connecticut, high priority must be given to removing labor constraints via labor force development programs. Given the levels of skill and knowledge demanded by this industry, and because there are limited training options for young people who may be interested in green industry employment, it is recommended that:

- More programs be offered at various levels of the educational system, but particularly at the high school and community college level, to help students build skills needed by greenhouse, nursery, and landscape employers. This will require greater collaboration between educators and the green industry to develop programs, simulate interest in the sector among young people, and offer meaningful employment opportunities for graduates of such programs.
- Educational programs for green industry careers be enhanced by establishing industry partnerships with educational institutions to offer internships and apprenticeships for those who may be interested in pursuing a green industry career.
- Advocate raising the cap on H-2B visas to help the green industry access temporary work visas. The H-2A program, despite its limitations, including complexity and cost, does not have an annual cap on the number of visas issued. The H-2B program, which landscapers are limited to, does have an annual cap, which significantly limits the utility of that program to the industry.
- Make significant adjustments to make the green industry more attractive to prospective employees. These could include increasing the pay scale, making benefits such as health insurance more available, and providing more opportunities for skill development, advancement, and personal growth.

This study grew out of a concern about lack of labor availability in the green industry and an interest in fostering employment opportunities and economic growth in Connecticut. Given the tight labor market in the state, and particularly in the green industry, without investment in labor force development and labor-saving technology, labor constraints will become economic growth constraints for the industry. The COVID pandemic has, in fact, been a mixed blessing for the industry. Although sales and demand are at record highs, they have underscored the lack of available labor and resulted in input cost inflation and the narrowing of profit margins. The alleviation of labor constraints may not be an easy task, but it is central to promoting a more competitive green industry and to increasing the contribution of this industry to the Connecticut economy.

An Economic Evaluation of Employment in the Connecticut Green Industry

1. Introduction

The green industry comprises a diverse group of business enterprises involved in producing ornamental plants as well as constructing and maintaining the lawns and gardens of residential, commercial, and public landscapes. Specifically, the industry includes wholesale and retail nursery, greenhouse, and turfgrass and sod producers; landscape, architecture, design, construction, and maintenance firms; and distributors of wholesale and retail lawn and garden products, including landscape distribution centers, garden centers, home improvement stores, and suppliers of inputs and equipment to these industry sectors (Laughton and Lopez, 2019).

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- Identify constraints in the labor market that may adversely impact growth in the green industry in Connecticut.
- Identify green industry employment and salary trends within the industry and relative to other relevant sectors of the state economy, broken down by skill levels, occupation codes, and employment location quotients in relation to national levels.
- Provide policy recommendations to mitigate bottlenecks in Connecticut's green industry labor market.

2. Employment and Wages in the Horticultural Labor Market

In this section we focus on employment and wages in the Connecticut green labor market, which is the largest employer in the state agricultural sector. For most sectors within the green industry, labor is the number-one variable cost. In the nursery production sector, labor costs range between 20 and 30 percent of production expenses for field-grown plants (Oregon State University, 2021). In addition, nursery production requires a range of specific skills, such as the ability to identify and properly diagnose problems in plants and other crops. The skills required of laborers in the green industry are not just niche; they also demand a certain baseline level of education or experience that cannot not necessarily be assumed or expected (Oregon State University, 2021). Pitt (2021) developed a conceptual framework for understanding the skill challenges facing the green industry.

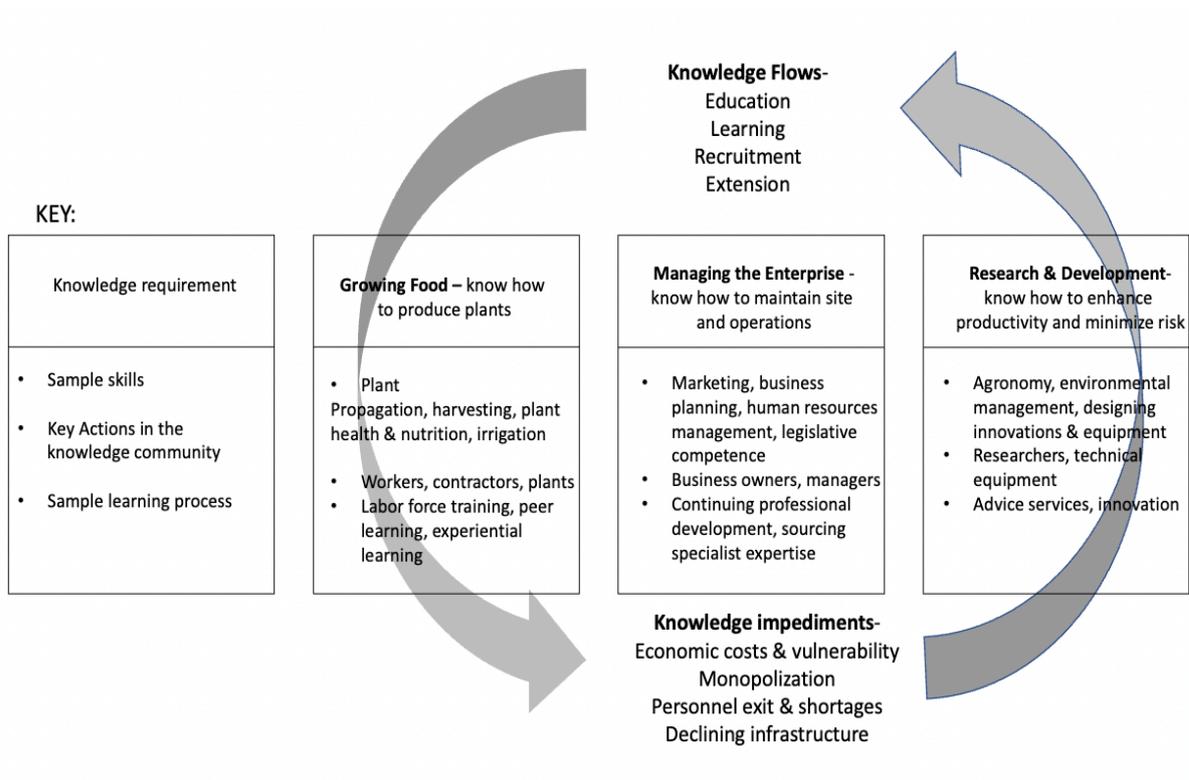


Figure 1. Pitt's Framework of Skills and Abilities Required to Grow Food

Pitt's framework illustrates the quite specific skill requirements that, combined with high labor demands, result in the green industry having great concerns about labor incentives, availability, and costs.

One recent factor that seems to influence the availability of labor in the green industry is the legalization of marijuana in many states across the country, including Connecticut. The cannabis industry provides prospective employees the potential to work in what is perceived as an "up-and-coming" industry (Johnson, 2019), and may pull from the same pool of potential employees who may be interested in green industry employment. In Canada, the cannabis sector was found to be a "budding source of employment," with about 10,400 workers in November 2018, just after the legalization of marijuana consumption: a 266 percent increase from the previous year (Johnson, 2019). As with the horticulture industry as whole, running a successful cannabis operation requires strong understanding of growth and propagation requirements, which in turn has implications for the skills and knowledge required of workers. There is a great deal of overlap in the skills required for employment in the cannabis industry and the green industry. Some studies have found, however, that cannabis legalization is unlikely to negatively impact incumbent firms through the labor market channel (Jiang and Miller, 2021). It remains to be seen whether the growth of the legal cannabis industry will pull employees away from the green industry or help to increase interest in the fields of agriculture and plant cultivation more broadly, which could ultimately benefit the green industry.

Average wages for employees in the ornamental horticulture industry are often below market rates in other comparable occupations. In Connecticut, the average worker in the Farmworkers and Laborers, Crop, Nursery, and Greenhouse sectors earns \$28,530 annually, with the top 10th percentile earning more than \$40,430 and the bottom 10th earning less than \$23,570 (O*NET OnLine, National Center for O*NET Development, 2021b), while

landscaping and groundskeeping workers earn, on average, \$36,030 annually, with the top 10th percentile earning more than \$56,460 and the bottom 10th earning less than \$26,210 (O*NET OnLine, National Center for O*NET Development, 2021a). Compared to the construction industry, these wages are relatively low.¹ In addition, compared to the Connecticut state median individual income of approximately \$37,865, the average horticulture industry employee earns significantly less (U. S. Census Bureau, 2020). Some of the wage difference can be explained by the seasonality of employment in the green industry. To make an above-average salary in Connecticut, a worker would need to be within the top 25 percent of the Farmworkers and Laborers, Crop, Nursery, and Greenhouse earners. (O*NET OnLine, National Center for O*NET Development, 2021b).

The discrepancy between average wages in the horticultural industry compared to other comparable sectors is not unique to Connecticut; it exists on a national scale as well. In the United States, the average worker in the green industry earns \$28,660 annually, with the top 10th tenth percentile earning more than \$37,990, and the bottom 10th earning less than \$25,270 (Recruiter, 2021). Compared to the United States national median individual income of around \$35,977, the horticulture industry—in Connecticut and nationally—does not, on average, provide market competitive wages to most prospective employees (U. S. Census Bureau, 2020). Only the top 10th percentile of employees earns wages that can be reasonably considered above average.

The skills required for employment in the green industry, combined with the lack of competitive wages, create a very real obstacle to assembling a strong ornamental horticulture workforce. While low wages, specifically, have been cited as a common difficulty associated with recruiting and retaining employees, many green industry production workers are

¹ In Connecticut, the median annual salary for construction laborers is \$49,900, with the bottom 10th percentile being \$33,580 or less and the top 10th being \$72,270 or more.

concentrated in a limited demographic range. For example, one study showed that, nationally, more than 46 percent of horticulture employees were Hispanic, and 76 percent were male (Waliczek et al., 2002). Similarly, fewer women were working in the Florida ornamental horticulture industry, and most women who were employed in the industry at the time worked in clerical positions (Waliczek et al., 2002). Waliczek et al. (2002) also found that workplaces employing a broader demographic range of workers showed improved recruitment and retention, and that greater diversity positively affected management styles and relationships within the company. Nearly 20 years later, available data suggests that the lack of diversity has not changed significantly. In 2019, 26 percent of U.S. farmworkers were female, and 57 percent were Hispanic (USDA, 2022). Data specific to the demographics of agricultural employees in Connecticut were unavailable, so it is not known how similar or different they may be to national trends.

The significance of migrant workers (other than those who enter under H-2 visas) to the green industry in the U.S. has declined over time. In other words, there are fewer employees who seasonally migrate from job to job, within the U.S. today than there were in the past. The green industry thus has become increasingly reliant on workers who reside locally. As a result, according to the USDA, “more than 80 percent of hired crop farmworkers are considered ‘settled,’ meaning that they work at a single location within 75 miles of their home” rather than moving from one region of the country to another to find employment (U.S. Department of Agriculture, 2022). This has made the green industry more reliant on the local pool of job seekers, or on temporary foreign workers who enter the U.S. on visas, such as H-2A and H-2B. Canada, which also struggles to incentivize local populations to take jobs in the horticulture industry, relies more heavily on foreign worker programs. Foreign workers account for 28 percent of Canada’s horticulture employees, with many farms relying on federal programs that bring in seasonal, lower-skilled labor (Johnson, 2019). Canada’s

endeavors to build a larger horticultural workforce suggest that making the green industry more appealing to local populations may be one way to address many of its present challenges.

The perception of the horticulture industry also plays a role in the labor shortage. The executive director of the Oregon Association of Nurseries, Jeff Stone, indicates that entry-level jobs are especially difficult to fill as they have the reputation of being dirty and unskilled (Meyers, 2018). Fewer and fewer people aspire to become “craftsmen of plants,” and the availability of skilled labor has been shrinking for a long time, according to Stone. This labor shortage has hindered the growth of the sector. As a result, the industry has been growing by only 2 percent annually in Oregon, whereas with a full labor force, the nursery market would expect an annual growth rate of between 10 and 20 percent (Meyers, 2018).

The reputation of horticultural work, the knowledge and skills required by modern production norms, the labor supply, and wages: all these factors impede the U.S. horticultural industry. In Connecticut, horticulture enterprises demand a rather high skill level of their employees but offer them inadequate incentives to gain the necessary skills. In addition, many of the jobs offer wages that are too low to entice enough local workers to careers in horticulture; even many well-established and experienced horticultural employees do not make significantly more than the median income in the state. Finally, the lack of interest from locally residing employees has resulted in a need for foreign, seasonal employees, complicating issues around diversity, communication, and overall operational management. These visa programs differ in their level of utility to the green industry depending on the sub-sector involved. Most plant growers are eligible to access the H-2A visa program, designated for agricultural employers, which has no cap on the number of visas issued. In contrast, most service sectors of the industry, such as landscape contractors, must apply through the non-

agricultural visa program (H-2B), which has a cap on the number of visas issued annually, and is typically very oversubscribed.

Waliczek et al. (2002) found that green industry businesses were recruiting employees with various educational backgrounds, including those with degrees in horticulture as well as degrees in other related areas. Therefore, one potential pathway to addressing the labor shortage in Connecticut's horticulture industry would be to further invest in a robust technical education program for horticulture, providing prospective students with the tools necessary to succeed in an array of horticultural jobs. Currently Connecticut has 20 high schools offering Agricultural Science and Technology Education, also known as Vo-Ag, and many of those have horticulture programs. In addition, the University of Connecticut, and other higher education institutions offer programs in horticulture, agriculture or related fields. Nonetheless, there does not seem to be an adequate number of students graduating these programs to satisfy industry demand. There may be an opportunity to better integrate horticultural and agricultural education into the general curriculum for all students, which could provide them with a broader understanding of horticulture, food, agriculture and the natural world.

Green enterprises also have a responsibility to create incentives to pursue a career in their industry. While some factors favor a career in horticulture, such as having a friend or family in the industry, knowing people who work in the industry, and enjoying working with plants, the most serious barrier to pursuing a career remains pay (Bledsoe, 2020). In Connecticut, for example, the construction industry typically offers more competitive wages than the horticulture industry. The presence of new and potentially lucrative sectors such as cannabis does not seem to be sufficient in and of itself to attract workers motivated to develop the knowledge and skills needed for a career in horticulture. And it goes without saying that the COVID-19 pandemic has damaged the momentum the horticulture sector had

been generating, as the number of people employed in the sector dropped, which decreased the total hours worked (Marwah et al., 2021). To remain competitive and reduce the current high level of employee turnover, the horticultural sector may have to consider raising wages (Waliczek et al., 2002). This, however, would introduce new challenges. Chief among them is that, in the absence of labor-saving technologies, green industry business would likely need to raise prices to cover their higher labor costs. Given that the purchase of ornamental horticultural products and services are discretionary for consumers, this could reduce sales for the industry.

While wage increases may reduce profits in the short term, increased wages could be the incentive that will reinvigorate the momentum that has been lost in the horticulture industry. With the promise of higher wages, more individuals who are interested in the field might choose to attend an institution, such as the University of Connecticut, where they can acquire the education, skills, and knowledge necessary to succeed in a horticultural career. As higher-skilled employees become more readily available, the operational efficiency of farms and greenhouses could increase, generating increased yields and, by extension, profits. With increased profits comes the potential for better wages and benefits, which would increase the appeal of horticulture careers. This entire process can become a positive feedback loop that propels the industry. The sources and data reviewed for this report all point to importance of the state, educational institutions, and the leaders of the horticultural industries investing in education, in their employees, and in their communities as the means to foster the growth and success of the green industry.

3. Data, Scope, and Methodology

This report quantifies the latest trends observed in the level of employment and wages, as well as the level of education, experience, knowledge, and skills required by the green industry in Connecticut, comparing these values to various benchmarks. Industry

sectors within or contributing to the green industry were selected based on their definitions in the NAICS (U.S. Census Bureau, 2022). Production and manufacturing include the floriculture, nursery, and sod production sectors (NAICS 1114), and lawn and garden equipment manufacturing (333112). Services include landscaping (56173) and landscape architectural services (54132). The wholesale and retail trade sectors include lawn and garden equipment merchant wholesalers (423820); flower, nursery stock, and florist supply wholesalers (42493); lawn and garden equipment and supply retailing (4442); and florists (4531). The data used for each of these components is described in Appendix B.

Many businesses and institutions, such as schools and universities, and state and municipal governments, have landscaped grounds that are managed internally. They are not included in the sales and employment data collected by the federal government (although their purchases of supplies from wholesalers and retailers are included). Thus, this information could not be captured in our figure, but we do not think that it differs significantly from what is reported.

The main source of information is IMPLAN Occupational Data (IMPLAN 2022). The IMPLAN software has a thorough and extensive economic database from more than 90 sources. This report contains the following metrics:

- *Output* represents the value of industry production; these are annual production estimates and are reported as producer prices. For manufacturers this would be sales plus/minus change in inventory, while for retail and wholesale trade, output = gross margin and not gross sales (i.e., the value of the goods and services sold).
- *Employment* represents the number of positions in the economy, not the number of employed persons. As many people have more than one job, there are always

more jobs than employed persons in the economy. *Employment* includes wage and salaried employees and proprietors.²

- *Location quotients* compare the relative concentration of local or state employment in a sector to the concentration in the U.S. They can be calculated for output or labor. An LQ of employment greater than 1 means that the employment share in the state is greater than the national share.
- *Average hourly wage for employees* includes base salary and/or wages, employee-paid social insurance tax, bonuses, stock options, severance pay, profit distributions, and reimbursements for meals and lodging, divided by the hours worked.
- *Average annual wage* includes base salary and/or wages, employee-paid social insurance tax, bonuses, stock options, severance pay, profit distributions, and reimbursements for meals and lodging, divided by the number of employees.
- *Education Required, Work Experience Required, and On-the-Job Training* is measured as the percentage of employees that exhibit the given competency for each sector.
- *Ability, Knowledge, and Skills* is a measure of the relative size of a competency compared to the total sum of like competencies and how important this competency is compared to other like competencies for each sector.³

² Jobs are not full-time equivalencies in input-output models but, rather, annualized counts per industry that include full-time, part-time, and seasonal employment. Thus, one job lasting 12 months equals two jobs lasting six months each and/or three jobs lasting four months each. A job can be either full-time or part-time. Similarly, a job that lasts one-quarter of the year would be 1/4 (0.25) jobs.

³ For more detail on how ability, knowledge and skills are measured, see <https://support.implan.com/hc/en-us/articles/360051197853-Occupation-Data-Details>

4. Results and Discussion

Since the onset of the COVID-19 pandemic in 2020, the state of Connecticut has suffered the slowdown or stoppage of a significant number of activities, resulting in a reduction of total output of approximately 5 percent (Table 1). The green industry, however, has increased its production by around 4 percent, though with heterogeneous results across its different components (Table 1). Landscape architectural services, lawn and garden equipment wholesalers, and florists saw a significant decrease in activity, while floriculture, nursery and sod, and landscape and construction services flourished.

Table 1: Total Output (Millions of \$)

	2019	2020	% Change	
Total Green Industry	Floriculture, Nursery & Sod (1114)	301	333	10.87%
	Lawn & Garden Equip. (333112)	68	69	0.90%
	Landscape Construction & Maint. Svcs (56173)	1,525	1,609	5.51%
	Landscape Architectural Svcs (54132)	57	50	-13.26%
	Lawn & Garden Equip. Wholesalers (423820)	66	58	-10.93%
	Flower, Nursery & Florist Wholesalers (42493)	41	36	-11.70%
	Lawn & Garden Equip. Retailing (4442)	413	430	4.12%
	Florists (4531)	67	62	-7.23%
	Total Green Industry	2,537	2,647	4.34%
<i>Total for Connecticut</i>	<i>479,768</i>	<i>456,961</i>	<i>-4.75%</i>	

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments. Nominal values are reported, without further adjustments.

The United States as a whole, and the state of Connecticut in particular, showed a very similar trend in the loss of jobs with a decrease of around 5 percent during the period considered, in contrast to the resilience observed in the green industry, which had maintained its pre-pandemic level of employment (Table 2). Despite the significant increase in output observed previously, the industry does not seem to have reacted in terms of employment, perhaps due to difficulties in finding employees.

We observe that the green industry is relatively more important to the overall economy in Connecticut compared to the national level, reflecting a certain degree of

specialization in the region. Furthermore, the green industry increased its importance in the region during 2020 (Table 3).

Table 2: Total Number of Jobs (Employees and Proprietors)

	2019	2020	% Change	
Total Green Industry	Floriculture, Nursery & Sod (1114)	4,502	4,746	5.41%
	Lawn & Garden Equip. (333112)	125	123	-1.81%
	Landscape Construction & Maint. Svcs (56173)	15,934	15,872	-0.39%
	Landscape Architectural Svcs (54132)	326	317	-2.89%
	Lawn & Garden Equip. Wholesalers (423820)	203	189	-6.95%
	Flower, Nursery & Florist Wholesalers (42493)	220	203	-7.72%
	Lawn & Garden Equip. Retailing (4442)	3,041	3,071	1.00%
	Florists (4531)	1,138	985	-13.44%
	Total Green Industry	25,490	25,505	0.06%
	<i>Total for Connecticut</i>	<i>2,333,390</i>	<i>2,207,363</i>	<i>-5.40%</i>
Total U.S.	201,644,200	190,776,800	-5.39%	

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments.

Table 3: Employment Location Quotient vs. National Levels

	2019	2020	
Total Green Industry	Floriculture, Nursery & Sod (1114)	2.37	2.64
	Lawn & Garden Equip. (333112)	0.60	0.62
	Landscape Construction & Maint. Svcs (56173)	1.00	1.06
	Landscape Architectural Svcs (54132)	0.98	1.01
	Lawn & Garden Equip. Wholesalers (423820)	0.79	0.78
	Flower, Nursery & Florist Wholesalers (42493)	1.08	1.06
	Lawn & Garden Equip. Retailing (4442)	1.08	1.11
	Florists (4531)	0.96	0.87
	Total Green Industry for CT	1.25	1.35

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments. The location quotient compares the relative concentration of employment in a given industry for a specific area to the concentration in the same industry for the entire U.S.A.

The different trends observed between the sales of the green industry and the number of jobs generated could be associated with the lack of competitive wages. Table 4 details the hourly wage obtained by the employees in the various components of the green industry and the average of the whole industry. It shows that the average wage per hour for the industry (including managers, technical staff, etc.) is below the average wage obtained by the lowest

possible level of occupation in the construction industry (e.g., construction laborer). Also, the average wage per hour in the green industry is 60 percent of the average observed at the state level.

Table 4: Average Hourly Wages (\$) for Employees (Proprietors not Included)

	2018	2019	% Change	
Total Green Industry	Floriculture, Nursery & Sod (1114)	16.54	15.86	-4.05%
	Lawn & Garden Equip. (333112)	20.71	28.12	35.75%
	Landscape Construction & Maint. Svcs (56173)	22.43	24.37	8.67%
	Landscape Architectural Svcs (54132)	43.51	45.78	5.22%
	Lawn & Garden Equip. Wholesalers (423820)	42.58	44.31	4.06%
	Flower, Nursery & Florist Wholesalers (42493)	70.85	73.66	3.97%
	Lawn & Garden Equip. Retailing (4442)	27.36	28.07	2.61%
	Florists (4531)	17.77	18.27	2.82%
	Total Green Industry	22.64	23.91	5.60%
	Construction Laborers*	24.55	25.75	4.86%
<i>Total for Connecticut</i>	<i>35.87</i>	<i>37.55</i>	<i>4.73%</i>	

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments. Nominal values are reported, without further adjustments. *Construction Laborers as defined by 2018 Standard Occupational Classification

Additionally, due to the seasonality of the jobs offered by the green industry, the differences in terms of annual income are bigger than the ones reflected by the wage per hour. On average construction laborers have a wage that is 12 percent higher, as can be observed in Table 5.

Table 5: Average Annual Wage (\$) for Employees (Proprietors not Included)

	2018	2019	% Change	
Total Green Industry	Floriculture, Nursery & Sod (1114)	29,597	27,714	-6.36%
	Lawn & Garden Equip. (333112)	50,702	58,857	16.08%
	Landscape Construction & Maint. Svcs (56173)	41,285	44,415	7.58%
	Landscape Architectural Svcs (54132)	89,383	93,424	4.52%
	Lawn & Garden Equip. Wholesalers (423820)	89,557	92,735	3.55%
	Flower, Nursery & Florist Wholesalers (42493)	142,805	147,905	3.57%
	Lawn & Garden Equip. Retailing (4442)	46,062	47,158	2.38%
	Florists (4531)	27,985	28,846	3.08%
	Total Green Industry	41,248	43,075	4.43%
	Construction Laborers*	46,088	47,882	3.89%
<i>Total for Connecticut</i>	<i>67,519</i>	<i>70,309</i>	<i>4.13%</i>	

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments. Nominal values are reported, without further adjustments. *Construction Laborers as defined by 2018 Standard Occupational Classification

As shown in Table 6, the top occupations in the Connecticut green industry are landscaping and groundskeeping workers, with over 42 percent of the jobs, and farmworkers and laborers, with over 10.6 percent of the jobs, followed by a mix of the business side of the industry (retailing/cashier/office clerks) and laborers and supervisors in related sectors. Appendix C shows the top occupations for each subsector of the green industry.

Table 6. Top Occupations in the Green Industry in 2019

	Occupation	Number of jobs	Percentage of jobs
Total Green Industry	Landscaping and Groundskeeping Workers	8063	42.24%
	Farmworkers and Laborers	2035	10.66%
	Retail Salespersons	1171	6.13%
	First-Line Supervisors & Groundskeeping Workers	973	5.10%
	Tree Trimmers and Pruners	595	3.12%
	Cashiers	459	2.40%
	Office Clerks, General	445	2.33%
	General and Operations Managers	405	2.12%
	Stockers and Order Fillers	316	1.65%
	Laborers and Freight, Stock, and Material Movers, Hand	272	1.43%
All remaining occupations	4356	22.82%	

Note: These occupations are defined using the Standard Occupational Classification (SOC) codes found at <https://support.implan.com/hc/en-us/articles/360052254333-Occupation-Data> . For detailed top occupations by subsectors, see Appendix C. The remaining occupations include 80 SOCs.

Beyond this classification, it is instructive to examine the kinds of education, experience, and labor skills required by the industry, particularly in relation to competitive labor sectors. The lower, and therefore less competitive, wages offered by the green industry likely stem from the lower level of education or experience required of workers. As can be observed in Table 7, the level of job skills required is significantly higher in the green industry than for construction laborers. Notably, 30 percent of the green jobs require college courses or more versus only 4 percent for construction workers. This pattern is observed again for work experience and on-the-job training required.

Table 7: Education, Years of Work and On-the-Job Training Required (2019)

		<i>Level of education required ⁽¹⁾</i>			
		Less than a High School Diploma	High School Diploma	Post-Secondary Education	College Courses or more
	Total Green Industry	25.87%	25.33%	18.41%	30.39%
	Construction Laborers	32.53%	34.90%	27.98%	4.59%
		<i>Years of work experience</i>			
		None	0 < year <= 2	2 < year <= 4	4 < year
	Total Green Industry	22.39%	55.07%	10.40%	12.14%
	Construction Laborers	43.47%	55.37%	0.00%	1.16%
		<i>On job training required</i>			
		None	0 < year <= 2	2 < year <= 4	4 < year
	Total Green Industry	21.88%	74.32%	1.33%	2.46%
	Construction Laborers	28.84%	70.00%	0.00%	1.16%

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments.
 *Construction Laborers as defined by 2018 Standard Occupational Classification. The description of the education category can be found in Appendix D.

Comparing abilities and skills of green and construction workers, we found a pattern very similar to the one observed for formal education and experience. In Table 8, one can observe that physical abilities (red) are significantly important for both, and although the share (importance) is not equal, overall the abilities required are not distinguishable. Additionally, it can be observed that communication skills, problem solving, and time management are valuable for both, without significant differences.

Finally, as expected, the knowledge required of workers in the green industry and construction is significantly different from what is required of construction workers (Table 9). The availability of workers in the green industry will be closely related to the investment required for workers to acquire the knowledge necessary and the wages they will obtain from working in the industry. Workers in segments of the green industry that fit profiles in terms of abilities and skills required in other industries, they are likely to choose to move to industries with higher wages.

Table 8: Top Ten Abilities and Skills Required (2019)

Total Green Industry		Construction Laborers	
Abilities			
Description	Share	Description	Share
Oral Comprehension	3.67%	Static Strength	3.92%
Oral Expression	3.51%	Manual Dexterity	3.80%
Near Sightedness	3.22%	Multilimbed Coordination	3.20%
Problem Sensitivity	3.14%	Trunk Strength	3.19%
Multilimbed Coordination	3.03%	Oral Comprehension	2.87%
Trunk Strength	2.93%	Control Precision	2.87%
Static Strength	2.85%	Arm-Hand Steadiness	2.86%
Information Ordering	2.84%	Near Vision	2.76%
Speech Recognition	2.80%	Oral Expression	2.65%
Control Precision	2.79%	Problem Sensitivity	2.55%
Skills			
Description	Share	Description	Share
Active Listening	5.20%	Coordination	6.21%
Coordination	4.98%	Active Listening	5.74%
Speaking	4.78%	Speaking	5.74%
Critical Thinking	4.71%	Operation and Control	5.74%
Monitoring	4.31%	Operation Monitoring	5.29%
Operation and Control	4.26%	Reading Comprehension	4.42%
Social Perceptiveness	4.19%	Critical Thinking	4.42%
Time Management	4.19%	Complex Problem Solving	4.42%
Service Orientation	4.17%	Monitoring	4.01%
Judgment and Decision Making	4.14%	Time Management	3.65%

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments.
 *Construction Laborers as defined by 2018 Standard Occupational Classification

Table 9: Top Ten Knowledge Fields Required (2019)

Total Green Industry		Construction Laborers	
Description	Share	Description	Share
Customer and Personal Service	8.63%	Building and Construction	17.50%
English Language	7.08%	Public Safety and Security	10.08%
Administration and Management	5.79%	Mechanical	9.75%
Mathematics	5.76%	Customer and Personal Service	6.65%
Mechanical	5.17%	Education and Training	5.10%
Clerical	4.92%	Mathematics	4.53%
Production and Processing	4.42%	Design	4.12%
Chemistry	4.38%	English Language	3.90%
Education and Training	4.37%	Administration and Management	3.72%
Sales and Marketing	4.35%	Engineering and Technology	3.47%

5. Summary and Recommendations

The Connecticut green industry is facing real challenges in attracting new workers, as well as in developing and retaining those workers once they are employed in the sector. This challenge is significant and is limiting the growth of the industry in the state. The preceding sections of this report have detailed the current situation as well as many of the factors that have contributed to it. This section attempts to address possible solutions to these challenges and to suggest actions policy makers, educational institutions, and ultimately the various sectors of the green industry itself might take to address them.

The pipeline of potential workers for the industry is constrained by the lack of available training in a “chicken-and-egg” scenario. There are insufficient educational programs available to train workers for employment in the horticultural field, which limits the opportunities for students interested in horticulture. But educational administrators argue that the lack of programs is a result of low levels of interest from students. Resolving this dilemma may require greater investment on the part of educational institutions and more and louder demands from students.

While previous sections noted that average wages in the green industry trail those in comparable industry sectors, such as construction, this should not be interpreted as suggesting that there are no “good jobs” in horticulture. On the contrary, with thousands employed in the sector, there are certainly many higher paying positions available for higher-skilled, supervisory, and managerial workers. Having training opportunities available, ranging from technical high school programs to community college and post-secondary technical programs, to associate’s and bachelor’s degree programs at universities, will enable those interested in the green industry to enter the field at a higher skill level. This will both increase their earning and promotion potential, as well as help staff higher-skilled positions within the industry, which are often difficult for companies to fill.

Still, the green industry has a large proportion of its employment at lower-skill levels or entry-level positions, which skews the average wages offered downward relative to other employers in the economy. Filling these entry level positions is a significant challenge for the green industry, as it is for other agricultural and service-sector employers. To fill these positions, some green industry employers have turned to foreign work visa programs such as H-2 visas. These are temporary, non-immigrant visas that allow workers from selected countries to legally come and work in the United States. Agricultural sectors, such as production greenhouses and nurseries, can bring workers in under the H-2A program, which though costly, does not have a cap on the number of visas that can be issued. Retail and service sectors of the green industry are limited, however, to H-2B visas, which have an annual ceiling on the number of visas that can be issued, severely limiting their availability. The limitations, costs, and regulatory risk associated with these temporary work visas means that they are an imperfect solution to the green industry's labor issues.

It should be noted that the ultimate responsibility for filling these positions lies with the green industry itself. There are several factors that have made many green industry jobs less desirable to workers than other available positions within the economy and which, as unemployment continues to fall and the labor market tightens, will make staffing more challenging. For example, the seasonality of employment and low wages may make green industry positions hard to fill. Nevertheless, employers have several options to make the industry more attractive to workers. While many entry-level positions in the sector require lower levels of education than other fields, this could provide those with lower educational attainment a valuable entry point into the green industry workforce. For their part, green industry employers could do more to offer their lower-skilled employee's opportunities for professional growth and development, creating pathways to higher-responsibility positions within the industry. The green industry could also do more to partner with educational

institutions of various levels, offering work placement and apprenticeship collaborations. Finally, the issue of pay scale cannot be ignored. While employee decisions about whether to seek employment or remain in a job are complex and involve more than just remuneration, earnings ultimately are one of the top concerns. Green industry employers may need to increase wage rates to attract and retain high-potential and high-performing employees.

This study grew out of a concern about lack of labor availability in the Connecticut green industry and an interest in fostering employment opportunities and economic growth. Given the tight labor market in the state, particularly in the green industry, without investment in labor force development and labor-saving technology, labor constraints will *de facto* become economic growth constraints for the industry. The COVID pandemic has been a mixed blessing for the industry because, although sales and demand are at record highs, it has exacerbated the labor shortage and also resulted in input cost inflation, which has narrowed profit margins. The alleviation of labor constraints may not be an easy task, but it is an important goal to promote a more competitive green industry and to stimulate the contribution of this industry to the economy. The future growth of Connecticut's green industry will in part depend on how employers and policy makers respond to this challenge.

APPENDIX A

NAICS Code Definitions

(1114) Greenhouse, Nursery, and Floriculture Production: This industry group comprises establishments primarily engaged in growing crops of any kind under cover and/or growing nursery stock and flowers. "Under cover" is generally defined as greenhouses, cold frames, cloth houses, and lath houses. The crops grown are removed at various stages of maturity and have annual and perennial life cycles. The nursery stock includes short rotation woody crops that have growth cycles of 10 years or less. This group includes the subsectors 111421 and 111422.

(111421) Nursery and Sod Production: This U.S. industry comprises establishments primarily engaged in the following: growing nursery products, nursery stock, shrubbery, bulbs, fruit stock, sod, and so forth, under cover or in open fields, and/or growing short rotation woody trees with a growth and harvest cycle of 10 years or less for pulp or tree stock.

(111422) Floriculture Production: This U.S. industry comprises establishments primarily engaged in growing and/or producing floriculture products (e.g., cut flowers and roses, cut cultivated greens, potted flowering and foliage plants, and flower seeds) under cover and in open fields.

(333112) Lawn and Garden Equipment Manufacturing: This industry group comprises establishments primarily engaged in manufacturing powered lawnmowers, lawn and garden tractors, and other home lawn and garden equipment, such as tillers, shredders, yard vacuums, and leaf blowers.

(423820) Farm and Garden Equipment Merchant Wholesalers: This industry comprises establishments primarily engaged in the merchant wholesale distribution of specialized machinery, equipment, and related parts generally used in agricultural, farm, and lawn and garden activities.

(42493) Nursery and Florist Merchant Wholesalers: This industry comprises establishments primarily engaged in the merchant wholesale distribution of flowers, florists' supplies, and/or nursery stock (except plant seeds and plant bulbs).

(444) Building Material and Garden Equipment and Supplies Dealers: Industries in this subsector retail new building material and garden equipment and supplies from fixed point-of-sale locations. Establishments in this subsector have display equipment designed to handle lumber and related products and garden equipment and supplies that may be kept either indoors or outdoors under covered areas. The staff is usually knowledgeable in the use of the specific products being retailed in the construction, repair, and maintenance of the home and associated grounds. (In this report, this NAICS code was pro-rated to include only the lawn and garden product line sales.)

(4442) Lawn and Garden Equipment and Supplies Stores: This industry group comprises establishments primarily engaged in retailing new lawn and garden equipment and supplies.

(4531) Florists: This industry group comprises establishments primarily engaged in retailing cut flowers, floral arrangements, and potted plants purchased from others. These establishments usually prepare the arrangements they sell.

(54132) Landscape Architectural Services: This industry comprises establishments primarily engaged in planning and designing the development of land areas for projects, such as parks and other recreational areas, airports, highways, hospitals, schools, land subdivisions, and commercial, industrial, and residential areas, by applying knowledge of land characteristics, location of buildings and structures, use of land areas, and design of landscape projects.

(56173) Landscaping Services: This industry comprises (1) establishments primarily engaged in providing landscape care and maintenance services and/or installing trees, shrubs,

plants, lawns, or gardens and (2) establishments primarily engaged in providing these services along with the design of landscape plans and/or the construction (i.e., installation) of walkways, retaining walls, decks, fences, ponds, and similar structures.

APPENDIX B

Sources of Data

All data in this report has been extracted from IMPLAN's extensive database.

The values for **Floriculture, Nursery & Sod Production (1114)** are extracted from IMPLAN sector "6-Greenhouse, nursery, and floriculture production."

The values for **Lawn & Garden Equipment Manufacturing (333112)** are extracted from IMPLAN sector "261-Lawn and garden equipment manufacturing."

The values for **Landscape Construction & Maintenance Services (56173)** are extracted from IMPLAN sector "477-Landscape and horticultural services."

The values for **Landscape Architectural Services (54132)** are extracted from IMPLAN sector "457-Architectural, engineering, and related services" (5431), and then adjusted (pro-rated) based on the U.S. Census Bureau 2017 Economic Census, which reports that NAIC sector 54312 represents 1.59 percent of the employment of NAIC 5431.

The values for **Lawn & Garden Machinery & Equipment Wholesalers (42382)** are extracted from IMPLAN sector "395-Wholesale - Wholesale - Machinery, equipment, and supplies" (42381 - 42386) and then adjusted (pro-rated) based on the U.S. Census Bureau 2017 Economic Census, which reports that NAIC sector (42382) represents 3.18 percent of the employment of NAIC 42381 - 42386.

The values for **Flower, Nursery Stock & Florist Supply Wholesalers (42493)** are extracted from IMPLAN sector "400-Wholesale - Other nondurable goods merchant wholesalers" (4241 to 4249 (except 4242, 4244 4247) and then adjusted (pro-rated) based on the U.S. Census Bureau 2017 Economic Census, which reports that NAIC sector 42493 represents 2.69 percent of the employment in NAIC 4241 through 4249 (except for 4242, 4244, and 4247).

The values for **Lawn and Garden Equipment and Supply Retailing (4442)** is based on the percentage of lawn and garden product line sales from various retail outlet types in

Connecticut, as reported by the U.S. Census Bureau 2012 Retail Trade Census (U.S. Census Bureau, 2018). The Retail Trade Census stated that building materials and garden equipment and supplies dealers (which would include home centers, garden centers, and hardware stores), had 13.4 percent of their sales in lawn and garden products. Food and beverage stores (which would include grocery stores), had 0.9 percent of sales in lawn and garden products. General merchandise stores had 1.2 percent of sales in lawn and garden. Non-store retailers had 2.8 percent of sales in lawn and garden, and miscellaneous store retailers had 4.7 percent of sales in lawn and garden. Retail categories with insignificant sales of lawn and garden products were excluded.

The values for **Florists (4531)** are extracted from IMPLAN sector “412-Retail - Miscellaneous store retailers” (4531 to 4533 and 4539) and then adjusted (pro-rated) based on the U.S. Census Bureau 2017 Economic Census, which reports that NAIC sector 4531 represents 5.86 percent of the output of NAIC 4531 to 4533 and 4539.

APPENDIX C

Table C1. Top 5 Occupations by Subsectors in 2019

	Occupation ¹	Number of jobs	Percentage of jobs
NAICS 1114²	Floriculture, Nursery, and Sod Production		
	Farmworkers and Laborers	1975	62.14%
	First-Line Supervisors	133	4.19%
	Landscaping and Groundskeeping Workers	67	2.11%
	Retail Salespersons	65	2.04%
	Sales Representatives	63	1.98%
	Remaining in this Subsector	875	27.55%
NAICS 56173²	Landscaping Const. & Maintenance		
	Landscaping and Groundskeeping Workers	7984	66.91%
	First-Line Supervisors & Groundskeeping Workers	962	8.06%
	Tree Trimmers and Pruners	595	4.99%
	Office Clerks, General	322	2.70%
	General and Operations Managers	268	2.24%
	Remaining in this Subsector	1801	15.10%
Wholesale²	Wholesaling		
	Sales Representatives, Except Technical and Scientific Products	80	21.38%
	Laborers and Freight, Stock, and Material Movers, Hand	15	4.11%
	General and Operations Managers	15	3.98%
	Customer Service Representatives	15	3.95%
	Office Clerks, General	15	3.92%
	Remaining in this Subsector	235	62.66%
Retail²	Retailing		
	Retail Salespersons	1,050	32.07%
	Cashiers	416	12.70%
	Stockers and Order Fillers	302	9.22%
	First-Line Supervisors of Retail Sales Workers	202	6.19%
	Customer Service Representatives	148	4.53%
	Remaining in this subsector	1,156	35.30%
Other²	Other Subsectors		
	Retail Salespersons	24	7.25%
	Cashiers	18	5.46%
	Stockers and Order Fillers	14	4.11%
	First-Line Supervisors of Retail Sales Workers	13	3.91%
	Customer Service Representatives	10	2.93%
	Remaining in other Subsectors	252	76.35%

Note: Source IMPLAN, after adjustment due to lack of detailed figures for some sectors. See Appendix B for sources of the adjustments. (1) Standard Occupational Classification as defined <https://support.implan.com/hc/en-us/articles/360052254333-Occupation-Data>. (2) This category is composed of floriculture, nursery, and sod production (NAICS 1114), Landscape Construction & Maintenance Services (NAICS 56173), **Wholesale:** Lawn & Garden Equip. Wholesalers (NAICS 423820), Flower, Nursery & Florist Wholesalers (NAICS 42493), **Retail:** Lawn & Garden Equipment and Supply Retailing (NAICS 4442), Florists (4531) and **Others:** Lawn & Garden Equipment Manufacturing (NAICS 333112) & Landscape Architectural Services (NAICS 54132).

APPENDIX D

Formal Education Category Description

Education Category Description	
Less than a High School Diploma	
High School Diploma (or GED or High School Equivalence Certificate)	
Post-Secondary Certificate - awarded for training completed after high school (for example, in personnel services, engineering-related technologies, vocational home economics, construction trades, mechanics and repairers, precision production trades)	
College Courses or more	Some College Courses
	Associate degree (or other 2-year degree)
	Bachelor's Degree
	Post-Baccalaureate Certificate - awarded for completion of an organized program of study; designed for people who have completed a Baccalaureate degree but do not meet the requirements for academic degrees carrying the title of Master
	Master's Degree
	Post-Master's Certificate - awarded for completion of an organized program of study; designed for people who have completed a master's degree but do not meet the requirements of academic degrees at the doctoral level
	First Professional Degree - awarded for completion of a program that requires at least 2 years of college work before entrance into the program, includes a total of at least 6 academic years of work to complete, and provides all remaining academic requirements
	Doctoral Degree
	Post-Doctoral Training

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