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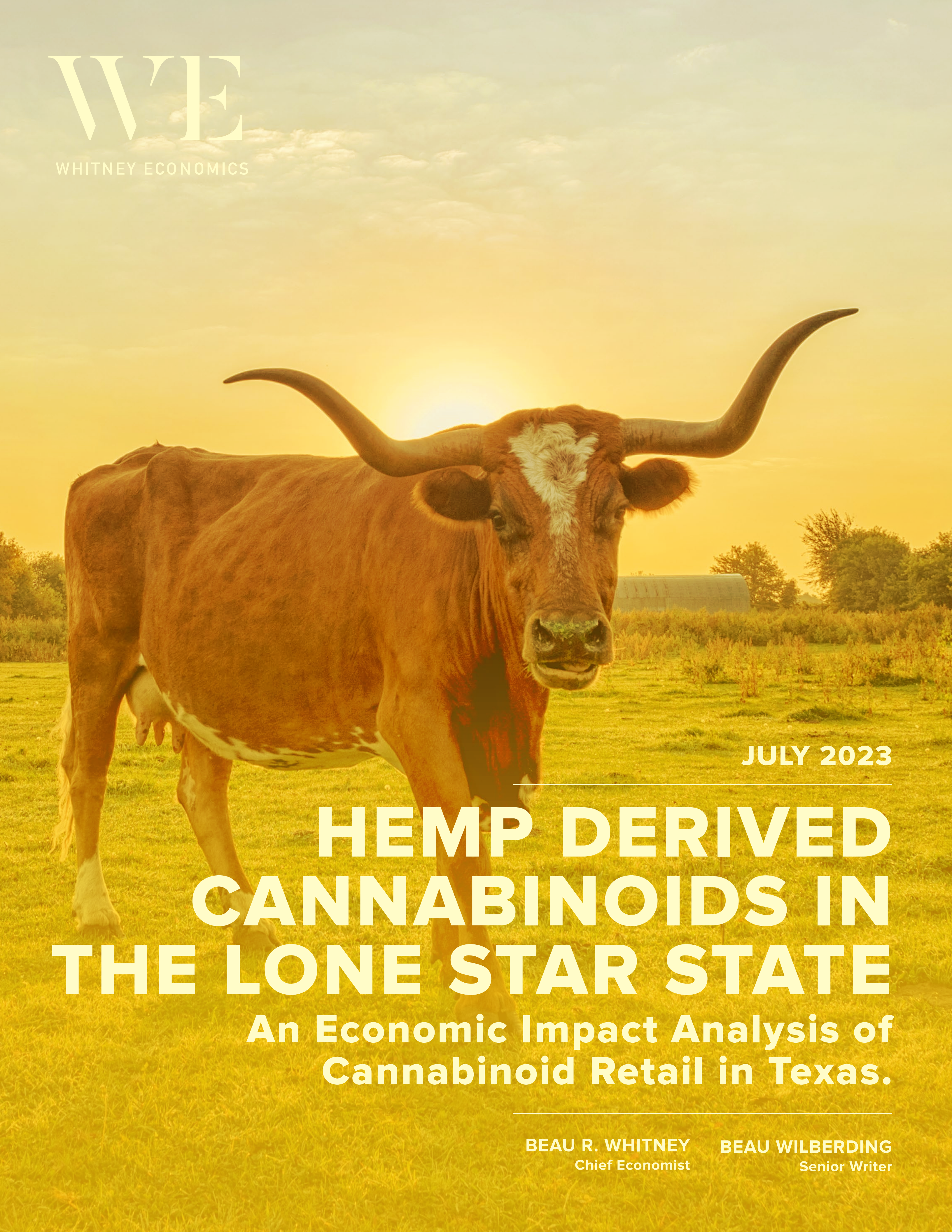

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HEMP DERIVED CANNABINOIDS IN THE LONE STAR STATE

An Economic Impact Analysis of Cannabinoid Retail in Texas.

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DISCLAIMER

Whitney Economics does not take a position on the legalization of cannabis nor does it take positions on proposed legislation; however, it does derive revenue from cannabis and hemp related companies and stakeholders. The views, opinions, and positions expressed in this paper are those of its author Beau Whitney, and do not necessarily reflect the views, opinions, or official positions of any of our affiliated organizations, groups or clients.

EXECUTIVE SUMMARY

This report is one in a series of economic reports that Whitney Economics (W.E.) has been commissioned to produce on the CBD and converted cannabinoid markets in the United States. W.E. has looked at the economic impact that this industry is having on individual states throughout the U.S. from agricultural, manufacturing, distribution and retail sales perspectives.

Throughout the 2023 legislative session, the Texas legislature debated concepts designed to ban or restrict the sale of converted, or synthesized, cannabinoids to consumers in Texas. Along these lines, two bills were introduced: SB264 and HB4238. During the legislative session, neither bill advanced, due to heavy opposition from veterans' organizations and other advocacy groups. There is an ongoing debate in Texas, the country's second most populous state, as to whether or not hemp-derived cannabinoid manufacturing and sales should be legal.

There has been very little data collected at the federal level with regard to adult-use and medical cannabis. This is beginning to change, and some data is being published by state regulatory agencies. Standardized tools and systems for data collections in both sectors are simply not in place. Despite its legal status, hemp has been caught up in the debate and politics around cannabis data collections.

To date, there has only been speculation as to the extent of the hemp-derived cannabinoid market. No study had been conducted to ascertain the size and impact of this industry on the overall Texan economy. As such, Whitney Economics has combined its expertise and extensive data set for the cannabis and hemp industries, with a survey of leading retailers manufacturers and distributors of hemp-based cannabinoids that are based in Texas.

An analysis of the Texas hemp-derived cannabinoid retail sector was conducted during a 6-week period in Q2'2023. The survey was left open longer than typical in order to capture as many data points and responses as possible. **The objective of this report is to ascertain the total economic impact the hemp-derived cannabinoid industry is having on the Texas economy and to understand the implications that a ban on sales would have on the state and the industry**.

Key Findings contained in this report:

1) Hemp-derived Cannabinoid Operators are a Major Economic Force in Texas

- **The total sales from these businesses in 2022 is estimated to be in excess of $8 billion, of which:**
- **$3.3 billion was derived from CBD and converted cannabinoid retail sales**
- **$836 million came from manufacturing sales, and**
- **$3.8 billion came from wholesale and distribution.**
- **The hemp industry supports the employment of approximately 50,100 Texas workers**
- **Texas hemp pays in excess of $1.6 billion in annual wages**

2) The Supply Chain Supporting the Cannabinoid Retail Industry Extends Throughout the U.S.

The supply chain that supports Texas cannabinoid retailers extends throughout the United States and cannot currently be supported solely by the 769 Texan hemp farmers who are licensed to cultivate up to 3,300 acres of hemp. With an economic impact estimated to be between $19.1 and $22.4 billion, the deployment of the hemp-derived cannabinoid retail, manufacturing and wholesale sectors appears to be a major success. ***This success was the stated intent of the 2018 Farm Bill: to create economic opportunities for U.S. hemp farmers, manufacturers and retailers.***

3) Proposed Restrictions Would be a Net Loss for Texas, with National and International Ramifications

Legislative discussions that are intended to end with the restriction of sales of hemp-derived converted or synthetic cannabinoid products would be a net loss for the state of Texas. It would have a negative economic impact on the state, displace thousands of workers, close over 3,600 licensed hemp businesses, and essentially force the transfer of an additional 460 businesses out of Texas and into other states. Any change in Texas policy will impact supply chains across the country and beyond its borders. Texas cannabinoid retailers are supplied by operators in all 50 states and they sell products in-state, out of state, and internationally.

Whitney Economics does not recommend enacting restrictions on cannabinoid sales for several reasons:

- **The economic damage in terms of business failures, job losses and adjacent economic activity to Texas would be too great.**
- **There would be a shift of $6.8 billion in economic activity away from the state, without addressing some of the stated underlying public safety concerns regarding hemp-derived products.**
- **Restrictions on sales would displace tens of thousands of workers during a time of national economic uncertainty**
- **Texas cannabinoid restrictions would disrupt the hemp supply chain throughout the United States at a time when opportunities for hemp farmers are being lost at a rapid pace.**

A trade-off between working to address gaps in the regulatory process, versus what would result in an outright ban, is too large to justify these potential restrictions on hemp-based cannabinoids. We feel that supporting the transition from a self-regulated industry, to one that is regulated at the product level, is a middle ground solution that makes sense, especially when compared to a complete ban of the industry.

INTRODUCTION

CBD is an Extract of Hemp Biomass

CBD and converted cannabinoid products are derived from extracts of the hemp plant. The plant's flower and leaves are first extracted to produce an oil. The oil is then refined in order to separate the cannabinoids from the plant matter, lipids and water that make up the extracted oil. Technicians have the ability to further refine the oils in order to isolate certain compounds. CBD can then be productized into vaporizers, edibles (ex. gummies), balms, tinctures and other wellness products. CBD also serves as a base for further refinement and conversions into other THC and cannabinoid products.

A lot has happened in the CBD space since 2018. Little known by consumers even 10 years ago, CBD has increased in popularity in recent years, particularly after the passage of the 2018 Farm Bill which legalized hemp and hemp derived products. Converted cannabinoid products evolved, as did the market, and consumer demand for these products surged in 2019 - 2020.

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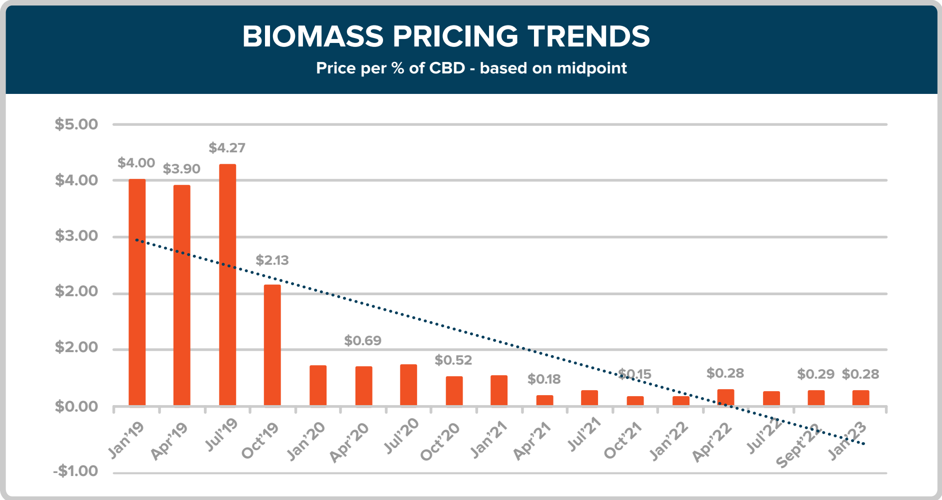
U.S. Hemp Production Capacity and Acres Licensed Increased Dramatically in 2019

The U.S. hemp industry has evolved in the short period after the 2018 farm bill. Hemp cultivation and production for cannabinoids, while a niche market prior to 2018, burst onto the scene in a big way after 2018. Previously, hemp for fiber and grain encompassed a majority of the acres licensed under the 2014 farm bill, acre allocations in favor of cannabinoid cultivation surged to nearly 82% of the nation's acres licensed. *< source: Whitney Economics U.S. Hemp Cultivator Survey (2019, 2020, 2021) >*

Excess Cannabinoid Inventories Led to Collapsing Prices from 2019 through 2021

With the surge in supply, the infrastructure required to handle the volume output of the farms became a limiting factor in the ability to bring the cultivated output to market. As a result, there was more supply of cultivated output than the processors could handle. With supply greater than demand, prices for cannabinoid materials collapsed, as did prices further down the value chain, including that for cannabinoid crude, distillate and isolate.



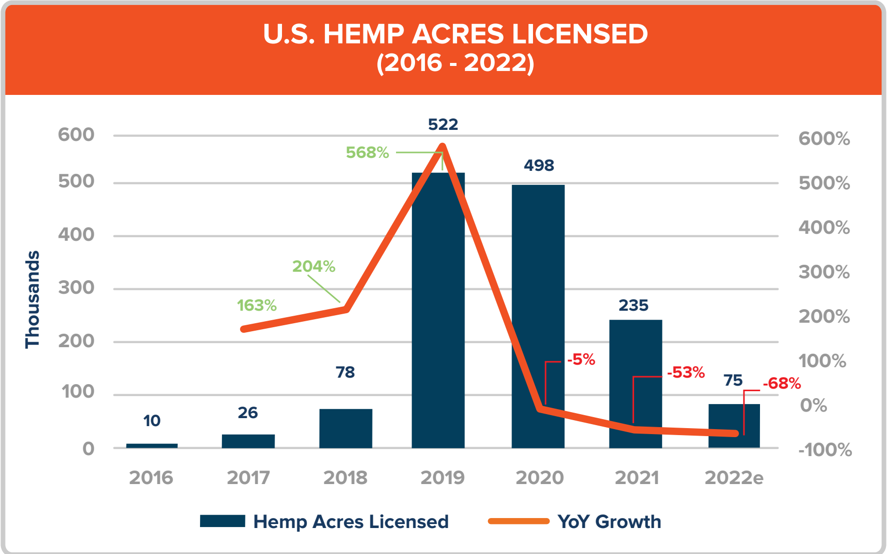
Source: PanXchange

Since 2018, Federal Regulatory Murkiness Has Created Uncertainty and Impacted Growth

Uncertainty at the federal level has also influenced the opportunities for cultivators and operators in the cannabinoid space. With the deployment of Epidiolex, a marijuana-based CBD seizure medication, in the U.S. market, the FDA determined that CBD is a drug. This guidance meant that marijuana-derived CBD could not be used as an ingredient for food or as a supplement, and created enough ambiguity that product manufacturers and investors pulled back. They were not interested in investing in and deploying products into a potentially illegal market. As a result, market growth has been muted despite significant demand for hemp-based cannabinoid products. Regulatory ambiguity at the federal level has presented too much risk for investors and manufacturers to absorb and has inhibited the growth of the market.

Uncertainty Has Driven Out Operators and Constricted the Market Since 2020

Uncertainties have consistently dogged hemp operators across the country. The combination of collapsing prices, a lack of regulatory certainty, a lack of legal certainty, a shortage of product development and not enough access to markets was too much to bear for many hemp operators. There has been a major pullback in the number of acres licensed as well as the number of processors in the U.S.



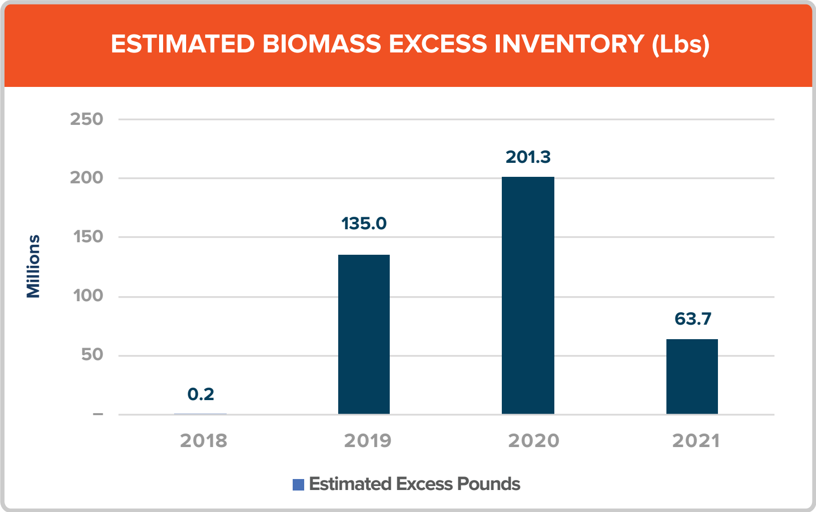
Source: Vote Hemp (2016 – 2018) Whitney Economics (2019 – 2022), Randall Lusson (2021)

Fewer Suppliers and Reduced Hemp Biomass and CBD Inventories Since Peaking in 2020

With a lack of consistent orders from product manufacturers, regulatory murkiness at the federal level, and dramatically falling prices, U.S. hemp cultivators and cannabinoid processors saw their inventories increase significantly in 2019 and again in 2020. At its peak there were approximately 201 million pounds of excess hemp biomass in the U.S. marketplace and in excess of 1.6 million kilos of processed cannabinoids.

Raw Material Shortage Supply

2022 saw a further reduction in excess inventories to such an extent that processors of CBD and cannabinoid manufacturers are anticipating potential shortages of raw material supply in 2023. While this has led to stable and even increasing prices for biomass, material shortages at the manufacturing levels could significantly impact both revenues and employment.



Source: Whitney Economics Hemp Cultivation Surveys (2019, 2020, 2021)

Economic Stress Drives Innovation and Opens New Market Opportunities in 2020

With little economic value left in the inventories of excess biomass and processed cannabinoids, farmers and processors have looked for innovative ways to monetize their inventory. Many sold their inventory below their costs of production, which resulted in continued downward pressure on prices. This unabated decline in pricing has put many operators out of business. Others found ways to monetize their inventory through process innovations. This led to a significant increase in processed materials that were further refined or converted into products, beyond the original CBD content. These products included gummies, vapes and other derivative products containing minor cannabinoids such as CBG and CBN, as well as products containing other forms of THC beyond the traditional THC delta-9 such as delta-8, delta-9, delta-10 and further refined products, such as HHC.

> *Unlike adult-use and medical cannabis, hemp-based products can be sold in all traditional distribution channels and retail outlets.*

Converted Products Were Creating Consistent Demand for Hemp by 2021

The deployment of products beyond traditional THC delta-9 and CBD have been a lifeline for farmers and processors in the hemp-based cannabinoid industry. **Given that all products derived from hemp are considered hemp, converted hemp-based cannabinoid products found new market opportunities that have not been available to medical or adult-use cannabis operators**. Hemp-based operators were also able to conduct interstate commerce, rather than being restricted only to the markets where the products were grown and processed (which is required of adult-use and medical cannabis products).

Consumers Are Seeing the Benefits of CBD and other Cannabinoid-based Products

Consumer demand has been steadily increasing as the potential benefits of hemp and hemp derived products became more widely known. Consumers began substituting hemp, hemp-based oil and oil derivative products for opioid and pharmaceutical medicines, particularly for pain management, anti-inflammatory, anxiety and diet issues. Seeing an opportunity to expand revenues in small businesses, hemp operators started offering more products. In many states, hemp is the only source of cannabinoids allowed, so the consumer demand has steadily increased, while regulatory oversight was limited to hemp at the farm gate. **From the period from 2019 through 2022, sales of hemp-based cannabinoids exploded and is estimated to be between $17.5 - $22.5 billion in the U.S. alone**. Unlike adult-use and medical cannabis, hemp-based products can be sold in all traditional distribution channels and retail outlets. This has given the U.S. consumer unprecedented access to cannabinoid products. ***(Author's note: The Whitney Economics estimates of total cannabinoid revenues has increased as a result of these more recent survey results)***

In 2022, a Nimble Industry Continues to Outpace Product Safety Regulations

Similar to the early days of adult-use and medical cannabis, the pace of expansion in the hemp market has surpassed the ability or federal willingness to regulate it. As a result, **some products that have been tested have shown discrepancies in labeling, cannabinoid content, the levels of THC, CBD and other ingredients and have shown indications of other "unknown substances"**. These issues will require further regulations, as the current environment is self-regulated, and federal regulation stops at the farmgate. **Regulatory ambiguity could be solved with greater clarity at the FDA and other federal agency levels**. That reform has so far been elusive to date.

Adult-use and Medical Operators Have Pushed Back Against Hemp-Based Cannabinoids

As the sales of hemp-based cannabinoids increased from 2019 – 2022, adult-use and medical cannabis operators have cried foul. Many companies highlighted the lack of regulations have led to a "public safety crisis", while others have cited the competition hemp cannabinoids represents and threatens their revenues derived from intoxicating cannabis. **Most claims regarding a public safety crisis have gone unsubstantiated, in terms of what specific data they are citing, and what specific risks they are concerned about**. Most public safety issues discussed were associated with youth access and usage by consumers who lack any knowledge of what they are ingesting. Many of these concerns can be addressed through basic regulations, yet it seems that adult-use and medical operators are calling for a complete and total ban on sales of hemp products, or for hemp to be regulated in a similar manner as a Schedule One narcotic. The trade-off between working to address gaps in the regulatory process, versus an outright ban, is too large to be economically justifiable. ***While it is appropriate to regulate cannabinoids, it seems unnecessary to force a dramatic change from 'unregulated' to 'schedule one narcotic.'*** The negative economic impact appears to exceed the justification.

FDA Issued a 2022 Update on Hemp-Derived Delta-8 Products

The FDA has issued an update specifically about Delta-8 which provided consumers with a good overview for consumer awareness. **The FDA has stated that "These products have not been evaluated or approved by the FDA for safe use in any context."** Extending this further, the FDA issued a statement in early 2023, that said the existing regulatory frameworks for foods and supplements are not appropriate for Cannabidiol and that they will work with Congress on a new way forward. Precisely the same thing can be said for almost all adult-use and medical cannabis products. One might ask, if hemp derived cannabinoid products are a risk to public safety, how are adult-use and medical products not a similar risk? The difference, adult-use operators would say, is that cannabis for adult-use and medical purposes is tightly regulated while hemp is not. Further, **regulation for hemp products stops at the farmgate and does not extend to the product levels. A lack of product regulation of hemp-derived products creates a competitive advantage for the hemp industry, and it may allow for the opportunities to sell potentially harmful products to unsuspecting consumers**. This point of view further demonstrates the importance of reasonable policies with regard to regulating market access and sales of hemp-based products.

> *One might ask, if hemp-derived cannabinoid products are a risk to public safety, how are adult-use and medical products not a similar risk?*

Since 2018, State Legislatures Have Stepped in to Fill the Regulatory Void

With continued regulatory murkiness around hemp at the federal level, pressure has mounted on state legislators to take action. State legislatures have been compelled to address issues surrounding hemp cultivation and product manufacturing on their own. The result is an inconsistent patchwork of regulations, from state to state. So far, 29 states allow for the sales of hemp-based cannabinoids and converted cannabinoids in either a regulated or loosely regulated manner. Other approaches being used by states include:

- **Prohibiting the sales of products that compete with cannabis products until a tax program has been developed and implemented**
- **Implementing moratoria on the cultivation of hemp**
- **Proposing the ban on sales of hemp-based cannabinoids within the state but allow for manufacturing and processing for out-of-state export**

Since 2020, State Legislative Actions Have Impacted the Hemp Industry at the National Level

With the regulatory uncertainty already high due to federal inaction, additional uncertainty around state regulations has negatively impacted the national hemp industry. Within this dynamic and changing environment, many operators cannot formulate meaningful long-term plans, or even short-term operational strategies, as they are not sure what the rules will be in three months, six months or a year. The market is understandably seizing up, with investments planned for hemp projects now being allocated elsewhere. At a time when, in order to accelerate the growth of the market, supportive policies are necessary, more restrictive measures are being put into place that are doing just the opposite. Data show that these policies are suppressing the growth and expansion of the industry.

What are the Impacts of this Environment of Uncertainty?

- **A lack of investment and deployment of the hemp infrastructure *reduced the economic potential of the U.S. hemp industry by $20 - $25 billion in 2021 for fiber and grain alone*. The value of this shortfall is the same size as the entire legal U.S. sales of the adult-use and medical cannabis retail industry.**
- **Uncertainty at the state level has reduced acreage and business licenses, limiting cultivation capacity.**

The Example of Oregon: State Bans and Regulatory Actions Create Unintended Consequences

Multiple states have attempted to enact legislation that would re-criminalize hemp derived cannabinoids or to ban it altogether, however this has led to many unintended consequences and legal battles. For example, the state of Oregon has enacted a moratorium on hemp cultivation in some counties. ***While this has mainly been an attempt to address illicit adult-use cannabis production, the legislation unintentionally impacted the supply chain of CBD for many states and impacted CBD processor revenues in Oregon by $50 million to $75 million per year***. It also impacted opportunities for hemp-based grains and fiber and reduced opportunities for farmers to take part in carbon offset programs. Legislation in Colorado intended to ban production of converted cannabinoids was proposed not realizing that this would have a direct economic impact of over $500 million per year in product manufacturing sales and an overall impact in 2023 in excess of $2 billion. Most manufacturers in Colorado surveyed indicated that they would simply move their entire operation to another state rather than close down operations. The Colorado legislature has since reconsidered this proposed legislation.

Hemp and Hemp Derived Products are Deemed Legal in U.S. 9th Circuit Court Ruling

Hemp derived products are hemp by definition and are therefore legal to sell and productize, according to the U.S. 9th Circuit. As such, they do not require as much regulation as does the federally illegal adult-use and medical cannabis. While the adult-use and medical industry is crying foul and attempting to paint hemp derived products in a negative light, the fact remains that until policy changes are made at a federal level, hemp derived products will remain legal.

DEA Has Reaffirmed the Legality of Delta-8 THC, Delta-10 THC, HHC

On or about February 13, 2023 the DEA responded to an inquiry from Attorney Rod Knight regarding the legal status of THCO (only). The DEA stated that THCO is a schedule 1 controlled substance applying the Analogue Act. The DEA letter was solely about THCO, specifically delta-8 THCO and delta-9 THCO. It did not in any way address delta-8 THC or any other compound. ***The legal status of delta-8 THC was not impacted in any way by the DEA's letter, except to the extent that its lawful status as "hemp" was reinforced***. The DEA could have said that Delta-8-THC was unlawful or was synthetic; it did not. Instead, previously, the 9th Circuit Court of Appeals had indicated that Delta-8 'fits comfortably' within the hemp definition of the Farm Bill.

In 2023, A Lack of Data has Led to Even Greater Uncertainty

Due to the federal illegality of cannabis at the federal level, most federal agencies are not allowed to collect data on the economics of cannabis. There are a handful of NAICS codes (North American Industrial Classification System) that are used to track the flow of goods and services throughout an economy, but there is currently only a very limited ability to track such things as revenues, employment, economic impact, taxes and the flow of cannabis goods and services throughout the economy. As a result, most of the data gathering has been in the form of meticulous manual data collection: compiling data from state regulators, parsing together point of sale data, and conducting business and consumer surveys. With the lack of centralized data in the marketplace, it is understandably tough to be able to ascertain risks felt by operators, investors and stakeholders participating in the hemp industry. This lack of basic economic measurements has led to even greater uncertainty.

Access to Data is Limited; Some States Report Better than Others

In adult-use and medical cannabis, there has been very little data collected at the federal level. This is beginning to change and some data is being published by state regulatory agencies. Because hemp is a federally legal agricultural crop, the ability to analyze the market is limited to the data that is collected by the USDA. This data is recent and not comprehensive, as it only goes back to 2021, the whole industry has very few NAICS codes and, unfortunately, despite its legality, hemp has been caught up in the debate and politics around cannabis data collection. A few teams of analysts, like the one at Whitney Economics, have been manually collecting data at the state level since

2019. Published data is largely limited, however, to the higher aggregated levels, and it does not include sales data at the product manufacturing or retail levels. This manual collection of regulatory and economic data is further supplemented by regular surveys of cannabis operators and stakeholders. This ongoing research is inspired by the lack of available, accessible data. The lack of data has hindered the ability to analyze the hemp market, and has limited the ability to provide useful, timely insights to regulators and policy makers on key issues, including the impacts of policy changes on the industry.

PROPOSED STATE LEGISLATION: Texas SB264 and HB4238 Texas Proposed Restrictions on the Sale of Hemp-derived, Converted Cannabinoids in 2023

There have been multiple efforts in Texas to pass legislation ***that restricts sales of Converted CBD Cannabinoid products and limits the THC content beyond the federal definition of marijuana***. Texas SB264 and HB4238 were two pieces of legislation that made assumptions about the public safety and health implications of cannabinoid products and also assumed that the health and safety issues outweighed the economic impacts of the sales limitations. In examining the potential impact, it appears that the legislature may have underestimated the effect that such legislation would have on the Texas economy. Advocates for access to hemp-derived cannabinoids in Texas came out in force against these bills, particularly veterans and the legislation did not advance. It is anticipated that these bills will be reintroduced in the next legislative session.

Lack Of Data Is Leading to Poor Policy Decisions and Misunderstandings

The data suggest that these proposed restrictions have the potential to do far more economic harm than good, while still not meaningfully addressing the public safety and regulatory concerns that drove the initial legislation. We should point out that much of the narrative associated with this conversation has been qualitative in nature, but not supported by data. Depending upon their source, qualitative inputs can lead to the development of uninformed policies that do not support larger public safety goals or regulatory objectives.

The Intention of this Report is to Fill the Void with Data

This project attempts to address the lack of data on the hemp-based cannabinoid market in Texas. Most estimates have vastly underestimated the amount of revenue being derived from Texas's hemp retail industry. To date, there has only been speculation as to the extent of the hemp-derived cannabinoid market. No study had been conducted to ascertain the size and impact of this industry on the overall Texas economy. As such, Whitney Economics has combined its expertise and extensive data set for the cannabis and hemp industries, with a survey of retailers of hemp-based cannabinoids in Texas.

OBJECTIVE OF THE REPORT

The objective of this report is to ascertain the total economic impact the hemp-derived cannabinoid industry is having on the Texas economy and to understand the implications that restrictions on sales would have on the state and the industry. In addition, the objective was also to assess the amount of employment, wages, and revenue derived from these products, to identify key issues facing the hemp, CBD and converted cannabinoid industry and to then summarize and articulate the quantitative and qualitative results for educational purposes.

Limitations in scope

The quantitative economic impact research from our fact finding was limited to the following items:

- **Types of business**
- **Annual revenues**
- **Percentage of revenues derived from CBD and Cannabinoid based**
- **Total labor demand**
- **Total wages paid**
- **In-state versus out of state sales**
- **Sources of supply (states)**
- **Sources of risk to the business operators**
- **Checking identification**
- **Possible reaction to legislation if bans are passed and signed into law**

In addition to the above mentioned specific quantitative data points, some qualitative data were gathered from interviews. These data include:

- **Key regulatory and strategic issues facing operators**
- **General comments about the industry or regulations**

Qualitative data has revealed some useful insights into the mindset of Texas hemp-derived cannabinoid operators.

DATA AND FINDINGS

Texans have limited access to cannabinoids

Despite being one of the largest states in terms of cannabis consumption, Texans currently have a very limited access to cannabinoids. Unlike many other states, Texas does not allow for adult-use cannabis production or sale, and has very restricted access to cannabis for medical purposes. As a result, hemp-derived is the only legal source of cannabinoids in Texas for consumers. Consumer interest in hemp-derived cannabinoids has increased since the passage of the farm-bill in 2018. It is notable that if legislation is passed to restrict or prohibit access to hemp-derived cannabinoids, Texas consumers would lose all access to the benefits of cannabinoids.

The Texas cannabinoid market has grown significantly

With the growing number of consumers purchasing hemp-derived cannabinoids, businesses have seen an economic opportunity associated with this emerging industry. This has led to a surge in the number of licensed operators in Texas.

Year	Retail Hemp Registration	Consumable Hemp Product License
2020	710	24
2021	2110	381
2022	2469	485
Current numbers for Texas	**4468**	**565**

The Texas Hemp-derived Cannabinoid Industry by the Numbers

Key data and insights can be gleaned from the results of the April / May 2023 survey of cannabinoid retailers, manufacturers, and distributors conducted by Whitney Economics. When combined with additional analysis of state hemp-cannabinoid, consumables and converted markets, the following data describes the hemp-derived cannabinoid market in Texas. **The data reveal two starkly different futures for hemp cannabinoid retail and cannabinoid companies in Texas. If converted cannabinoids are no longer legal to sell in the state, the data show a significant decline in the industry. Conversely, if converted cannabinoids are allowed to remain in the state, then there is the potential for significant and sustained growth**.

SECTOR BY SECTOR OVERVIEW

CULTIVATION

Cultivation: Everything Starts with the Plant

The Texas hemp cultivation industry, while not included in the survey, serves an important and notable function in the Texas hemp industry as it supplies the raw material inputs that go into extracted and converted products. The hemp agriculture sector took time to enter into the market after the passage of the 2018 farm bill, and has been supplying hemp raw materials in the form of extractable biomass into the manufacturing sector. Although an important supplier to manufacturers it is not the only source of raw materials into this space. There are 769 Texas hemp farmers who are licensed to cultivate up to 3,359 acres of hemp.

Texas Indicators	2019	2020	2021	2022
Acres	0	3,860	4,084	3,359
YoY Change Acres	0	0	-5.8%	-17.8%
Growers	0	816	1,108	769
Acres / Growers	0	4.73	3.69	4.37
Output Capacity (2k lbs/acre)	0	7,720,000	8,168,753	6,718,000
YoY Change Capacity (lbs)	0	7,720,000	448,753	(1,450,753)
Value of Biomass @ $2.50/lb	**$0**	**$19,300,000**	**$20,421,883**	**$16,795,000**

Source: Whitney Economics, Texas Department of Agriculture and Consumer Services, Randall Lusson

Texas Hemp Cultivation is a $17 million industry by itself.

Despite not being the only supplier into Texas manufacturers, the Texas cultivation sector is already a $17 million industry. This does not include the smokable hemp flower sales, whose products are used as a tool for nicotine secession. The Texas Department of Agriculture does not differentiate publicly the split between fiber, grain and cannabinoid cultivation, however previous data indicates that a large majority of this sector supports the cannabinoid market. While the number of farmers has declined year over year, the amount of acreage per licensee is increasing. The value of the crop is calculated based on the total capacity licensed in 2022, and not the output. Unfortunately, Texas experienced a drought in 2022 and so not all of the acres planted made it to market. Addressing the dynamic nature of an agricultural operation, it is important to make informed, data driven decisions at the legislative and regulatory levels, to examine the potential impacts across the supply chain.

Cultivation is Localized, Similar to Farm to Table

Although Texas farmers are able to ship biomass nationally, the quality of the biomass degrades exponentially depending upon the distance from the source. Generally, farmers support local manufacturers, and, as a rule, tend not ship their products more than 100 – 200 miles from its source. ***There is more demand in Texas for hemp biomass than the Texas market can produce. This is rare in the U.S. hemp industry. However, the elimination of the manufacturing and retail operations would do irreparable harm to Texan hemp farmers at a time where more demand is needed for biomass***.

"Legislation that would restrict THC content in Texas products would have a serious impact on our business opportunities."

- Texas Hemp Farmers

100% of Texas survey respondents stated that if legislation was passed that restricts sales or manufacturing of cannabinoids, they would either leave the state or go out of business.

PROCESSING AND PRODUCT MANUFACTURING

Processors and Manufacturers Produce Products for the Retail Channel

Manufacturers are a key part of the hemp-derived product supply chain. They convert the raw hemp biomass into extracted oils and productize the intermediary ingredients into retail consumer goods. Product manufacturing can either produce all of the materials and ingredients in Texas or they can import some of them from other states. The product manufacturing sector drives economic activities throughout the country and internationally.

The Product Manufacturing Sector has Already Invested in Texas Infrastructure

The processing and product manufacturing sectors have been much maligned in recent years, yet, they too are significant contributors to state economies. Based on data from a Q2'22 survey of Colorado cannabinoid manufacturers, many of whom also have operations in Texas, Florida and elsewhere, the average investment into manufacturing operations is between $5 million and $12.5 million. There are an estimated 226 cannabinoid manufacturer or extractor permits issued in Texas. Even at the low end of the average investment into their operations, the product manufacturing sector has invested over $1.1 billion in infrastructure to set up operations in Texas.

Category	CBD Processor or CBD Converted Cannabinoid Product Manufacturer
Jobs per Operator	12.8
Wages per Hour	$21.25
Annual Wages per Employee	$44,200
Wages Paid Per Operation	$563,550
CBD only Sales	$611,875
Cannabinoids Sales	$3,090,000
Total Revenue from Cannabinoids	$3,701,875
Total Revenue Per Operator	$3,897,917
Percentage of Total Sales	95.0%

Source: Whitney Economics: Survey of Texas Cannabinoid Operators

The manufacturing sector is also a large source of employment for workers.

With an estimated 226 operators permitted in the state, the manufacturing sector employs nearly 3,000 workers and pays over $127 million in wages. Nearly all of the revenues from these operators are derived from hemp.

Manufacturing Operators in Texas	Total Texas Jobs	Total Wages Paid
226	2,882	$127,362,300

Source: Whitney Economics: Survey of Texas Cannabinoid Operators

WHOLESALE AND DISTRIBUTION

Wholesalers and distributors in many ways are the connective tissue for the hemp industry. These businesses facilitate the trade of intermediate and finished goods throughout the hemp supply chain.

Wholesalers and distributors also facilitate interstate commerce as hemp derived products are manufactured and tested throughout the United States.

Category	Cannabinoid Distributor / Wholesaler
Jobs per Operator	16.5
Wages per Hour	$22.09
Annual Wages per Employee	$43,867
Wages Paid Per Operation	$723,809
CBD only Sales	$713,462
Cannabinoids Sales	$10,594,000
Total Revenue from Cannabinoids	$11,307,462

Source: Whitney Economics: Survey of Texas Cannabinoid Operators

There are approximately 339 wholesale and distribution businesses in Texas and are the source of 5,594 jobs paying in excess of $245 million in wages each year.

Wholesale Operators in Texas	Total Texas Jobs	Total Wages Paid
339	5,594	$245,371,183

Source: Whitney Economics: Survey of Texas Cannabinoid Operators

88.9% of survey respondents stated that if legislation was passed that restricts sales or manufacturing of cannabinoids, they would either leave the state or go out of business.

CANNABINOID RETAIL

The Profile of a CBD and Cannabinoid Retail Business

There are 4,468 hemp retail permits issued in Texas. There are also many more retailers in operation that do not realize they need a permit to sell hemp derived products. For example, it is assumed that roughly two thirds of the 11,200 gas stations in Texas also sell hemp cannabinoid products. Hemp retailers represent the most jobs in the Texas hemp industry.

Based on the survey results, a typical Texas business that sells CBD and other cannabinoid products:

- **Has 9 employees**
- **Pays employees $29,515 in wages each year**
- **Pays $291,322 in wages per store**
- **Generates sales of $937,000 per year from stores with a focus on CBD and Cannabinoid products**
- **Cannabinoids generate total sales for all products of nearly $513,000 per store each year in Texas**

More Pay, More Revenue, More Employment for Retail Businesses Focused on Cannabinoids

Based on the survey responses, retail stores that focus on CBD and Cannabinoids pay higher wages per operation, generate greater revenues and employ more employees than respondents from gas stations and grocery stores. These stores also generate sales and payroll taxes at higher rates.

Category	Retail – Smoke Shop	Retail – CBD Store	Retail - Vape Store	Retail – MJ Dispensary Limited Sample Size	Retail – Gas Station Limited Sample Size
Jobs per Operator	11.4	5.4	20.0	8.5	5.0
Wages per Hour	$13.26	$14.27	$14.93	$17.00	$15.00
Annual Wages per Employee	$27,581	$29,682	$31,054	$35,360	$31,200
Wages Paid Per Operation	$313,870	$161,468	$620,156	$300,560	$156,000
CBD only Sales	$67,098	$136,994	$168,748	$12,000	$60,000
Cannabinoids Sales	$233,708	$377,029	$671,5212	$3,000	$78,000
Total Revenue from Cannabinoids	$300,806	$514,023	$840,269	$15,000	$138,000
Total Revenue Per Operator	$668,006	$474,037	$1,669,754	$120,000	$240,000
Percentage of Total Sales	45.0%	108.4%	50.3%	12.5%	57.5%

Source: Whitney Economics, Texas Department of Agriculture and Consumer Services, Randall Lusson

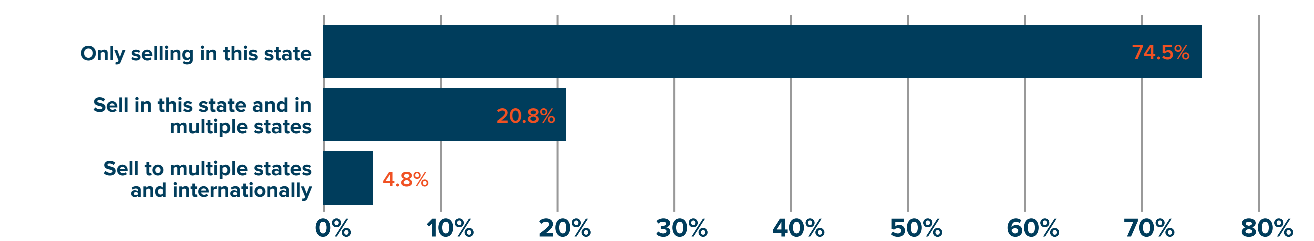
A Majority of the Total Demand is for Converted Cannabinoid Products

Survey respondents indicated that over 89.5% of cannabinoid sales were from converted products while 10.5% of sales were CBD only. This shows a strong consumer preference for converted cannabinoid products. And that a restriction on sales of these products would have a profound impact on the businesses. It is not surprising that a higher percentage of hemp-based sales were CBD related (43.5%) in gas stations and grocery stores, where consumers are more familiar with CBD than other cannabinoid products (56.5%).

Texas Retailers Sell in Multiple Markets, Both Domestic and international

Texas cannabinoid retailers have customers that extend far beyond the borders of the state. In fact, 4.76% of respondents indicated that in addition to selling to Texas consumers, they also had international customers. This is a similar pattern to other major cannabinoid producing states. Even today, the impact of a ban on retail sales of converted cannabinoids would be felt in international markets.

DO YOU SELL ONLY IN YOUR STATE, IN OTHER STATES, OR ELSEWHERE?



Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Total Sector Jobs and Wages

The total economic impact of the Texas cannabinoid market has increased significantly since 2019. There are now over 5,000 permitted companies in this space in Texas.

Year	Retail Hemp Registration	Consumable Hemp Product License
2020	710	24
2021	2110	381
2022	2469	485
Current number	4468	565

Overall market size based on the estimated 4,468 smoke shops, vape stores, gas stations and CBD stores indicate that the CBD and Cannabinoid market is a job creator that pays livable wages. Based upon the total number of stores in this sector (4,468) the total employment in the retail sector is estimated to be over 41,642 jobs, earning $1.23 billion in wages.

Retail Operators in Texas	Total Texas Jobs	Total Wages Paid
4,468	41,642	$1,229,064,875

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Total Stores in Texas	4,468
Average Employees in Survey	10.1
Average Wages / Hour	$14.89
Annualized Wages Survey	$30,975
Total Wages per Store	$310,411
Ave CBD and Cannabinoid Revenue	$513,157
Total Estimated Revenue in Texas* **includes Gas Stations not permitted*	**$3,323,369,476**

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

The Texas Hemp-based Cannabinoid Market is Already Worth Billions Today

There is a multiplier effect for revenues derived from the retail sales of products containing hemp-derived cannabinoids. Similar to adult-use and medical cannabis, the multiplier factor is 2.8x. This means that for every dollar of revenue derived by this sector, there is an additional $2.8 dollars that follows through the Texas economy. For example, the $3.2 billion in revenue in 2022 results in an overall economic impact of $9.3 billion. This simple calculation shows that the Texas hemp-derived cannabinoid industry is already a multi-billion-dollar market.

The Multiplier Effect - 2.8x (Retail only)	
Total Estimated Sales	$3,323,369,476
Total Economic Impact	$9,305,434,533

Source: Whitney Economics

MARKET SUMMARIES

Total Operators Used in this Analysis

There are 5,033 hemp permits issued in Texas based on data from the Texas Department of Agriculture and other state agencies.

Total Estimated Number of Hemp Permits	
Retailers	4,468
Wholesalers	339
Processors	226
Extractors	0
Total Estimated Hemp Permits Overall	**5,033**

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Average Sales (based on Survey)

The Average Sales per respondent is higher for manufacturing than it is for retail. In terms of average revenue per retailer, due to the limited number of official gas station respondents, Whitney Economics used the average of the overall retail responses rather than blending traditional retailers with gas stations.

Sales Breakdown	
Average Sales: Retail	$513,157
Average Sales: (Gas only)	$138,000
Average Retail Sales Used in Analysis	***$513,157***
Average Sales: Distributors	$11,307,462
Average Sales: Manufacturers	$3,701,875

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Projected Sales of CBD and Cannabinoids in Texas based on 5,033 Permits

Based on the 5,033 permit holders and the average revenue from survey respondents, there is a total of $8.0 billion in CBD and Cannabinoid sales in Texas throughout the supply chain, not including cultivators.

Total Estimates based on Number of Licenses	
Retailers	$3,323,369,476
Wholesalers	$3,833,229,618
Processors	$836,623,750
Extractors	$0
Total Estimated Sales Overall	**$7,993,222,844**

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Statewide Jobs and Wages

Not including cultivators, the hemp-derived industry contributes in excess of 50,100 jobs to the Texas economy generating $1.6 billion in wages.

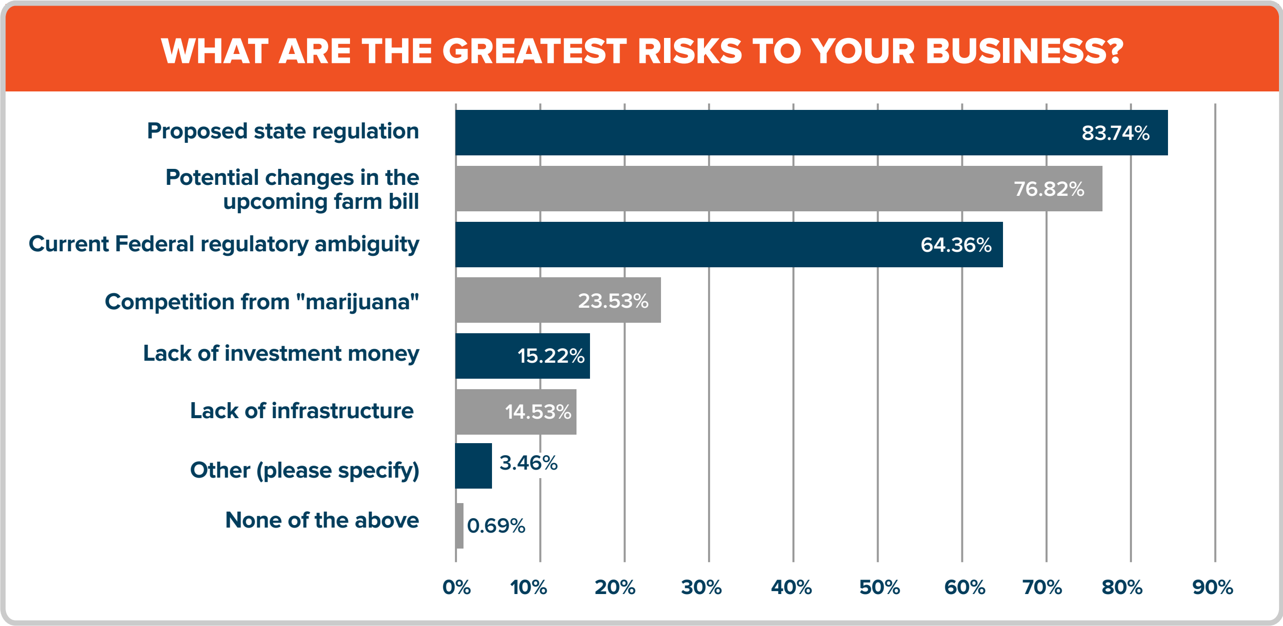
Statewide Jobs and Wages	Jobs	Wages
Retailers	41,642	$1,229,064,875
Wholesalers	5,594	$245,371,183
Manufacturers (Processors / Extractors)	2,882	$127,362,300
Total Estimated Jobs and Wages	**50,117**	**$1,601,798,358**

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

OBSERVATIONS AND POLICY RELATED ISSUES

Texas Cannabinoid Operations Currently View State Bans as the Biggest Risk to their Business

Texas operators view the proposed state regulatory changes as the biggest risk to their business. So, a ban and THC restrictions are prominently in the minds of these business owners. Similar to state legislators, there are also concerns about the level of federal ambiguity and the potential impact that will have on the industry and how the federal government will respond. Changes to the upcoming Farm Bill could also significantly impact their business or it may actually help to clarify the role cannabinoids play in the industry. Regulatory concerns are easily the dominant set of perceived risks to Texas cannabinoid operators.



Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

CBD and Converted Cannabinoid Suppliers and Retailers Take Public Safety Seriously

Most of the cannabinoid suppliers that have provided inputs into the Whitney Economics studies on this topic are self-regulated and very focused on consumer safety. In many ways, they want some form of regulatory oversight just as long as it does not recriminalize the hemp derived products or regulate them as though they are Schedule 1 drugs. The same holds true for the respondents from Texas and elsewhere around the country.

Hemp Cannabinoid Manufacturers Test Frequently and are Calling for Regulation

Based on a survey of Colorado cannabinoid manufacturers in 2022, data has consistently suggested that public safety issues largely originate from illicit and unregulated sources. From a public safety point of view, the major converted cannabinoid producers in Colorado, for example, test their products and materials an average of 3.9 times before sale into retail channels.

Average Times Tested Before Consumer:

3.90

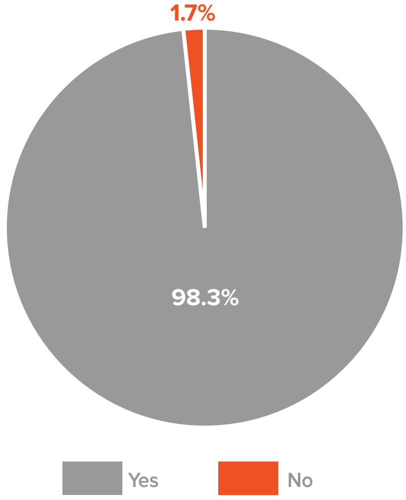
Hemp Operators Want Regulations, Just Not Re-criminalization

The hemp cannabinoid industry is also calling for restricting access to minors and for greater truth-in-labeling rules. This would indicate that a transition from self-regulation to some form of greater oversight would be both welcome and orderly. Given that hemp processing and manufacturing is a viable agricultural commodity that generates billions in economic activity each year, ***re-criminalizing hemp and regulating it similarly to a schedule one drug is not economically justifiable***.

Texas Retailers Check Identification and Reduce Access to Minors

As an example of the Texan retailers taking a responsible approach to their business, 98.3% of the respondents reported that they check ID's and of those who did not, they were either product manufacturers or suppliers. This is self-reported data and was not audited for accuracy. Only two retailers responded that they do not check identification when selling the products. This runs contrary to much of the narrative about CBD and converted cannabinoids that the products are unsafe and getting into the hands of children. It is notable that this does not include transactions from online sales.

Do You Check Identification?



Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

The Texas Cannabinoid Retail Sector has an Extended Supply Chain Throughout the U.S.

The cannabinoid retailers receive supply from nearly every state in the U.S. While a significant majority of respondents indicated that they receive products from Texas (64.63%), they also received products from other states as well.

Top Supplying States

Texas hemp operators source their products and supply from nearly every state in the U.S. Texas is the largest supplier of goods and services, but the supply chain extends from coast to coast. Florida, California and Colorado are also large percentage suppliers to Texas operators.

Rank	State	Percentage of Responses
1	Texas	64.63%
2	Florida	53.40%
3	California	53.06%
4	Colorado	43.20%
5	Oregon	25.85%
6	Oklahoma	16.33%
7	Missouri	14.29%
8	North Carolina	13.27%
9	Tennessee	11.56%
10	Kentucky	11.22%

Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

This chart shows that while cannabis policy is contained within a particular state boundary, the supply chain for hemp, CBD and converted cannabinoids extends across the country and around the world. Many policy makers do not realize that the policies they are adopting in one state will impact employment, wages and people in other states. This is a key differentiator of hemp-based products from other cannabis products, and it is why state policies have often had unintended consequences.

Regulators and Legislators Mistakenly View Hemp the Same as Adult-use and Medical Cannabis

Policy makers appear to view the hemp derived cannabinoid manufacturing as a siloed market with the supply chain as though it is contained within the state, similar to how cannabis is regulated in Texas and other states. In fact, the hemp supply chain extends throughout the U.S., which means that a significant change in policy in Texas would have ramifications for hemp cultivators and processors far beyond the borders of the state.

A Cannabinoid Manufacturing Ban or THC Restrictions Would Not Increase Public Safety

Given that respondents overwhelmingly stated that they will supply the U.S. from other jurisdictions, it does not appear that the banning of retail cannabinoid sales in Texas would increase public safety. However, ***efforts to limit access to minors, and holding suppliers accountable to labeling and product content would be a more effective path to increase public safety and would have the support of the major manufacturers and retailers who were interviewed for this report***.

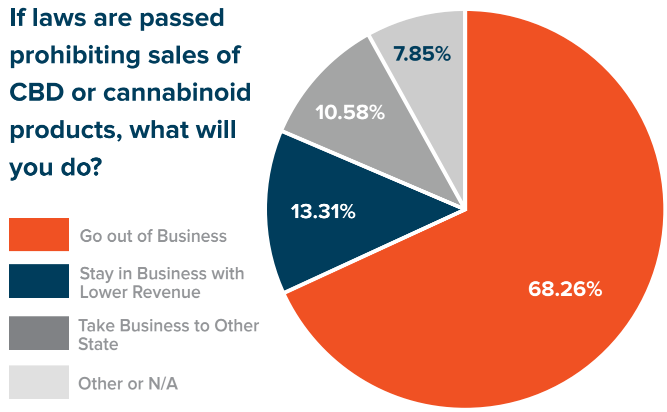
Sales Restrictions of Cannabinoids would Significantly Impact Hemp Agricultural, Manufacturing & Retail

When asked if laws were passed in Texas prohibiting the sale of most CBD or cannabinoid products, what would the business owner do in response:

- **68.26% of responders said that they would go out of business**
- **13.31% said they would remain in business, just with lower revenue**
- **10.58% said they would move the business to another state**

Extrapolating this to the entire market, 3,601 businesses would fail, 460 businesses would leave, and only 972 of the 5,033 hemp permitted businesses would remain in Texas.

If laws are passed prohibiting sales of CBD or cannabinoid products, what will you do?



Source: Whitney Economics Survey of Texas CBD and Cannabinoid Operators

Sales Restrictions of Cannabinoids Would Impact Employment and Wages

Current unemployment rate in Texas is 4.11%. Enacting laws that prohibit or restrict the sales of CBD and Cannabinoids would result in a job loss of 40,791 workers. This would increase the unemployment rate from the current 4.11% to 4.38%. The ban would also impact employment in the cultivation sector in Texas. (Not included above)

Texas - Data Series	Back Data	Dec 2022	Jan 2023	Feb 2023	Mar 20232	Apr 2023	May 2023
Labor Force Data							
Civilian Labor Force(1)		(R)14,706.5	14,754.60	14,819.30	14,898.10	14,960.30	(P)15,009.3
Employment(1)		(R)14,145.6	14,185.40	14,232.10	14,298.30	14,354.70	(P)14,393.0
Unemployment(1)		(R)560.9	569.30	587.20	599.80	605.70	(P)616.3
Unemployment Rate(2)		(R)3.8	3.90	4.00	4.00	4.00	(P)4.1

Source: https://www.bls.gov/eag/eag.fl.htm

Texas Hemp Is Meeting the Intent of the 2018 Farm Bill - Creating Opportunities for U.S. Farmers

With a major market supporting thousands of jobs, a supply chain throughout the U.S. and consumer support, it appears that the U.S. hemp-based cannabinoid retail industry is meeting the intention of the 2018 Farm Bill. By banning or restricting the retail sales of these products in Texas, state lawmakers are either preventing or severely limiting opportunities for farmers, manufacturers and retailers. Therefore, it appears that state policies are conflicting with federal policy.

Solutions to Some State Issues Will Ultimately Be Made at the Federal level

While there have been some regulatory gaps in federal policy as a result of the 2018 Farm Bill, states may be better off by allowing the federal government to address them instead of developing a patchwork of rules and regulations at the state level that makes hemp operators uncertain on how to conduct interstate commerce. The 2023 Farm Bill is currently being negotiated in Congress. States have been clear in the fact they hemp and hemp related laws need to address several issues and gaps in policy that came about in 2018. Negotiations are already underway on a variety of issues including changing the definition of hemp, providing exemptions on testing, addressing product remediation and potentially extending the regulatory purview beyond the farm gate and more at the product level. If states enact legislation in early 2023, they may have to re-address these laws again once the 2023 Farm Bill becomes law.

TOTAL ECONOMIC IMPACT

To sum up the overall economic impact of a ban or restriction of the retail sales of these products in Texas, of the 5,033 hemp permitted businesses, 4,061 would either go out of business or else leave the state. Beyond the estimated loss of $1.1 billion in infrastructure investment, business revenues would decline 85.9% and employment in this sector would decline 81.4%.

Sector	Statewide Losses	Out of Business	Move Out of State	Percent of Licensees	Lost Revenue	Lost Jobs	Lost Wages
Retailers	3534	3168	366	79.1%	$2,628,730,774	32,938	$972,170,167
Wholesalers	301	207	94	88.9%	$3,407,315,216	4,972	$218,107,718
Manufacturers	226	226	0	100.0%	$836,623,750	2,882	$127,362,300
Total --->	4061	3601	460		$6,872,669,740	40,791	$1,317,640,186

Source: Whitney Economics

Retail Multiplier

With roughly $3.3 billion in lost retail sales associated with CBD or Cannabinoids, when considered from a multiplier effect perspective the economic loss associated with bans or restrictions on cannabinoid products in Texas would be estimated in the range of $8.5 billion - $10.5 billion

The Multiplier Effect - 2.8x (Retail only)	
Total Estimated Sales	$3,323,369,476
Total Economic Impact	$9,305,434,533

Source: Whitney Economics

CONCLUSION

Cannabinoid Retail Is Viable in Texas

Despite the federal regulatory uncertainty and the dynamic market conditions, falling prices and uncertainty from regulators and policy makers, the Texas hemp-derived cannabinoid retail sector has quickly evolved into an economically viable and sustainable industry. With a national supply chain, this sector has had a positive economic contribution to the state of Texas.

Economic Impact of Hemp Cannabinoid Processing and Manufacturing on Texas

In addition to employing over 50,100 workers, generating $1.6 billion in wages in Texas, the influence of this industry is felt beyond state borders. The $8.5 - $10.5 billion economic impact of hemp to the Texas economy is significant enough to justify more favorable policies, not less favorable ones.

Near-Unanimous Concerns from Texas Hemp Cannabinoid Retailers

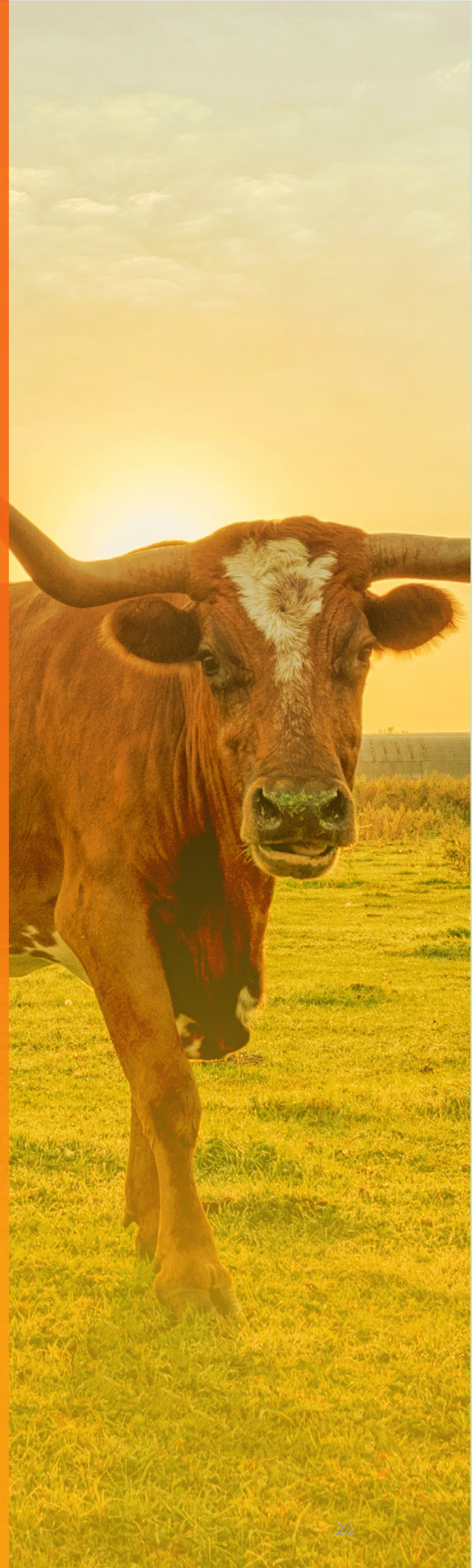
When asked, nearly 79% of respondents said that a restriction on cannabinoid retail sales would result in them either going out of business or completely exiting the state, taking with it the jobs, taxes and economic contributions with them. Public safety remains a concern for every company contributing to this report.

Whitney Economics does not recommend enacting restrictions on cannabinoid sales for several reasons:

- **The economic damage in terms of business failures, job losses and adjacent economic activity to Texas would be too great.**
- **There would be a shift of $6.8 billion in economic activity away from the state, without addressing some of the stated underlying public safety concerns regarding hemp-derived products.**
- **Restrictions on sales would displace tens of thousands of workers during a time of national economic uncertainty**
- **Texas cannabinoid restrictions would disrupt the hemp supply chain throughout the United States at a time when opportunities for hemp farmers are being lost at a rapid pace.**

A trade-off between working to address gaps in the regulatory process, versus what would result in an outright ban, is too large to justify these restrictions on hemp-based cannabinoids. We feel that moving away from self-regulation, and toward being regulated at the product level, is a middle ground solution that makes sense, especially when compared to a complete ban of the industry.

APPENDICES



APPENDIX

Methodology

Whitney Economics was selected to provide a report on the economic impact of the Hemp-based cannabinoid industry in the state of Texas. With a demonstrated track record of creating unbiased economic reports in the cannabis and hemp for industry groups and officials at every level of government, Whitney Economics is uniquely positioned to assess the market from an operational and policy perspective. Whitney Economics has dedicated resources for the ongoing data collection and analysis of the cannabis and hemp industries, both in the U.S. and internationally. As such, we have an extensive database upon which to draw.

NOTES ON DATASET

- As part of this report, the data was gathered with a targeted survey of Hemp operators as well as smoke shops, vape shops, gas stations and CBD stores. Manufacturers and distributors were also included in the survey. Emails were sent directly to the operators and reminders were sent to drive more participation.
- Whitney Economics conducted a 16-question survey of leading hemp-based cannabinoid companies in Texas. This survey was conducted during a six-week period in Q2'2023.
- The survey was sent to over 2,560 (approximately 52.7%) of the estimated 5,033 Hemp, CBD and Cannabinoid retailers, manufacturers and distributors in Texas.
- The data does not include assessments of the revenues derived by CBD and cannabinoid products sold at grocery stores or gas stations. ***As a result, Whitney Economics feels that the total revenues and economic impact is understated***.
- There was a response rate of 11.0% which is high. This enables statistically extrapolation to the extent the results and projections have a 95% confidence level with a margin of error of +/- 5.4%
- The response rates represented 5.3% of all permitted manufacturers, 5.3% of distributors and 5.1% of retailers.
- Separate research was conducted to ascertain the number of smoke shops, vape shops, hemp operators, CBD stores, gas stations, distributors and manufacturers there were in the state.
- Whitney Economics also supplemented the data with observations and data from other markets both on the adult-use and medical industries as well as with the industrial hemp industry, much of which came directly from state and federal regulators

NOTES ON DATA FROM SURVEYS

- All data from surveys was self-reported: some data was independently verified, while some was unable to be verified.
- The data was self-reported and was not validated for accuracy, although some data in the responses was triangulated for accuracy based on other survey responses.
- Data was then aggregated and then included in economic models to determine impacts
- Once the data was reviewed and tabulated, there were certain averages that stood out in the report and those averages were then extrapolated to the rest of the industry and hemp permit holders.
- Whitney Economics compiled confidential information from these surveys and the information is tightly restricted in its use and confidentiality.
- No specific company or data is mentioned in this report as a condition of the survey.

NOTES ON CALCULATION OF ECONOMIC IMPACT

- Economic impact relates in part to employment, revenues of operators, the amounts of suppliers into the market. It also examines the direct and indirect effects from the industry, such as ancillary services.
- Whitney Economics also applied a multiplier effect to the revenues derived from the hemp cannabinoid retail sector.
- Whitney Economics has previously calculated the multiplier effect for cannabis. This established cannabis multiplier (2.8x) was applied to the hemp revenues to ascertain the direct and indirect effects of the proposed legislation.
  - For comparison's sake, the multiplier effect of the construction industry is 1x and the multiplier effect of a national park relative to the local economy is 6x.

APPENDIX
Survey Questions

This is a sample list of questions for the survey of CBD and Cannabinoids Retailers. These questions helped form the basis for the data and impacts presented in the report.

GENERAL:

- Does your company sell or product CBD or Cannabinoid products?
- In what state is your company doing business in?
- What type of business are you?

SALES:

- How much revenue do you generate from the sales each year related to the following:
  - CBD Only
  - Converted Cannabinoids (Delta-8, Delta-10, HHC etc.)
- What is your total revenue each year for all products?
- What percentage of sales is CBD / Converted cannabinoid related?
- Do you sell only in your state, in other states, or elsewhere?

EMPLOYMENT:

- How many employees does your business have?
- What is the average hourly wage paid?

SUPPLY CHAIN

- What states do you RECEIVE your products from? (Check all that apply)

OTHER:

- What are the greatest risks to your business? (Check all that apply)
- Do you check ID’s? (Y/N)
- If laws are passed prohibiting sales of CBD or cannabinoid products, what will you do?
- Any comments you would like to add about this industry or regulatory environment?

APPENDIX

About the Author / Statement of Conflicts

Beau Whitney, Cannabis Economics, Operations and Supply Chain Expert

Beau Whitney is the founder and Chief Economist at Whitney Economics, a global leader in cannabis and hemp business consulting, data, and economic research. Whitney Economics is based in Portland, Oregon.

Serving an international clientele, Beau is considered one of the leading cannabis economists in the U.S. and globally. His applications of economic principles to create actionable operational and policy recommendations has been recognized by governments, and throughout the economic, investment, business communities. Beau recently spoke about cannabis economics at the United Nations.

His white papers analyzing the adult-use, medical and industrial cannabis markets have been referenced in the Wall Street Journal, Washington Post, New York Times, USA Today, the Associated Press, as well as in leading cannabis industry publications.

Beau Whitney is a member of the American Economic Association, the Oregon chapter president of the National Association for Business Economics, is a member of multiple regulatory advisory committees throughout the U.S. and participates on the Oregon Governor's Council of Economic Advisors.

Beau has provided policy recommendations at the state, national and international levels and is considered an authority on cannabis economics and the supply chain.

Beau Whitney
WHITNEY ECONOMICS

Statement Of Conflicts

Whitney Economics does not take a position on the issue of cannabis legalization, however there are potential conflicts while presenting economic and market analysis.

- **Whitney Economics receives compensation for business and economic analysis of the cannabis industry.**
- **Mr. Whitney has previously held positions and licenses within the legal regulated cannabis industry.**
- **Mr. Whitney currently has investments in a cannabis investment fund, Mantis Growth Investments, and he is a member of the fund's Board of Directors.**
- **Mr. Whitney serves in an unpaid role as Chief Economist for the National Cannabis Industry Association**
- **Whitney Economics is a member of the European Industrial Hemp Association.**
- **Mr. Whitney is a founder of Every Day Hemp Company, an Oregon-based manufacturer of hemp based plastic products.**

APPENDIX
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