

Cannabis: The New Root and Stem of Higher Education

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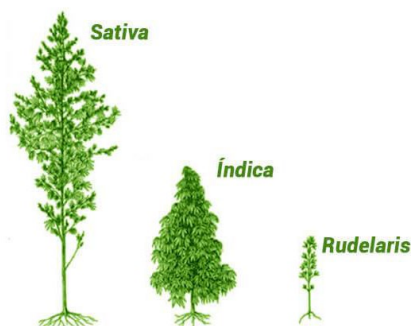
Overview

Why does Cannabis matter?

The “cannabis industry” refers to all business activities and professionals involved in the legal production, transportation, sale, or consumption of medical marijuana, recreational marijuana, hemp, and any other product derived from those three categories.¹ In simpler terms, think of cannabis as a cash crop. Corn is one such example of a cash crop. It is sold in any way that people wish to consume the product: on the cob or off it, ground into grits, as an ingredient in vegetarian burgers, and so on. There are also derivative products from cash crops. For instance, sorbitol, a sugar found in corn, is used in many toothpastes. In the same vein, marijuana has a variety of product uses, and as interest in the crop continues to grow, people are finding more ways to use the crop in products. Cannabis can be smoked, eaten, used for medicinal or industrial purposes, etc. It has even found its way into pet foods. You may yourself use a cannabis product whether it is the plant itself or a product such as hemp lotion. But just like you may use toothpaste without realizing there is a corn derivative in it, there will be a host of products that will have cannabis ingredients that you will only become aware of if you read the nutrition or product label.

What is Cannabis?

One of the challenges the cannabis market faces is difficulty in communicating the benefits and range of uses the plant has outside of recreationally smoking it. Many people conflate the terms “cannabis” and “marijuana.” Exploring the plant science of cannabis, from the family all the way down to plant varieties’ chemical compounds, clarifies various terminology (such as hash oil or hemp), shows where different cannabis product originate from in the plant genus, and make it easy to understand the varying legalization status of different plants.



Source: <https://cannabiscritic.home.blog/2018/11/13/cannabis-species-types/>

Like all other plants, there is a family, genus, and species classification. *Cannabaceae* is a family of flowering plants that contains the Cannabis genus. There are three species of Cannabis: *C sativa*, *C indica*, and *C ruderalis* (the least used of the three). Within the two primary species lie the marijuana and hemp varieties. Marijuana comes from the sativa and indica species and hemp only from the sativa species.² Both of these species contain unique chemical compounds, and these compounds are the source of the medical, business, government, and recreational interest in cannabis plants. They are called “cannabinoids.”

The two most popular cannabinoids are tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is the psychoactive part of cannabis plants that gets users “high,” and its effects are what most people think about when they hear someone say

¹ <https://www.maximumyield.com/definition/5126/cannabis-industry>

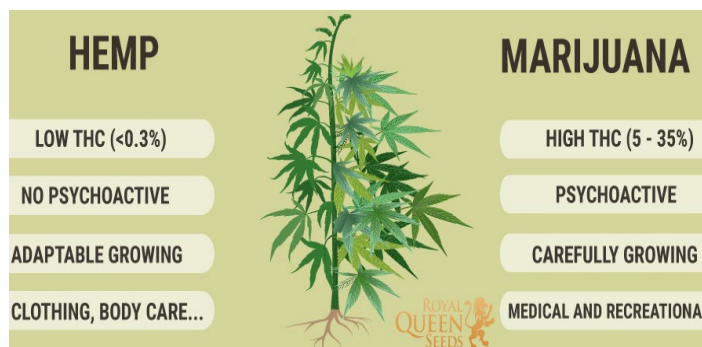
² <https://www.marijuanabreak.com/how-many-species-of-cannabis-are-there>

“cannabis.” The latter compound, CBD, is the non-psychoactive part of cannabis plants. Although it cannot get users high, it is still highly demanded due to its medicinal benefits.³

Hemp and marijuana plants contain both of these chemical compounds. However, relative to marijuana, hemp has a much higher CBD-content and typically has less than 0.3% THC-content. Although both hemp and marijuana belong to the sativa species of cannabis plants, hemp enjoys a superior legal status to marijuana. In December 2018, President Trump signed a farm bill into law that federally legalized growing and selling

hemp. Therefore, it is now legal in all 50 states to grow and sell hemp.⁴ It is mainly used to manufacture clothing, food and drink products, personal healthcare product, and rope, but it has also seen some medicinal use through CBD extraction. Hemp can impact you on a daily basis from the t-shirt you are wearing to the body lotion you are using. Marijuana, on the other hand, typically has 15 to 18% THC-content in the states

that it is legal, but it can be much higher. It is also used in recreational products such as “edibles” and hash oil (which can have THC levels over 90%) as well as medicinal products.^{5,6,7} American culture is steadily shifting away from the smoking-based conception of cannabis. Famously, former Speaker of the House John Boehner, who voted against medicinal marijuana legalization in 1999 and told a constituent in 2011 that he was “unilaterally opposed” to recreational marijuana, is now on the board of advisors for a cannabis company: Acreage Holdings. People are starting to see cannabis as an investment opportunity instead of a subculture or a black-market economy.⁸ The graph on the next page shows how estimated recreational cannabis demand compares to other common industries and goods. This estimate shows recreational cannabis is near the top of the list, alongside beer and cigarettes.



Source: <https://www.royalqueenseeds.com/blog-the-marijuana-vs-hemp-debate-what-s-the-real-difference-n1111>

³ <https://www.royalqueenseeds.com/blog-the-marijuana-vs-hemp-debate-what-s-the-real-difference-n1111>

⁴ <https://www.vox.com/the-goods/2018/12/13/18139678/cbd-industry-hemp-legalization-farm-bill>

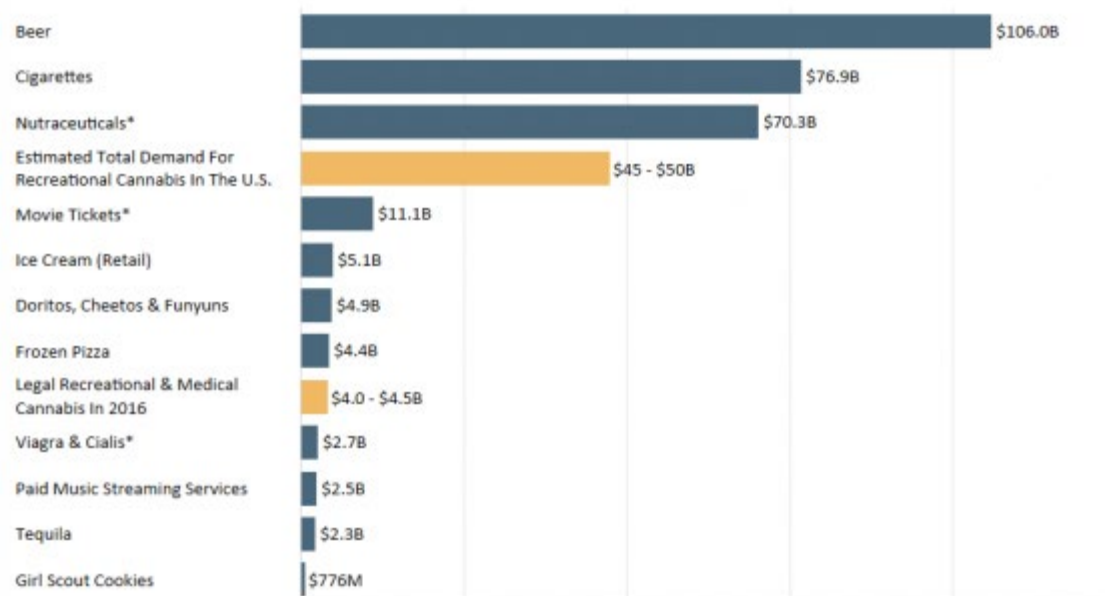
⁵ <https://medium.com/cbd-origin/hemp-vs-marijuana-the-difference-explained-a837c51aa8f7>

⁶ <https://www.businessinsider.com/what-is-hemp-different-from-weed-2018-3>

⁷ <https://www.cnbc.com/2014/02/26/dabsmarijuanas-explosive-secret.html>

⁸ <https://www.nytimes.com/2018/04/11/us/politics/boehner-cannabis-marijuana.html>

Annual U.S. Cannabis Sales Vs. Other Industries & Goods



*Includes U.S. and Canada

Source: Brewers Association, IRI, Mordor Intelligence, MPAA, Statista, Eli Lilly and Company, Pfizer, RIAA, U.S. Distilled Spirits Council

Note: All data is for 2015 or 2016, most recent figures are reported in the chart...

Highlights for the U.S. and global cannabis industry:

- There is a strong business justification for the cannabis industry. Hemp is federally legal in all 50 U.S. states, medicinal marijuana is legal in 30 states and Washington, D.C., and recreational marijuana is legal in 10 states and Washington, D.C. Over half of the US population now has access to recreational marijuana.⁹
- As of 2017, the cannabis industry was valued at \$9 billion and had created 200,000 new jobs.¹⁰
- Outside of the U.S., the global legal marijuana market is projected to grow to \$146.4 billion by the end of 2025.¹¹ Twenty-one countries or territories have legalized cannabis fully or partially for medical and/or recreational adult use. This figure excludes countries that have decriminalized small possession amounts of marijuana (such as the Netherlands).¹²
- Big Tobacco is granting credence to the growing cannabis market. Altria (formerly Philip Morris) invested \$1.8 billion in the Cronos Group, a Canadian-based cannabis company hoping to break into the newly legalized U.S. hemp market.¹³

⁹ <https://www.forbes.com/sites/julieweed/2018/12/15/predictions-for-cannabis-2019-from-entrepreneurs-on-the-front-lines/#8a8113c4a4cf>

¹⁰ <https://www.thebalancecareers.com/legal-marijuana-industry-jobs-2059646>

¹¹ <https://www.grandviewresearch.com/press-release/global-legal-marijuana-market>

¹² <https://www.cannabisbusinesstimes.com/article/cannabis-legalization-world-map/>

¹³ <https://www.fool.com/investing/2018/12/22/better-marijuana-stock-cronos-group-vs-medmen.aspx>

- The industry is becoming professionalized. One example is the cannabis job recruitment platform company “Graduajana,” which renamed itself as “Vangst” to attract more users and advertisers.¹⁴ However, some of the cannabis word-play branding remains intact, such as company names like Leafly.
- Cannabis is stimulating the creation of science-based cannabis careers. This category includes “Master Extractors,” who typically hold Ph.D.’s in biochemistry and run the labs that ensure the correct amount of THC and/or CBD are extracted from harvested cannabis plants.¹⁵
- Another job category is horticulture-based. For example, there is demand for “Master Growers.” These are the horticulturists who are responsible for the healthy and consistent cultivation of cannabis. They oversee the plant nutrition, pest management, technology, etc., of cannabis farms.¹⁶
- More generally, industrial engineers, food scientists and technologists, soil and plant scientists, biochemists and biophysicists, and chemists will be in high demand for this industry. (Employment data models are shown in this paper’s Occupational Analysis.)
- Distribution-based jobs include “budtenders,” who mirror their bartender counterparts, except they have a suite of cannabis products at their backs rather than alcohol.
- Traditional corporate jobs such as IT and marketing will also be created.¹⁷

Given the domestic and global trend towards medicinal and/or recreational cannabis legalization and the multitude of businesses those laws will create, U.S. universities should consider preparing their students for emerging jobs in this growing market. The industry has expanded far beyond smoking cannabis products, since that is not what the future average use of cannabis will be. For the most part, universities have been taking a “wait and see” approach given the problem of the federal legality. However, seeing how far cannabis has come legally and culturally, it seems unlikely to be stopped now. Some universities will ignore cannabis and others will take advantage of the opportunity.

¹⁴ <https://www.greenentrepreneur.com/article/331253>

¹⁵ <https://www.trade-schools.net/articles/cannabis-jobs.asp>

¹⁶ <https://www.trade-schools.net/articles/cannabis-jobs.asp>

¹⁷ <https://www.trade-schools.net/articles/cannabis-jobs.asp>

Trends in Cannabis

Four of the most important cannabis trends are the continued existence of perplexing legal statuses, cannabis company and product developments, cannabis company financing and tax revenue uses, and finally, cannabis' new image on college campuses.

The federal question remains unanswered

The world is changing its mind about cannabis. From Europe to South America, countries are starting to legalize its different forms. The Appendix summarizes how global cannabis prohibition began and how legalization has crept up to the U.S.' northern and southern borders.

While nationwide legality is no longer a worry for the hemp industry, recreational and medicinal marijuana's legality is the source of the cannabis industry's greatest uncertainty and risk. Federally (the legal floor), marijuana remains illegal. However, in 2013, as a response to states such as Colorado legalizing recreational marijuana, Deputy Attorney General Jim Cole of the Obama administration wrote what became known as the "Cole Memo." This series of documents recognized that while medicinal and recreational marijuana use remained illegal under the federal Controlled Substances Act, federal prosecutors should not focus on the substance so long as other federal priorities were not threatened by state legalization. However, Jeff Sessions, former Attorney General of the Trump Administration, rescinded the Cole Memo in 2018, which effectively ended the "hands-off," non-interference era of the federal government's policy towards marijuana.¹⁸ Under the federal government's drug scheduling system, marijuana is a schedule I drug, a category it shares with heroin. This designation means that marijuana is classified as a substance with little to no medical benefit.¹⁹ Nevertheless, legal marijuana in some form can still be accessed by over half the U.S. population; medicinal marijuana is legal in 30 states and recreational marijuana is legal in 10 states (AK, WA, OR, CA, NV, CO, MI, VT, MA, ME) and D.C.^{20, 21} Puerto Rico has also legalized medicinal marijuana.²² Time will tell how the federal government chooses to regulate marijuana.

¹⁸ <https://www.cnn.com/2018/01/04/politics/jeff-sessions-cole-memo/index.html>

¹⁹ <https://www.vox.com/identities/2018/8/20/17938372/marijuana-legalization-federal-prohibition-drug-scheduling-system>

²⁰ <https://www.forbes.com/sites/julieweed/2018/12/15/predictions-for-cannabis-2019-from-entrepreneurs-on-the-front-lines/#8a8113c4a4cf>

²¹ <https://www.businessinsider.com/legal-marijuana-states-2018-1>

²² <https://weedmaps.com/learn/laws-and-regulations/puerto-rico/>

All the different ways to use cannabis

Recreational products

Legalizing recreational cannabis has not changed the traditional consumption method of the product: smoking it. The most interesting development in smoking products has been the emergence of the craft brewery atmosphere. It seems to be a logical development, particularly when the name for the bartender's counterpart is called a "budtender," and there are other loose parallels. Instead of scrutinizing the ABV percentage, you scrutinize the THC percentage. Instead of nitrogenized beer, there are CBD-infused hybrid strains. Instead of choosing between a creamy stout and a citrusy IPA, you choose between an "energizing" sativa strain and a "mellowing" indica strain (or a hybridized combination of the two strains).²³

This analogy has not been lost on brewing companies. Many of these firms are seeking to diversify their exclusively alcoholic beverage revenue streams. Legal North American marijuana began in the Rocky Mountains. Molson Coors is now partnering with Canadian cannabis company Hydropothecary Corporation to create non-alcoholic, cannabis infused beverages to be sold in Canada starting in October 2019. The creator of Blue Moon, Keith Villa, and his wife Jodi Villa are partnering with cannabis extraction lab Ebbu to create a new firm: Ceria Beverages. It will create THC-infused beverages with the same "onset time as alcohol." Outside of the realm of THC, firms such as New Belgium Brewing have started to create hemp-based drinks known as "Hemp Pale Ales" (HPA's).²⁴ Besides diversification and growth concerns, there are other connections between alcohol and cannabis such as science and culture. Cannabis and hops both belong to the same Cannabaceae plant family and both alcohol and marijuana are seen as connected since they are emblematic of American counterculture.²⁵

Another important product category is "edibles." Edibles are food products infused with THC and/or CBD, and since either chemical can virtually be put in all foods, edibles can basically be anything. Cookies and brownies may be the most commonly thought of edibles. However, they are not the market's first choice, as gummies are most popular edible in the United States. In California, gummies claim 27% of the market, followed by baked goods (10%) and chocolate bars (7%). The most popular edible flavors are the kinds of fruits incorporated into pies, drinks, and ice cream. These flavors include watermelon, blackberry, and blue raspberry.²⁶ Even pets have joined the market. Some dispensaries in Colorado offer hemp and CBD products specifically designed for household pets.²⁷

²³ <https://www.rollingstone.com/culture/culture-lists/american-pot-5-best-strains-of-2017-199870/gsc-a-k-a-platinum-cookies-f-k-a-girl-scout-cookies-199919/>

²⁴ <https://www.westword.com/marijuana/five-beer-companies-and-brewers-entering-the-legal-cannabis-trade-10666109>

²⁵ <https://www.nytimes.com/2018/11/15/dining/drinks/beer-cbd-marijuana-breweries.html>

²⁶ <https://bdsanalytics.com/what-was-hot-in-pot-in-2018-cannabis-product-trends/>

²⁷ <https://www.thestreet.com/lifestyle/health/5-cannabis-products-on-rise-14578907>

But ingesting cannabis is not the only reason why it is sold. Continuing the previous beer analogy, a criticism of the nascent cannabis industry is that it is overly marketed to men and ignores women. One way the industry is trying to correct this problem is the introduction of cannabis beauty and skin care products. Research is still lackluster, but the products are said to help fight acne and to have anti-inflammatory properties.

Medicinal products

Historically, people think of traditional, THC-based cannabis products when they think of medical marijuana. However, this view is changing for two legal reasons. First, because of marijuana's schedule I classification, the amount of medical research that can be conducted is severely limited, which has had a limiting effect on its usage.²⁸ Second, the previously mentioned 2018 Farm Bill means that hemp-derived CBD is legal in all 50 states.²⁹ The U.S. Food and Drug Administration (FDA) also recently received a unanimous vote from its federal advisory committee to recommend approval of a pharmaceutical CBD oil called Epidiolex. Studies have found CBD oil to be useful for treating pain, cancer, anxiety, depression, and sleep issues.³⁰ The four primary methods of taking CBD oil are ingestion, sublingual, topical, and inhalation.³¹

Branding and market leadership

With Canada only having legalized recreational marijuana within the last year, it is too soon for market leaders to emerge. In the United States, California, Colorado, and Oregon (the states with the most developed cannabis markets) have seen firms come and go in their top ten brand lists.³² Firms have not been shy about their attempts to make their brand synonymous with cannabis itself. In what led to an interesting financial story, the Potash Corp. gave up its POT stock ticker and demand for these three letters was so high that Canadian exchanges held a lottery to see which company would get the ticker. Other noteworthy stock ticker branding includes the Canopy Growth Corp.'s WEED ticker, and ETFMG Alternative Harvest's MJ ticker (Mary Jane).

²⁸ <https://www.rollingstone.com/culture/culture-lists/american-pot-5-best-strains-of-2017-199870/gsc-a-k-a-platinum-cookies-f-k-a-girl-scout-cookies-199919/>

²⁹ <https://medium.com/cbd-origin/is-cbd-legal-legal-status-of-cbd-2018-d1b4a0ed42df>

³⁰ <https://www.thestreet.com/lifestyle/health/5-cannabis-products-on-rise-14578907>

³¹ <https://echoconnection.org/how-take-cbd-oil-options/>

³² <https://bdsanalytics.com/what-was-hot-in-pot-in-2018-cannabis-product-trends/>

How cannabis companies raise money and how governments use cannabis taxes

Financing within cannabis companies

In terms of private funding, cannabis companies are following the typical trajectory of any firm, using seed capital and Series A rounds.³³ Recently, Silicon Valley entered the market in a “Shark Tank” style entrepreneur pitch, where the winner received a \$10,000 investment.³⁴ There was also a popular instance where Peter Thiel invested \$75 million in a cannabis company. On the private lending side, it can be difficult for cannabis companies to get loans. Banks are wary lending and CPAs are loath to audit these firms due to federal regulation, making it difficult for cannabis companies to prove their financial health. Where things get more interesting is in terms of public funding. There have been many interesting stock exchange developments for cannabis companies in North America. Canada’s legalization of recreational cannabis was recognized as the biggest trend of 2018 for the industry.³⁵ It allowed companies like the Cronos Group and Tilray to list on the NASDAQ and reach market caps of \$1.3 billion and \$1 billion, respectively. However, another trend with a potentially stronger effect on the market is the fact that Canada’s recreational cannabis legalization causes the stock exchange listing to cut both ways between the United States and Canada. U.S. cannabis companies, denied access to U.S. exchanges due to federal law, have begun listing on the Canadian Securities Exchange (CSE). Two such companies are MedMen and Green Thumb Industries. Each now has a valuation exceeding \$1 billion.³⁶

Tax revenue and usage

Colorado, the poster-child of cannabis in the United States, trailblazed the industry’s taxation. The western state has three primary cannabis taxes: a 2.9% sales tax, a 10-15% special sales tax on retail marijuana, and a 15% excise tax on retail marijuana. The combined effect of these taxes yielded a revenue of \$211M for Colorado. Highlights of this tax revenue usage include \$30M for state public school funding and \$32M for substance abuse, youth prevention, and mental health services.³⁷ Some, such as NYU Professor Mitchell Moss, believe that legalizing and taxing marijuana could be the future of infrastructure funding such as mass transit.³⁸ For example, many New York state senators are calling for recreational cannabis legalization so the taxes can fund much-needed subway repairs.³⁹

³³ <https://www.greenentrepreneur.com/article/312309>

³⁴ <https://www.theatlantic.com/business/archive/2018/04/a-silicon-valley-pot-deal/558281/>

³⁵ <https://www.forbes.com/sites/julieweed/2018/12/15/predictions-for-cannabis-2019-from-entrepreneurs-on-the-front-lines/#373a4ca94a4c>

³⁶ <https://www.forbes.com/sites/kriskrane/2018/07/30/us-cannabis-companies-gaining-ground-on-canadians-public-markets/#2fbbcdf0de0c>

³⁷ <https://www.westword.com/news/heres-where-your-colorado-marijuana-tax-dollars-go-10214271>

³⁸ <https://newyork.cbslocal.com/2018/12/06/marijuana-tax-nyc-subway-system-mta-mitchell-moss/>

³⁹ <https://www.nytimes.com/2018/12/05/nyregion/marijuana-legalized-nyc-subway.html>

Cannabis rebrands itself at universities

Cannabis research programs have been stymied due to its schedule I status. For example, the University of Washington and Washington State issued research guidance prohibiting marijuana research despite the state’s legalization. Recreational marijuana’s uncertain legal environment has hindered its ability to become ingrained in higher education. Nonetheless, some schools have begun to embrace cannabis, especially from business programs. Central Washington University’s business school hosted a “Cannabis Caucus” last year and will host another this year. Additionally, Evergreen State College offers a course called “The Business of Cannabis,” where students learn a variety of topics ranging from the social history of cannabis to tax implications outlined for the cannabis industry.⁴⁰ Cannabis degrees have begun to emerge as well. These degrees are supported in two ways: trade schools and traditional four-year institutions. First, trade schools are trailblazing cannabis degrees. California has three: Oaksterdam University, Cannabis College, and Humbolt Cannabis College.⁴¹ Oaksterdam’s horticulture program which teaches students how to cultivate and manage cannabis plants is an example of these trade schools’ offerings.⁴² Many of these schools are not accredited, but accredited cannabis trade programs do exist. Recently, Hocking College, a small vocational school in Ohio, created what is believed to be the first cannabis laboratory technician major.⁴³ Northern Michigan University offered the nation’s first four-year Bachelor of Science for cannabis. The program combines chemistry, biology, botany, horticulture, marketing, and finance, showcasing the interdisciplinary skills required in the industry. Harvard University, the University of Denver, Vanderbilt University, and Ohio State University have begun offering a myriad of classes on marijuana policy, law, business, and journalism.⁴⁴ Aside from cannabis-focused programs or a cannabis degree, a degree in business administration is commonly used to break into the industry. Other common degrees used in the cannabis industry are biology, healthcare, and marketing.

⁴⁰ <https://www.greenentrepreneur.com/article/322215>

⁴¹ <https://thebestschools.org/magazine/marijuana-degrees/>

⁴² <https://oaksterdamuniversity.com/academics/>

⁴³ <https://www.forbes.com/sites/joshmoody/2018/08/28/time-for-colleges-to-give-cannabis-a-try/#6ba380d56db1>

⁴⁴ <https://www.usatoday.com/story/news/nation-now/2017/10/09/marijuana-degree-northern-michigan-university/745964001/>

Occupational Analysis

Current available jobs related to cannabis

Occupational and job analysis in this research is focused on two areas: the U.S. and a cannabis company, MedMen Enterprises, used as an example. While this research is not exhaustive, its purpose is to provide a sense of the current need for professionals in the industry.

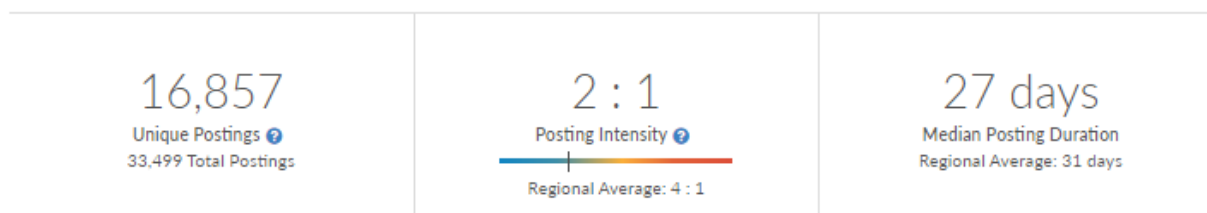
This report shows occupational and demographic information for cannabis-related jobs on a national level. It also includes the employment outlook for emerging jobs that will require cannabis knowledge. All figures and tables are taken directly from Economic Modeling Specialists International (Emsi) and its 2019.1 datasets.

Region: The U.S.

Currently emerging jobs related to Cannabis

Figure 1 highlights the number of job postings across all occupations that include the word “cannabis.” Out of 33,499 job postings, 16,857 were unique, resulting in a posting intensity of 2:1, suggesting that firms may not be trying as hard to fill these positions.

Figure 1: Job Postings that Contain “Cannabis” Across All Occupations



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Numerous reports and job posting sites were consulted to determine the new jobs being created or are soon to be created by the cannabis industry. The following job titles were listed: field grower, general manager, cannabis grower (manufacturing and production), master grower, digital marketing director, merchandise planner, and director of operations and client onboarding.^{45,46} It is worth noting that there is a plethora of job listing platforms dedicated to cannabis, such as the previously mentioned company Vangst.

Salary expectations

Ancillary jobs such as construction, store workers, and corporate functions such as IT should expect compensation in line with other industries that employ those jobs. Cannabis-specific jobs on the other hand, have a wide variance in salaries. Master extractors can earn as much as

⁴⁵ <https://vangst.com/cannabis-jobseeker>

⁴⁶ <https://www.indeed.com/q-Cannabis-jobs.html>

\$150,000 annually and trimmers (low-skill farm workers) earn between \$11.50 and \$14.40 per hour.^{47,48} Directors of Cultivation or Master Growers earn between \$47,000 and \$250,000, and budtenders earn between \$12 and \$16 per hour. Most of the pay variation within a cannabis job is due to varying skill and education levels of employees.⁴⁹

Education and skill requirements

The industry spans from science-based to business-based careers, and the skills required for each cannabis job vary greatly. Typical in-demand skills are present, such as reading and writing comprehension (specifically legal comprehension in the case of cannabis), basic computer skills (from Microsoft products like Excel and Azure to POS systems), and general soft skills (communication, workplace passion, etc.⁵⁰ Careers beyond “budtender” or Extractor Assistant will require a bachelor’s degree, such as business careers. Typically, scientific careers (e.g. Master Growers or Master Extractors) will require a master’s degree, Ph.D., or another advanced degree. Undergraduate degrees for scientific cannabis careers are typically in subjects such as engineering, biology, chemistry, agriculture, and horticulture. Similarly to education requirements, work experience is also variable. Some workers have come in with no direct experience, while others have required years of experience.⁵¹

Employment outlook

There are firms that specialize in hemp production, recreational marijuana production, medical marijuana production, or a combination of those three. The two countries with the highest demand for workers are Canada and the United States. Both countries have a need for traditional corporate jobs in addition to cannabis professionals. Due to cannabis’ murky legalization status, the Bureau of Labor Statistics has abstained from making projections. Firms such as BDS Analytics and Arcview have filled the void, estimating that there could be as many as 630,000 cannabis jobs by 2025.⁵² Presently, there are estimated to be approximately 200,000.⁵³ It is commonly thought that that the western regions of the United States are the only states that are hiring in the cannabis industry because Colorado and Washington were the first two states to legalize recreational marijuana. California is the cannabis industry’s highest employing state, boasting a cannabis workforce of approximately 100,000. However, cannabis has been maturing to an extent, meaning its employment will be dispersed across the U.S. Specifically, Michigan’s cannabis employment is expected to overtake Washington’s. Oregon, another

⁴⁷ <https://www.hempstaff.com/cannabis-jobs-salaries>

⁴⁸ <https://www.forbes.com/sites/julieweed/2018/09/24/jobs-in-legal-cannabis-are-on-the-rise-and-salaries-are-getting-high/#7c9e1f26e3db>

⁴⁹ <https://www.forbes.com/sites/julieweed/2018/09/24/jobs-in-legal-cannabis-are-on-the-rise-and-salaries-are-getting-high/#7c9e1f26e3db>

⁵⁰ <https://www.cannabisbusinesstimes.com/article/job-skills-hiring-cannabis-companies/>

⁵¹ <https://www.forbes.com/sites/heathercabot/2018/02/13/do-you-need-a-degree-to-work-in-marijuana/#4b7f61577511>

⁵² <https://azmarijuana.com/marijuana-news/u-s-marijuana-industry-jobs-estimated-to-triple-by-2025/>

⁵³ <https://www.thebalancecareers.com/legal-marijuana-industry-jobs-2059646>

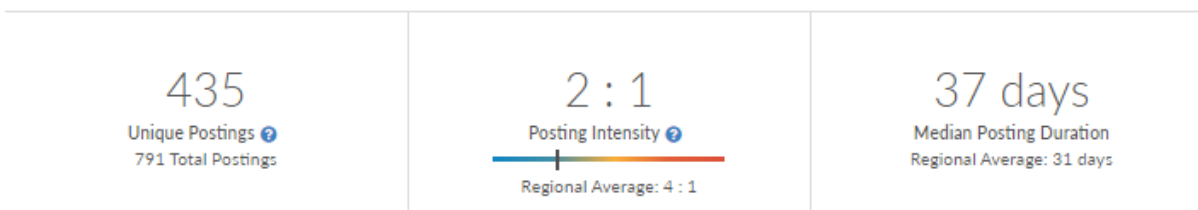
popular West coast cannabis state, will also see its employment numbers overtaken by a newcomer cannabis state: Massachusetts.⁵⁴

Job posting analytics of an example company: MedMen LLC

MedMen Enterprises is a U.S.-based cannabis company that is publicly traded on Canadian stock exchanges. It owns and operates licensed cannabis facilities in cultivation, manufacturing, and retail. This firm hires for both the previously mentioned cannabis industry jobs (growers, extractors, budtenders, etc.), but it also hires for ancillary jobs that include process engineers and corporate function positions. MedMen LLC has been highlighted to contextualize this report’s content within a single company and to show the jobs that are being added to help “professionalize” and grow this market.

Figure 2 shows the job posting intensity for MedMen LLC. There were 791 total postings, of which 435 were unique. This means that for every two jobs posted, one was unique, suggesting that MedMen LLC is putting in half as much effort into job postings as the national average.

Figure 2: Job Postings Overview for MedMen LLC



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

⁵⁴ <https://chicago.suntimes.com/business/meet-the-weed-workforce-marijuana-jobs-set-to-triple-in-next-decade/>

Figure 3 details the geographic breakdown for MedMen LLC’s job postings by state. California had the highest postings (252), followed by Nevada (71).

Figure 3: Regional Breakdown of Job Postings for MedMen LLC

Job Postings Regional Breakdown



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 4 lists the cities with the most job postings for MedMen LLC. The two with the highest concentration of job postings are in California (Culver City and Los Angeles), followed by two Nevada cities (Reno and Sparks).

Figure 4: Top Posted Cities for MedMen LLC

City	Total/Unique (Dec 2017 - Feb 2019)	Posting Intensity	Median Posting Duration
Culver City, CA	290 / 161	2 : 1	44 days
Los Angeles, CA	71 / 33	2 : 1	30 days
Reno, NV	49 / 31	2 : 1	22 days
Sparks, NV	50 / 26	2 : 1	46 days
Utica, NY	48 / 17	3 : 1	32 days
Desert Hot Springs, CA	17 / 16	1 : 1	17 days
Eustis, FL	31 / 16	2 : 1	31 days
Orlando, FL	31 / 15	2 : 1	44 days
New York City, NY	17 / 13	1 : 1	49 days
Las Vegas, NV	17 / 10	2 : 1	50 days

Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 5 exhibits MedMen LLC’s top posted occupations. The three occupations with the highest number of unique job postings were bookkeeping, accounting, and auditing clerks (26), First-line supervisors of production and operating workers (20), and general and operations managers and accountants and auditors (19) suggesting these are the most sought-after occupations

Figure 5: Top Posted Occupations for MedMen LLC

Occupation (SOC)	Total/Unique (Dec 2017 - Feb 2019)	Posting Intensity	Median Posting Duration
Bookkeeping, Accounting, and Auditing Clerks	68 / 26	3 : 1	44 days
First-Line Supervisors of Production and Operating Workers	32 / 20	2 : 1	23 days
General and Operations Managers	34 / 19	2 : 1	51 days
Accountants and Auditors	54 / 19	3 : 1	47 days
Marketing Managers	26 / 18	1 : 1	30 days
Industrial Production Managers	25 / 15	2 : 1	27 days
Natural Sciences Managers	23 / 12	2 : 1	39 days
Computer User Support Specialists	17 / 12	1 : 1	53 days
Customer Service Representatives	28 / 12	2 : 1	24 days
Construction Managers	19 / 11	2 : 1	38 days

Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 6 displays MedMen LLC’s most frequently posted job titles. The four jobs with the highest number of unique job postings were operations analysts (23), restaurant managers (12), administrative assistants (11), and laboratory managers (10).

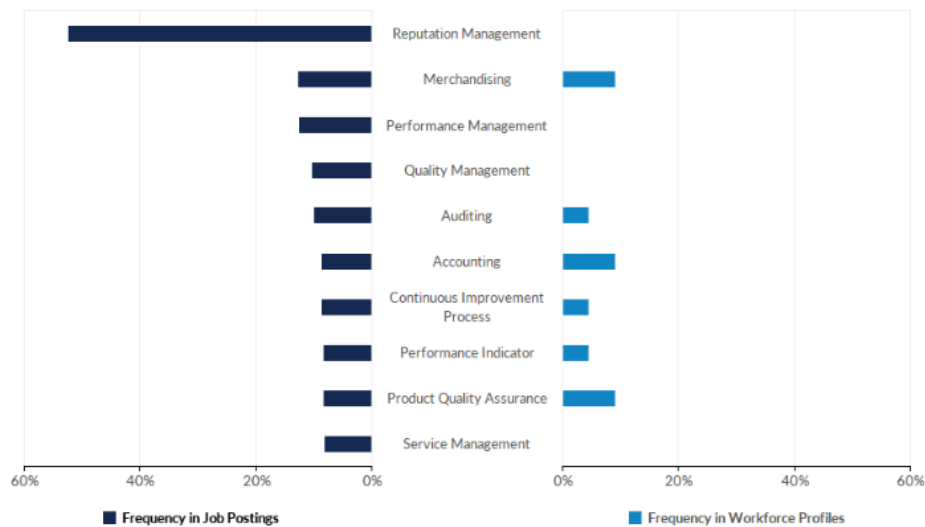
Figure 6: Top Posted Job Titles for MedMen LLC

Job Title	Total/Unique (Dec 2017 - Feb 2019)	Posting Intensity	Median Posting Duration
Operations Analysts (Computer and Mathematical)	62 / 23	3 : 1	44 days
Restaurant Managers (Food Preparation and Serving Related)	28 / 12	2 : 1	24 days
Administrative Assistants	29 / 11	3 : 1	21 days
Laboratory Managers (Management)	16 / 10	2 : 1	35 days
Auditors	11 / 9	1 : 1	44 days
Tax Associates	16 / 9	2 : 1	136 days
Project Managers (Management)	14 / 8	2 : 1	46 days
Quality Assurance Engineers (Architecture and Engineering)	8 / 8	1 : 1	8 days
Brand Ambassadors	14 / 8	2 : 1	45 days
Human Resources (HR) Business Partners	11 / 7	2 : 1	47 days

Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 7 shows the most frequently posted hard skills desired by MedMen LLC compared to the most frequently listed hard skills in workplace profiles. Of the skills that appear in both job postings and workforce profiles, workforce profiles are always within 5% of matching the frequency of job postings. However, four skills (reputation management, performance management, quality management, and service management) do not appear in any workforce profile.

Figure 7: Top Posted Hard Skills for MedMen LLC



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 8 shows the most frequently posted common skills desired by MedMen LLC compared to the most frequently listed common skills in workplace profiles. It tells a similar story to Figure 7. Common skills that appear in both job postings and workforce profiles have similar frequencies, but workforce profiles are missing three skills that appear in job postings (problem solving, business acumen, and time management).

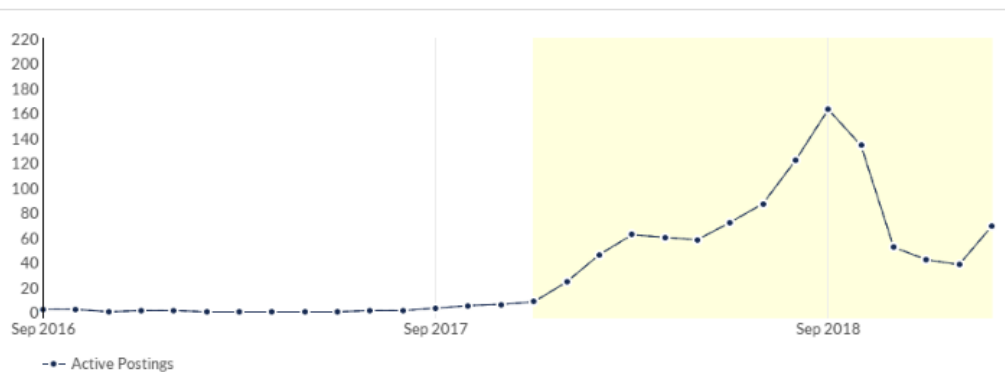
Figure 8: Top Posted Common Skills for MedMen LLC



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Figure 9 displays a graph of MedMen LLC’s monthly active postings. From September 2016 to November 2017, active postings never exceeded 6 postings per month or a ratio of 1:1. From December 2017 to September 2018, postings rose from eight per month to a high of 163 before falling to 38 in January of this year. However, February recorded 69 monthly job postings.

Figure 9: Monthly Active Postings for MedMen LLC



Source: Economic Modeling Specialists International (EMSI) 2019.1 Dataset

Impact on Higher Education

Online and campus-based degrees that are related to both the business and science of cannabis are expected to remain in demand. However, institutions need to lead and develop relevant degrees without getting too far ahead of the market. Proper market research and well-structured advisory committees at the degree level could minimize the risk of moving out too aggressively before the market is ready.

For those entering the cannabis industry with advanced degrees, there may be a market for post-baccalaureate certificates or highly specialized noncredit certificate programs.

Without rebuilding from scratch, institutions can adapt existing graduate degree programs with specializations around cannabis science or business. An MBA with a specialization in cannabis marketing or operations may not be as far-fetched as one would think.

Agriculture, chemistry and biotech programs might explore further courses, specializations, or new product development programs around the fusion of cannabinoids into other substances, recipes, or existing products.

Societal challenges may also yield new programming opportunities around ethics, legal issues, community impact, law enforcement, and a plethora of other issues of debate. The financing, accounting, and taxation of the market may also yield programs as local, state, and federal entities may incur additional costs as a result or see the cannabis market as a source of revenue. Interstate commerce, as well as the import and export of raw and finished materials, will also evolve.

Appendix

The rise and fall of illegal Cannabis

International legalization status

Cannabis prohibition began in 1961 when the United Nations condemned it as part of its Single Convention on Narcotic Drugs in Vienna, Austria. This international illegalization was further bolstered by the Convention on Psychotropic Drugs of 1971 and the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988. Together, these treaties require that all participants prohibit the possession, use, trade, and distribution of narcotics outside of medical and scientific purposes in addition to joint efforts to prevent international drug trafficking.⁵⁵ However, while these treaties have provisions to allow for exceptions based on signatories' constitutions, many legal experts argue that any move towards legalization of use, sale, or possession violate these international accords. Arguments in favor of breaching these agreements include what some countries consider to be the dubious inclusion of cannabis in the treaties' legal frameworks, the increase in the scientific understanding of the drug, and the unintended consequences of what some nations considered to be repressive drug control strategies.⁵⁶ In 2013, the United States, by virtue of Colorado fully legalizing cannabis, became the first nation to defy these treaties. Five years later, the first two nations to fully legalize cannabis on a national level were Uruguay and Canada. It is also worth noting that several nations have unique, specific requirement-based legal statuses that parallel full legalization.⁵⁷ For instance, the Netherlands allows its citizens to keep and grow some marijuana, and its police force allows coffee shops to sell marijuana so long as it is not sold to minors. Another example is that Spain permits the existence of marijuana clubs which are locations in which its citizens can purchase the drug for recreational use, but marijuana is still officially illegal to sell.

North American legalization status

Canada had long since legalized medicinal marijuana, when in 2000 the Canadian Supreme Court ruled that Canadians have a constitutional right to use cannabis as medicine.⁵⁸ Eighteen years later, we would see an even more dramatic legal change in the U.S.' northern neighbor. The Cannabis Act, signed into law by Prime Minister Justin Trudeau, created a strict legal framework for cannabis. Some of the legal measures include tracking requirements of cannabis from "seed to sale" to keep cannabis out of the black market as well as an age restriction of 18 years to purchase and use cannabis products. Additionally, the sale of cannabis edible products and concentrates was to be delayed until approximately one year after the law came into force on October 17th, 2018.⁵⁹ Perhaps the most significant aspect of cannabis legalization in Canada is that it is the first country in the Group of Seven (G7) to legalize recreational marijuana.⁶⁰ The G7 holds substantial political and economic clout, and Canada's legalization of recreational marijuana is seen as normalizing the drug's use.

⁵⁵ <https://www.vox.com/2016/5/8/18089368/war-on-drugs-marijuana-cocaine-heroin-meth>

⁵⁶ <https://www.tni.org/en/publication/the-rise-and-decline-of-cannabis-prohibition>

⁵⁷ <https://www.vox.com/identities/2018/8/20/17938416/marijuana-legalization-world-uruguay-canada-netherlands>

⁵⁸ <https://london.ctvnews.ca/medicalmarijuana/a-timeline-of-some-significant-events-in-the-history-of-medical-marijuana-in-canada-1.3858860>

⁵⁹ <https://www.justice.gc.ca/eng/cj-jp/cannabis/>

⁶⁰ <https://www.usatoday.com/story/news/2018/10/17/marijuana-now-legal-canada-but-buying-weed-remains-challenge/1672074002/>

Developments south of the U.S. border are similar to what has occurred in Canada. In 2009, as part of an effort to treat addiction as a public health issue rather than criminal offense, Mexico decriminalized the possession of five grams of marijuana in addition to “personal use amounts” of cocaine, heroin, and other drugs.⁶¹ Following a Mexico Supreme Court 2018 ruling that an absolute ban on recreational marijuana was unconstitutional, newly elected Senator Olga Sánchez Cordero introduced a marijuana legalization bill as the Mexican debate on cannabis legalization continues.⁶²

⁶¹ <https://www.rollingstone.com/culture/culture-features/legal-pot-in-mexico-everything-you-need-to-know-194984/>

⁶² <https://www.npr.org/2018/11/14/667699301/mexico-hopes-to-legalize-marijuana>