

Here to Stay or Up in Smoke?

A Look at the U.S. Cannabis Market



Despite being controversial, the U.S. cannabis industry is growing rapidly.

With a product that is quasi-legal, the industry faces many uncertainties regarding its future direction. At the same time, the speed at which the industry is growing leaves companies struggling to keep up with demand as well as the frequent changes common to any nascent industry.

The complexities can seem daunting.

Yet the upsides are often worth the risk, and many cannabis producers are rising to the task of balancing stringent regulations, rising consumer demand, and shifting market landscapes.



BALANCING STRINGENT REGULATIONS



RISING CONSUMER DEMAND



SHIFTING MARKET LANDSCAPE



The cannabis industry shares many similarities to the pharmaceutical, cosmetic and food & beverage industries but must also address unique needs and challenges.

Cannabis companies and their ancillary partners have to be innovative and flexible to keep up with the fast pace of change.

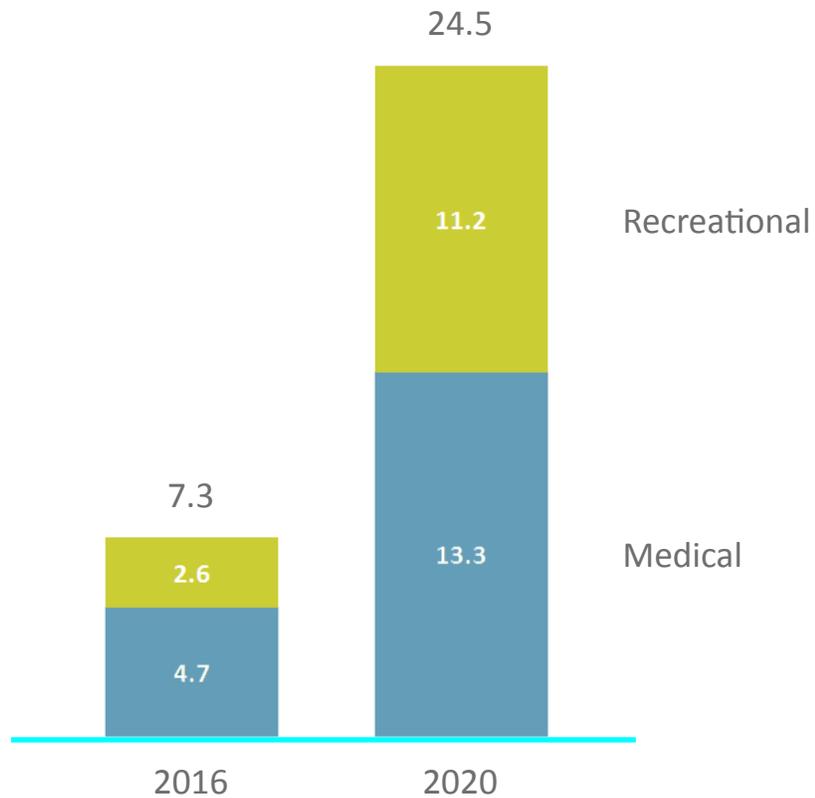


Market Growth – Booming

The U.S. cannabis industry is booming despite its inconsistent legal status. In the past five years, the industry has grown over 200% as more states began legalizing some marijuana use for medical purposes. This has prompted an influx of business startups and has helped legitimize marijuana use in the eyes of many. Last year, the industry topped \$7.3 billion – a 35% growth over 2015 – which is higher than the dot com and broadband booms and which many believe is conservative. Indeed, industry experts see this pace of growth continuing over the next five years.

Legal Cannabis Market Growth

\$Billion



Market Growth – Breaking it Down

Currently, 65% of cannabis sales stem from medical marijuana, which is legalized to various degrees in 29 states with legislation pending in 15 more. However, recreational or adult use of cannabis (legal in nine states but only in effect in five currently) is fast growing. It usually outpaces medical sales by a 15:1 margin the first few years it becomes available. Nevada, the latest state to legalize recreational use, expects to see 20:1 or higher sales of recreational cannabis due to the state's high tourism volume. Experts believe that by 2021 every state in the U.S. will have legalized cannabis for medical use and that sales of medical marijuana will top \$15 billion at that point. An additional six states are expected to permit recreational cannabis sales in the next two years.

As sales are growing rapidly, the formats are shifting away from cannabis as a flower/bud into more processed formats of oils, edibles, and topical products. This provides an opportunity for ancillary businesses (e.g., packaging) to grow and expand within the industry as well. Current estimates put the cannabis packaging market at less than 1% of industry sales at \$15 million. However, experts believe the pace of growth for packaging may eclipse the growth rate of the overall cannabis market as legalization spreads to more states, packaging becomes more regulated, and cannabis brands move towards higher-end and more customized packaging options. When sales were under \$5 billion, most packaging companies were not willing to invest in creating products specifically for the cannabis industry, preferring instead to borrow and adapt packaging products from other industries such as pharmaceuticals and cosmetics. Now, however, with cannabis sales approaching \$10 billion, firms are finding it worthwhile to develop products specifically designed for the unique needs of cannabis companies.



Market Challenges – Legal, Regulatory, and Financial

One major issue facing the U.S. cannabis industry is that despite being legal to some degree at the state level, at the federal level cannabis is a Schedule 1 substance that is illegal to manufacture, distribute or sell in the United States. The industry is on the brink of a legal battle between state and federal rights, and the outcome is unclear. Currently, federal law prohibits the sale of marijuana for either medical or adult recreational use, meaning the states that have authorized marijuana use are in violation. However, under the Obama Administration, enforcement was minimal and states generally could legalize without federal interference. On the state level, several rewrote laws to make marijuana possession and use a misdemeanor rather than a felony.

The Trump Administration has taken a more hardline stance on cannabis. This administration has instructed federal agencies to seize assets and prosecute anyone involved with the cannabis industry and cannabis users. Further, it is likely that the administration will allow the Rohrabacher-Blumenauer Amendment – which had protected state-approved medical marijuana operators – to expire at the end of 2017. Therefore, cannabis companies live with the constant worry that their businesses can be seized at any time. This uncertainty has limited the companies' growth as they do not wish to become too big to attract attention and has prevented them from receiving the funding and tax benefits that are available to other businesses.

Another challenge caused by the lack of federal approval is that risk-averse financial institutions are unwilling to work with cannabis companies. Most large banks will not work with dispensaries, cannabis retailers, or cannabis producers. The major credit card companies, Visa and MasterCard, do not allow their cards to be used to buy cannabis or related products. Although the Obama Administration had issued guidelines for banks on how to deal with the cannabis industry, most banks do not view them as a shield from charges, such as aiding drug trafficking. This has led the cannabis industry to have mostly cash-based businesses. To further complicate matters, a few states (e.g., Hawaii and Colorado) are trying to prohibit the use of cash for sales of cannabis to reduce the likelihood of theft and other crimes, and are promoting debit payment apps as an alternative workaround.

However, there may be some light at the end of the tunnel for the cannabis industry on the legal and regulatory front. Roughly 20 bills have been introduced in the House and Senate that could impact it. These bills fall into three broad categories: Veterans Access, Business Equity, and Taxation/Regulation. Legislation introduced in the House and Senate would require the Secretary of Veterans Affairs to authorize VA health care facilities to recommend medical marijuana to veterans who need it (the VA is currently prohibited by law from even discussing cannabis use with veterans). Several bills would amend the tax code to allow normal business expense deductions for businesses in compliance with state law. Some members of Congress are seeking to create a federal excise tax on marijuana and a framework to regulate marijuana like alcohol, removing it from the Controlled Substances Act schedule. It is unclear whether any of the bills will make it to a vote. However, industry analysts see some consistency in the administration's support of states' rights and think that this may indicate that medical marijuana may be allowed by states that codify its use in law even as the administration moves away from legalizing adult recreational use.

The vast differences in state legal frameworks constitute another constraint on the growth of cannabis companies. State laws are not uniform on growing, processing or dispensing cannabis. In some cases, two counties in a state may have different regulations in place. Requirements about who can touch the cannabis plant, what levels of THC products may contain, and where it can be distributed all vary greatly, which makes it difficult for cannabis operators to establish large scale operations across multiple states. Also, the regulations change frequently (usually yearly) within the states, which means that processes that were once approved must be changed. This disrupts businesses as they adapt to new rules. As a result, experts often advise companies to hold off on making significant capital investments in machinery until regulations stabilize after a few years.

Packaging accessibility is one regulatory issue in particular that poses a significant challenge. Cannabis processors struggle with complying with tighter state restrictions on child-proof/resistant packaging while at the same time being able to make the packaging easy to open for the elderly. No different than the issues faced in the pharmaceutical industry before it, the cannabis industry needs to develop new packaging that



can address the different cannabis formats while meeting accessibility regulations. While a federal standard exists for what constitutes “child-resistant,” the term has many nuances, such as being child-resistant for single-use or multi-use. As a result, definitions vary state by state. For example, a classic blister pack for electronics that requires scissors to open might be an option for child-resistant cannabis packaging, but once opened, it cannot be resealed. Although this can be used for single serve products, which are below 10 milligrams of flower, it is not viable for multi-serving products that some states require must have re-sealable, child-proof packaging.

Inspections are another regulatory challenge. A few states (e.g., Colorado), put restaurant inspectors in charge of inspecting cannabis facilities because federal FDA inspectors are prohibited from working with cannabis companies. Other states (e.g., Washington) do not yet require any inspections. However, some cannabis edibles producers have chosen to model their operations on FDA guidelines on the assumption that their business will eventually fall under the FDA’s purview.

The cannabis industry also faces its own internal challenges. On one hand are the traditional cannabis producers, who tend to be from a more old-school ganja culture with a laidback approach to business. This group tends to comprise small mom & pop operations that often struggle with following regulations and lack the mind set needed to innovate and operate a large-scale business. Experts agree that cannabis companies often just “check the boxes,” which ultimately leads to problems and further changes to regulations. On the other hand, the major players in the cannabis industry are the venture capitalists who have recently entered the market to partake in the perceived financial boom. Companies run by these individuals often lack a grasp on how fluid the cannabis market is and how they cannot easily expand the business to other markets. In states such as Washington where the cannabis industry is more mature, there has been a lot of consolidation and change as traditional companies are going out of business due to the higher level of competition from the VC firms. This is also pushing cannabis prices lower and has resulted in some growers selling the flower at a loss.

Processing Needs – Evolving

The cannabis industry currently employs 100,000-150,000 workers, mainly in labor-intensive positions. Much of the cannabis is harvested by hand, as many companies lacked capital to invest in equipment when they first started. Now that they are more established, it is still difficult to obtain equipment financing as banks have been reluctant to work with cannabis companies due to their precarious legal status. Further complicating the issue is that some states require cannabis companies to be vertically integrated and grow, process and package the cannabis at a single facility.

In states that do not require vertical integration, a cultivation site, such as a warehouse, grows the cannabis and harvests the flower, if it looks good and tests well, to sell it in flower form for “top dollar.” Then the trim, which is less satisfactory flower product, is typically sold to a processor to be made into oil. The processor runs the cannabis flower through a CO₂ extraction machine to get raw CO₂ oil and then refines it in a distillation process to either be sold as is, or made into shatter, wax or any form of concentrate or oil that could be used with a vaporizer. The same oil could also be infused into candy, butter for baking, or any other edible product. CO₂ extraction is not widespread in the industry, but several experts believe it is going to become so. CO₂ extraction is considered a much safer processing method that can strip out flavors and leave just the THC, which can be put into any food product without altering its taste. This is especially ideal for beverages. However, the drawback is that the equipment is far more expensive than other cannabis processing equipment.

Cannabis is often very “dirty” in its natural state, often containing contaminants and pesticides. There is a danger in processing the dirty cannabis as the pesticides can turn into hydrogen cyanide when processed into another form, which is especially dangerous to people with compromised immune systems. The danger is significantly lessened for cannabis left in its natural flower state and smoked. Experts estimate that at least 50% of cannabis contains contaminants and pesticides, which is a major issue for the industry and a risk for processors who can end up with product that cannot be sold.





Testing is required at multiple stages of the processing to determine the level of THC in the product. Testing generally happens upon harvest and the cultivator tests the flower for potency, contaminants, pesticides, other regulated endorphins. The act of extraction concentrates the oil so the product must be tested again once extracted. Even if the flower meets regulations for THC levels, sometimes upon extraction, the concentration of endorphins surpasses the legal level. For instance, the flower may contain 15% THC, but once concentrated will have dramatically higher levels (70-95% THC) depending on processing method. The level of potency is a key determinant in final sale price. As a result, the use of the cannabis flower is in decline as the customer base has matured and the industry has learned that the THC levels increase when processed into a concentrate. In fact, in the recreational adult-use market, use of cannabis flowers has dropped from 95% of sales 2 years ago to 50-55% in more mature markets.

Track and traceability are stringent requirements for all legal cannabis sales. Most states require that the cannabis be tracked from seed to store and have varying requirements as to what is suitable. Colorado has one of the most advanced track and trace systems, requiring two different RFID tags to be used: one for the plant and one for the packaged product. Plant tags contain the facility's retail or medical marijuana license number whereas packaging tags contain the facility license information and product serial number. All tags are trackable through a state-managed inventory database that allows regulators to see if product has gone missing while in transit. Tracking stops at the point of sale, with no information being gathered after consumer purchase. Further complicating the issue is that Colorado only has one approved supplier for the RFID tags, which can cost \$0.45 per tag for plants and \$0.25 per tag for product packaging.



Packaging Requirements – Stringent

Cannabis can be segmented into three broad categories: Flowers, Concentrates, and Edibles. The differing product types all have unique packaging needs. Cannabis flower products are dried flowers that are smoked. Some common packaging types include:

- Airtight, odor-proof glass jars are preferred by many cannabis companies as they are reusable – and consumers are likely to re-use them after purchase, heightening brand awareness.
- Pyrex tube jars are less expensive than glass jars and have more options for custom printing and lid options.
- Smell-proof bags are generally the most cost-effective option. These are opaque bags that have zippers to re-seal and can be heat sealed, making them tamper-evident.

Cannabis concentrates are any product made by extraction (e.g., oils, waxes). Common packaging types include:

- Heat-proof borosilicate glass containers allow product to be liquefied without breakage.
- Polystyrene containers, the most cost-effective packaging, are more compact than glass and can come with a silicone insert for stickier products.
- Acrylic containers are BPA-free and offer a more ‘high-end’ look and feel.

Cannabis edibles are the fastest-growing cannabis product; they range from bakery goods to sodas and teas. Packaging types include:

- Tube jars that can be sealed with shrink bands to ensure product integrity.
- Single-use bags using food-grade films to ensure freshness, which are also child-resistant.
- Resealable, smell-proof bags that can be heat sealed and include a zipper for resealing.

Cannabis packaging is highly regulated and varies by state, but some of the most common requirements are:

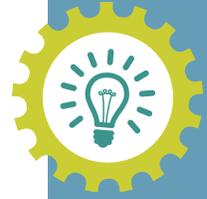
- Child-proof/child-resistant (includes CR-Paks – a child-resistant tube for vape pens and other products and child-proof zipper bags designed for flower cannabis, child resistant packaging often blends plastic and cardboard materials).
- Re-sealable
- Tamper-evident
- Opaque



Many states also require single-use packaging for products even when the product will be sold in bulk (e.g., vape cartridges). However, the variability in packaging rules and designs makes it difficult for suppliers to develop a one-size-fits-all package that can be used in multiple states. For instance, Colorado allows child-proof resealable zipper bags while Washington does not allow for reclosable child resistant packaging. Colorado also requires that the edible cannabis food products be marked with a THC symbol on food itself requiring the use of edible ink.

As the industry establishes its foothold, cannabis brands are starting to use packaging to differentiate themselves from competitors. Gone are the days of cannabis being sold in clear plastic packaging with ink-jet printed labels. Now, spending is increasing rapidly on high-end packaging options, with the belief that the packaging can help them differentiate their products and attract older, more affluent consumers. To achieve this goal, brands have been moving towards higher-end packaging that resembles what may be seen at a high-end grocery store, pharmacy, or spa. However, cannabis companies' branding efforts are often undermined by not being able to trademark their brand – the US Trademark Office denies trademark protection to any brands selling cannabis, making it difficult to establish brand identity.

Much of the initial packaging materials used in the cannabis industry were sourced from China. Although a significant portion still comes from overseas, higher-quality domestic packaging materials are coming into use. These include cardboard tubes for cannabis flowers that can be encased in a full color foil wrap or printed on directly and used with embossed labels for a more “kraft” appearance. Also popular are opaque bottles for liquid edibles (as many states require opaque packaging), aluminum or colored plastics. And pop-cap bottles are becoming increasingly popular for edibles and have an “old-timey apothecary feel.”



Areas of Potential – Innovative Solutions

As with any industry just getting off the ground, cannabis is ripe with possibilities for innovation. Cannabis companies are turning to various associations and conferences to seek solutions and share ideas. The variations in state regulations can be a boon for innovation, as ways of accommodating those rules can lead to new solutions. For instance, smell-proof packaging was a challenge in the early days of cannabis production. Many overseas packaging suppliers had products that failed to contain the cannabis smell. Further compounding the issue was that the cannabis smell becomes stronger the higher the quality and concentration. Cannabis producers sought out packaging suppliers at trade shows to find suppliers willing to work with them to develop higher quality bags that could contain the odors.

Child-proof packaging is currently a major focus for industry innovation. Some companies are experimenting with containers that have combination locks that are web-enabled and connected to physician's offices. This innovation has implications for the pharmaceutical industry as well. Other child-proof packaging ideas are also being explored.

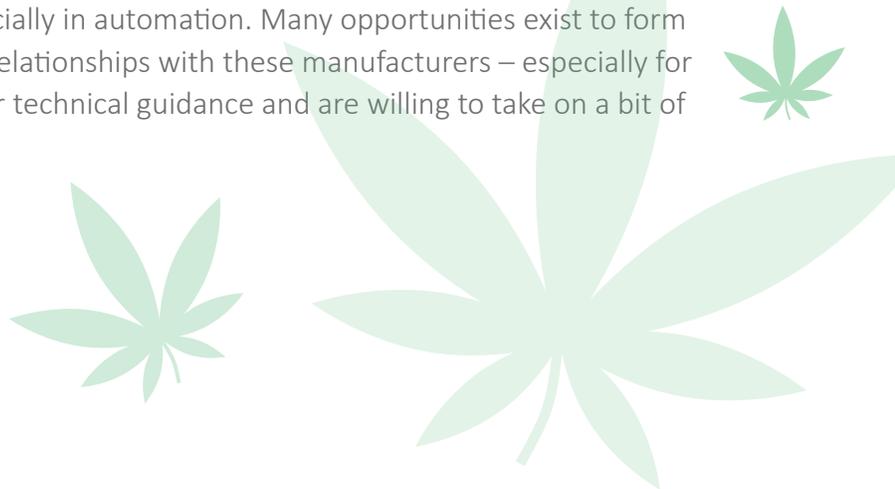
On the processing side, some companies are struggling with production of vape pen cartridges, which account for approximately 30% of cannabis sales. Recent research revealed that the propylene glycol (PG) liquid that cannabis oils are suspended in when put in vape pens may cause "popcorn lung" if used over a long period of time, such as for patients using marijuana for chronic pain management. There is major concern among cannabis producers that PG may be banned in some states in the future, and they have begun looking for alternative suspension systems for delivery of the cannabis oil.

Cannabis companies also want to find ways to automate manual cultivation and for machinery that aids in detecting and eliminating contaminants on the plant. Better, faster CO₂ extraction equipment is also in demand, but industry experts are unsure whether this technology will become more widely accepted.



Takeaway

Most people involved with the cannabis industry are aware of the risks, especially in terms of legal status, but believe the potential rewards outweigh them. Overall, there is a belief that cannabis will become a mainstream, but heavily regulated, product in the U.S. in the next 10 years, like alcohol and tobacco. Large food and beverage companies are eyeing the market and positioning themselves to be ready to move once the federal threat is removed. In the meantime, because processing, packaging and retail must be state-specific, suppliers to the cannabis industry must have local teams that understand the regulations and peculiarities of each market. Cannabis manufacturers are actively looking for equipment and technology OEMs to aid them with implementing new processes and technologies, especially in automation. Many opportunities exist to form strong and lasting relationships with these manufacturers – especially for the OEMs that offer technical guidance and are willing to take on a bit of risk.





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