Article

Replacing Tobacco with Hemp in the Beqaa Is Financially Rewarding for Farmers and Government in Lebanon

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Abstract: Lebanon has been grappling with severe financial and monetary crisis since 2019. In this context, minimizing losses and finding additional revenue sources to sustain state operations have become imperative. One potential solution is to replace subsidized tobacco farming, which has no economic value, with hemp farming for industrial and medicinal purposes. This shift not only ensures economic efficiency but also provides farmers with a moral and profitable crop. However, until now, there has been no scientific study examining the economic impact of hemp cultivation in Lebanon’s Beqaa area. To address this gap, we conducted a Cost-Benefit Analysis within a Business Plan framework to assess the benefits of replacing tobacco with hemp and to provide decision-makers with data-driven strategies. For this analysis, we obtained accurate data on tobacco farming from the state-owned Tobacco Monopoly (Regie), while data on hemp was sourced from existing literature and adapted to Lebanon. Our findings indicate that tobacco farming currently generates USD 828 per dunam for farmers but results in a net loss of USD 317 per dunam to the economy, a shortfall subsidized by the Regie. In contrast, hemp yields a net profit of USD 2405 per dunam, equating to an overall gain of USD 19,240,000 in the Bekaa Valley area. This stark contrast in profitability underscores the potential of hemp as a more lucrative and sustainable alternative to tobacco.

Keywords: hemp; tobacco; cost-benefit analysis; cannabinoids; business plan

1. Introduction

1.1. The Purpose of the Study

The purpose of this study is to investigate whether it is possible to offer tobacco farmers in Lebanon a more moral and economically viable alternative that can enhance economic efficiency, increase state revenues, and minimize losses. The research question we aim to address is whether substituting subsidized tobacco farming with hemp for industrial and medicinal purposes would result in higher gains for farmers and the Lebanese economy.

To answer this question, we will employ Cost-Benefit Analysis (CBA), a comprehensive approach developed by economists to evaluate the advantages and disadvantages of specific policies or projects. For this analysis, we obtained accurate data on tobacco farming from the state-owned Tobacco Monopoly (Regie). Data on hemp was sourced from existing literature and adapted to the Lebanese context. Unfortunately, no data was available to us in the same geographical region since hemp is still considered and perceived as an illegal product in the MENA region due to cultural, religious, and legal constraints. The profitability of the agricultural practice of hemp vis-à-vis tobacco sheds light on the potential of hemp as a more economically viable and sustainable alternative to tobacco. In that context, comprehensive historical background and literature data are presented here to probe whether substituting tobacco with hemp is profitable, economically efficient, and moral.
1.2. Reasons to Replace Tobacco with Hemp

The challenge with subsidizing tobacco plantations stems from the perception of the product as morally questionable. Tobacco farming is often seen as a “heritage” tied to specific places, peoples, and times, inadvertently supporting the dominance of major tobacco corporations. This deeply ingrained heritage not only upholds the industry’s monopoly but also grants a level of legitimacy to its operations [1]. However, subsidizing a non-essential and potentially harmful product depletes the nation’s wealth. In 2008, it was estimated that the total subsidies to tobacco farmers reached $51.1 million in Lebanon, suggesting a need for morally sound alternatives in farming practices [2].

Hemp emerges as a potentially more profitable and sustainable alternative to tobacco. This shift could be driven by an escalating demand for hemp-based products or more favorable market conditions. Furthermore, hemp is recognized as a sustainable crop with positive contributions to the ecosystem, such as its favorable effects on biodiversity, substantial carbon uptake, and the fact that it can thrive without the need for herbicides and pesticides [3]. Therefore, hemp cultivation is environmentally friendlier than tobacco farming, requiring less water and fewer pesticides and adapting to various climates. Changes in regulations and evolving consumer preferences may further endorse hemp farming as a viable and sustainable option. Additionally, hemp’s versatility extends to textiles, paper, building materials, and health products, offering opportunities for diversification and new revenue streams [4].

Moreover, hemp is not associated with mortality but rather with wellness and health. Cannabinoids are in high demand globally for various applications. The cannabis industry, presently a niche market, holds the potential for substantial innovation and investment in bio-based technologies, with projections estimating its global market to grow from USD 10 billion in 2025 to a remarkable USD 115 billion by 2040. Even capturing a small share of this projected 2040 market could prove to be a lucrative investment [5].

Tobacco leaf production was once an efficient governmental social policy tool to enhance wealth distribution and help farmers stay rooted in their lands. However, smoking tobacco has since been recognized as an epidemic [6]. Smoking accounts for 26.3% of deaths and 17.1% of Disability-Adjusted Life Years (DALYs) among males and is responsible for 9.3% of deaths and 6.2% of DALYs among females [7]. It is also a leading cause of premature death in the developed world and has become an increasingly significant health concern in the developing world [8].

In response to the globalization of the tobacco epidemic, the World Health Organization introduced the Framework Convention on Tobacco Control (WHO FCTC) on 21 May 2003. The objective is to strengthen international health cooperation to combat the tobacco epidemic and save lives from the detrimental effects of tobacco, with the main aim of achieving a smoke-free world [9].

Currently, few policymakers advocate for tobacco, especially given its connection to health-related costs that run into millions of dollars. Although tobacco farming places a financial strain on the public budget, it remains a vital source of income for many farmers in Lebanon’s least developed regions, such as the Beqaa Valley. This income is crucial for supporting their families and educating their children, leading some farmers to regard tobacco leaf production as essential for their subsistence and economic security.

Amidst this scenario, there is increasing agreement on the need for the government to provide these farmers with a more morally and financially sustainable alternative. It is proposed that the Lebanese government should alter its social policies to ensure better economic gains for the country, offering a more profitable and ethical product while still encouraging farmers to cultivate their land.

The Regie Libanaise Des Tabacs et Tombacs (Regie) operates a Price Support Program (PSP), setting predetermined prices and production quotas for licensed tobacco farmers. However, most tobacco leaves purchased through this program are sold on the international market, often at a loss. In 2008, the total subsidies provided to tobacco farmers amounted to USD 51.1 million [2]. This figure underscores the financial implications of the current
system and the importance of considering more sustainable alternatives. In this paper, we provide a comprehensive literature review on the advantages of hemp as a substitute for tobacco plantations. In addition, we rely on the analysis of a combination of data provided by Regie and literature reports to examine whether hemp cultivated for medicinal and industrial purposes could serve as a substitute for tobacco plantations in the Beqaa area of Lebanon [10].

2. Materials and Methods

2.1. Methodology

To determine whether legal hemp for industrial and medicinal uses could have a net positive economic impact and replace the loss-generating tobacco industry, we employed Cost-Benefit Analysis (CBA) within a Business-Plan Methodology. This approach serves as a decision-making tool to assess the economic viability of substituting tobacco plantations with hemp in Lebanon. The business-plan technique is advantageous in this context as it presents economic reasoning in a practical and immediately relevant manner [11,12].

Additionally, CBA was used to evaluate the feasibility of replacing tobacco with hemp in the Beqaa region, considering the respective contributions of each product to overall societal well-being. CBA provides a systematic framework for evaluating this initiative, facilitating trade-off decisions by comparing costs to benefits and converting them into monetary values. This method ensures that policy measures are adopted only when the benefits outweigh the costs, thus enhancing efficiency [13,14].

Cost-Benefit Analysis (CBA) is particularly effective in our case for assessing the economic contributions of hemp and tobacco, respectively. It provides a systematic framework where all measurable costs and benefits of both alternatives are considered, ensuring objective evaluation in regulatory contexts [13]. This approach is crucial for evaluating the substitution of tobacco with hemp for industrial and medicinal purposes, aiming to enhance economic efficiency by adopting the hemp alternative because its benefits exceed its costs [14].

Our methodology, which is aligned with the phases described by Sullivan et.al., includes: [13]

1. Identifying hemp for medical and industrial uses as an alternative to tobacco, establishing benchmarks, and defining the scope of the investigation.
2. Determining the respective costs of tobacco and hemp, encompassing the estimation of total costs and financial savings.
3. Highlighting the direct, quantifiable, and tangible benefits arising from both alternatives.
4. Based on the analysis, we selected hemp as the more economically advantageous product.

Given that land in Lebanon is usually small in surface area and owned by individuals, the unit dunam is commonly used in the local community, which is equivalent to 0.1 hectare. To that end, we have performed analysis based on that unit. The data on the costs of tobacco planting and the yield per dunam, along with the purchasing prices from the monopsony and its sales, is both available and accurate. This data is provided by the Regie Libanaise des Tabacs (Regie).

In order to assess both choices, we need to utilize three financial tools: Gross Profit Margins, and Breakeven (sales).

| Break-Even (sales) = \( \frac{\text{Fixed Cost}}{(\text{Selling price} - \text{Variable Costs})/\text{Sales}} \) |

In our case, the variable costs are zero since the newly established monopoly of Hemp is supposed to sell the product to international and local markets. The breakeven point is the operational level at which sales revenues and total costs are equal. In general, fixed costs are those that remain constant irrespective of sales variations, while variable costs are expenses associated with sales. In our scenario, with a monopsony regulating the market, there will
be no variable costs, and the selling price is going to equal the value of the net price of sales. Therefore, the breakeven is going to be equal to the fixed costs; \( \text{Break-Even} = \text{Fixed Costs} \).

To calculate the percentage profit margin, we can use the following formula:

\[
\text{Gross Profit Margin (\%)} = \frac{\text{Gross Profit}}{\text{Net Sales Revenue}} \times 100
\]

where:
- \( \text{Net Profit} \) is the total revenue minus total expenses.
- \( \text{Revenue} \) is the total income generated.

2.2. Assumptions

We assume a uniform marginal utility of money among farmers, adhering to the constant marginal utility of money principle [15]. We assumed that our decision-making process relied on complete, reliable, and readily available information. Additionally, we consider all costs and benefits to be quantifiable, without any data gaps that might complicate our evaluation. Direct costs and benefits are presumed to encompass all relevant costs and benefits of the decisions.

In our case, we compare hemp farming to tobacco farming as the benchmark. We have therefore determined the costs and revenues associated with each practice for the year 2022. Subsequently, we have highlighted the benefits arising from each practice, categorized into mainly direct costs and direct benefits. Direct benefits and costs are quantifiable, while indirect benefits result from secondary effects, and intangible benefits are challenging to quantify.

2.3. Limitations

We lack data on the actual revenues and costs of hemp in Beqaa, Lebanon, and the MENA region. The available data is from the USA. To obtain more accurate information regarding hemp production in Lebanon’s Beqaa Valley specifically, we must await the results of the Regie and LAU’s experiment of planting two lands in that area with feminized hemp seeds, expected to be completed in 2025–2026. However, since both Hemp and Marijuana are types of flowering plants belonging to the same Cannabaceae family, it is likely that hemp yield and quality in Lebanon will be above the world average since illegal marijuana production is known to be of high yield and high quality. In that regard, we believe our data on the economic revenue from hemp in Lebanon is conservative and represents an underestimation of the potential of this crop in the Lebanese context.

3. Understanding Cannabinoids

Cannabis is among humanity’s oldest cultivated crops, with its use dating back approximately 12,000 years [12]. It likely began flourishing in the nutrient-rich dump sites of prehistoric hunters and gatherers. Subsequently, cannabis spread from Neolithic China to Korea and Japan around 2000 BC and arrived in the Middle East during this period [13]. It was acquired by the Assyrians, Egyptians, and Hebrews from Aryan cultures as early as 1000 BC. Cannabis was featured in various cultural practices, including its use in the robes of priests in Solomon’s Temple. The psychoactive form of cannabis is mentioned in the Talmud, suggesting its use by ancient Jews, possibly in the form of hashish. Notably, cannabis pollen was found in the tomb of Ramses II in Egypt, and several mummies from that era contained trace cannabinoids, indicating its prevalent use. Cannabis oil was likely used throughout the Middle East for centuries, even around the time of Christ’s birth [12].

The two most studied cannabinoids are tetrahydrocannabinol (THC), the psychoactive component responsible for the “high” associated with Cannabis, and cannabidiol (CBD), a safe, non-addictive, and non-hallucinogenic substance known for its medicinal properties. Bud, oil, and tinctures containing CBD are on the market for the purpose of reducing inflammation and stress. Because of its intoxicating effects, THC is prohibited in many countries, despite its widespread medical and recreational usage. The determination of the THC concentra-
tion threshold on a dry weight basis is commonly employed as the primary criterion for distinguishing between the two unique types. On a dry weight basis, THC concentrations in industrial hemp are typically below 1%, preferably below 0.3%, but in marijuana they can go up to 15% [10]. The EU and US regulations impose more stringent limitations on THC concentration, capping it below 0.3%. However, Switzerland, Australia, and the Czech Republic allow up to 1% THC, while Italy caps it at 0.6% [10,16]. *Cannabis sativa* L. (hemp) and *Cannabis sativa* (marijuana) are closely related but not identical; the two have often spread together over space and time. Hemp has been utilized for its fibers for millennia in the production of rope, canvas, clothing, paper, shoes, and sails. In contrast, *Cannabis sativa* is primarily cultivated for its psychoactive effects. These effects are due to a resin rich in cannabinoids produced by the female plant. The most significant cannabinoid, delta-9-tetrahydrocannabinol (THC), was identified by two biochemists in 1964. THC is known to cause various sensory and psychological effects, which can include mild reverie and euphoria; increased sensory awareness, creativity, and empathy; impaired short-term memory; altered perception of time and space; enhanced appetite and sexual desire; occasional drowsiness; and a tendency to promote introspection. However, these effects are subject to individual variation, influenced by factors such as age, dosage, strain, and frequency of use. Hemp typically contains less than 1 percent THC, while psychoactive cannabis can have THC levels as high as 20 percent in certain modern strains. Hashish, which means “dry herb” in Arabic, consists of this resin in a purified form and is substantially more potent. To release THC into the bloodstream, cannabis must be heated above 100 °C, necessitating cooking or smoking [17].

3.1. Why Hemp Is Important

Industrial hemp (*Cannabis sativa* L.) is characterized by its fast growth, ability to cope with different climatic conditions, and good thermal and acoustic insulation properties. Hemp was one of the first fiber crops and the main cash crop until the 19th century. However, its association with a high content of THC led to the banning of its cultivation. Practically, most hemp parts (stem, seeds, leaves, and flowers) find application in a myriad of end-use products. The three main components of hemp—fiber, seeds, and phytochemical compounds could be used for products in the bioplastics, cosmetics, bioenergy, automobile, and construction industries. Currently, the paper, textile, food, and construction sectors are the dominant markets for industrial hemp [18].

The cultivation of hemp may also be used strategically as a replacement for opium, thereby reducing drug use. Arguably, cultivation of the Cannabis plant not only brings economic benefits to the population but also diminishes the influence of extremists who may rely on opium as an illegal funding source. Furthermore, hemp could be a substitute for tobacco plantations [18].

3.1.1. Use of Hemp and CBD Oil

CBD oil is a non-psychoactive cannabinoid chemical derived from industrial hemp, featuring potential health benefits and devoid of addictive properties. CBD is incorporated into a wide variety of products, including beverages, lotions, and pharmaceutical compounds [10]. Table 1 summarizes the use of hemp-based products in commercial settings.

<table>
<thead>
<tr>
<th>Hemp Based Product</th>
<th>Application</th>
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<tbody>
<tr>
<td>Hemp based foods</td>
<td>Hemp foods have significant health benefits and may help as a food supplement to combat hunger [10]. Hemp seeds have a high nutritional value, along with the oil extracted from them [18].</td>
</tr>
<tr>
<td>Hemp in Cosmetic and Therapeutic Industries</td>
<td>Over 100 bioactive compounds in hemp inflorescences have been identified, including THC and CBD [18]. Hemp seed oil products have regenerative, anti-aging, and anti-inflammatory properties and therefore have found application in the cosmetics industry [10].</td>
</tr>
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3.1.2. The Market

In 2021, it was estimated worldwide that the total area under hemp cultivation for grain was 11,422 hectares (ha) and 74,307 ha for fiber, representing increases of 117% and 63%, respectively, compared to 2010 [18]. It was also projected that significant growth will occur in the global hemp market, expecting a fourfold increase from USD 4.7 billion in 2020 to USD 18.6 billion by 2027, with an average annual growth rate of 15.8%. This surge is attributed to the rising popularity of hemp-based products, such as seeds for oil, food, beverages, and fibers for technical applications in automotive and construction [10].

Notably, a 60% growth in hemp production acreage in Europe was observed, with the region poised to cultivate up to 25% of the world’s hemp. France is highlighted as the third-largest global producer, contributing 60% of the EU’s output. The growth in the hemp food components market is linked to increasing acceptance of hemp seeds in the food supply, projecting the global market for industrial hemp to be valued between USD 5.6 billion and USD 26.6 billion by 2025. This growth is driven by demand in the textile sector and supportive government policies.

Around 30 countries across Europe, Asia, North America, and South America have legalized Cannabis cultivation. Canada leads the global market for hemp-based goods, while China is a significant player in textiles and other products since it produces about half of the world’s hemp fiber.

It was estimated that the combined value of legal and illicit global cannabis markets is between USD 214 billion and USD 344 billion. While legal markets are expected to grow by 2025, illicit channels currently dominate the global market. Cannabis cultivation was reported in 151 countries between 2010 and 2018, with outdoor cultivation being predominant. However, there’s a trend towards increasing indoor cultivation, especially in the United States, Canada, Chile, Uruguay, Colombia, and Ecuador [21].

3.1.3. Trends and Market Dynamics

Old Trends

In many instances, neo-liberal trends in the global economy have directly contributed to the expansion of illicit economies. The dramatic price crashes of traditional export commodities have compelled many small farmers in the global South to turn to the illicit cultivation of opium, coca, and cannabis—among the few remaining agrarian products where they have a comparative advantage. The illegal nature of these activities can offer them higher prices and better chances of survival [22].

New Trends

Significant policy shifts have fueled an unprecedented surge in medical cannabis markets, suggesting that this trend holds the promise of various benefits. According to recent reports, the CBD market is poised to witness substantial expansion, with a projected increase of USD 23,023.51 million from 2022 to 2027. This growth is anticipated to

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<td>Hemp as an Eco-Friendly Multipurpose Crop</td>
<td>Hemp is a cash crop with environmental benefits, adaptability to various agronomic conditions, and numerous beneficial uses such as carbon dioxide absorption, phytoremediator for soils, production of bioplastics, and eco-friendly paper production [10,18,19].</td>
</tr>
<tr>
<td>Hemp as an Energy Source</td>
<td>Hemp has found uses as a versatile energy resource, suitable for heat, electricity, and biofuel production, and may serve as a raw material for the production of numerous consumer goods [10].</td>
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<tr>
<td>Hemp Fibers as a Textile</td>
<td>Hemp constitutes one of the strongest plant-based fibers, which has amplified its application in the traditional textile and paper production [18].</td>
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<tr>
<td>Hemp as a replacement to the Traditional Construction Material</td>
<td>Hemp is increasingly recognized as a widely utilized plant in the production of bio-based building materials. However, they have a limitation due to their relatively low mechanical strength, which could restrict the scalability of these products as structural components in construction [18,20].</td>
</tr>
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occur at a Compound Annual Growth Rate (CAGR) of 16.28% during the forecast period. Notably, North America is expected to play a pivotal role, contributing 51% to the global market’s growth, thanks to the legalization of medical marijuana and the presence of numerous companies. The United States and Canada emerge as the leading markets in North America, further buoyed by the legal export of CBD products from Canada to the US. Reports have predicted significant growth in the CBD market share within the marijuana segment. Government initiatives to legalize medical marijuana are expected to fuel growth, alongside an increasing number of patients using marijuana products for medical purposes and heightened research efforts by companies in the marijuana sector [22–24].

3.2. The Major Driver: Legalization and Regulatory Changes

Historic policy changes are reshaping the global cannabis market, with the gradual dismantling of the prohibitive regime that prevailed in past decades being a welcome development. Legalization and regulatory shifts regarding CBD were identified as the primary drivers of market growth. Governments, recognizing the therapeutic potential of CBD, have established favorable regulations. For instance, the US Farm Bill of 2018 legalized hemp cultivation, the primary CBD source, thereby permitting the nationwide marketing of various CBD products. This legislative shift not only fosters market growth but also creates new markets and employment opportunities, contributing to the overall expansion during the forecast period. Moreover, the growing prevalence of the Internet and smartphones has made online shopping, particularly among millennials, more convenient. Consequently, it was forecast that the flourishing e-commerce sector would be a key driver of market growth throughout the forecast period [23,24].

3.2.1. Challenges

The Concentration of Generated Wealth in Big Pharma

There is a concern that the legally regulated medical and non-medical markets emerging from the ashes of global drug prohibition will lead to a corporate takeover that concentrates profits in the pockets of a few Big Pharma, Agro, and cannabis companies. This will push small-scale farmers in the global South out of business. To remediate this effect, it is the responsibility of governments and the cannabis industry alike to ensure fair(er) trade principles to guide the transition from illegal to legal markets [22].

The neoliberal trends that expanded in the past in illicit economies still present additional challenges for traditional cannabis growers in the global South, requiring the development of fair(er) trade scenarios to protect them.

The ‘green rush’ financial rewards have seldom reached traditional cannabis growers in the global South, who struggle to access the corporate-driven market, despite some governments’ intentions to encourage smaller local groups to enter the market. Transitioning out of illegality presents significant challenges due to the enduring legacy of criminalization and legal and administrative barriers. Conquering and protecting spaces for small-scale farmers in traditional producing countries amidst the current overheated and highly competitive global cannabis market dynamics will necessitate affirmative action, regulation and control of foreign investment and transnational corporations, and well-designed legislative and market strategies. Furthermore, concerns are mounting about numerous for-profit cannabis companies from the global North aggressively competing to secure positions in the expanding multibillion-dollar global cannabis market. Individuals attempting to transition from illegality encounter substantial obstacles due to a combination of the enduring impact of criminalization and administrative barriers [22].

Cost of CBD Challenge

The ProQuest.com report (2023) highlighted a notable challenge in the form of the high cost of CBD products, which may impede market growth. Fluctuating prices pose difficulties for individuals dependent on cannabis treatments. The elevated cost is attributed to CBD’s recent entry into the market, coupled with the specialized machinery and time-
consuming processes involved in its extraction and purification. As a result, the high cost is anticipated to act as a restricting factor during the forecast period [23,24].

3.2.2. Opportunities
Policy Amendments to Address Past Failures

Addressing past failures in cannabis control and adopting new models for cannabis regulation could yield significant benefits in terms of health, human rights, and potential reductions in crime and overincarceration. A proactive engagement by countries in the global South in regional and global forums to initiate a debate about an international cannabis trade regime, challenging the strictures of current UN drug control treaties. The authors call for the establishment of a legal national and export market for cannabis-based alternative health products alongside high-standard pharmaceutical prescription medicines. Additionally, they propose encouraging cannabis growers to organize and register themselves as cooperatives to pool resources and coordinate lobbying efforts and negotiations with governments and companies. The authors also suggest enacting land reform programs to address the current challenges faced by cannabis growers without access to land or security of tenure. They argue that, through appropriate public policies, small-scale farmers can benefit from market opportunities by forming mutually advantageous partnerships with ethical companies. According to the authors, this approach goes beyond standard corporate social responsibility (CSR) and aligns with government obligations to address poverty, hunger, structural inequality, and discrimination, as outlined in the 2030 Sustainable Development Agenda. They cite the 2016 United Nations (UN) General Assembly Special Session on the World Drug Problem (UNGASS), which reaffirmed a spirit of ‘shared responsibility’ in this context. This underscores the importance of the international community playing a more active role in facilitating the transition from illicit crops to the legitimate hemp market in Lebanon [22].

Policymakers across governance levels have to seize the opportunities presented by the dramatic shifts in the cannabis market. It is important to shape the market’s growth to enable cannabis producers in the global South to transition out of illegality. From a sustainable development perspective, this involves establishing standards and charting a course that promotes a race to the top, not the bottom. In that regard, moving beyond a set of minimum legal standards would pave the way for a fairer and more equitable approach within the emerging licit cannabis market, which is coined a fair(er) trade cannabis model [22,25].

The Green Rush of Investors

There is a shift in attitudes and policies that have garnered considerable interest from the business community, including the pharmaceutical, tobacco, and alcohol industries, as well as investment bankers and hedge funds. Despite the apparent existence of a speculative bubble, investment opportunities are particularly attractive in the global South and traditional cannabis-producing countries. This has led to a ‘green rush’ of investors and medical cannabis companies, primarily Canadian, attracted to regions such as Latin America and the Caribbean. They are seeking to capitalize on emerging consumer states within the Western Hemisphere and Europe and tapping into supply from traditional producer states to reap potential enormous profits. Cannabis companies that went public on the Canadian stock exchange accumulated billions of dollars, triggering a financial bubble driven by highly speculative market predictions [22,25,26].

For governments in the global South, carefully structured producer frameworks have the potential to assist in fulfilling human rights commitments and achieving previously elusive development outcomes in marginalized communities. This contribution aligns with the Sustainable Development Goals (SDGs) committed to at the UN level [22,25].

Following this trend, we believe that policymakers in Lebanon should not be left alone; the international community should invest in the transition process to legalize and organize
the production of hemp products to foster regional stability, cut off financing for illegal organizations, and facilitate the integration of illegal crop farmers into the legal economy.

3.3. Key Players in the International Market

The international market is segmented based on source (marijuana and hemp), distribution channel (offline and online), and geography (North America, Europe, APAC, South America, and the Middle East and Africa). The Medical Marijuana Market is projected to increase by USD 21,248.51 million, with an estimated CAGR of 21.86% between 2022 and 2027. Additionally, the Legal Cannabis Market is anticipated to rise by USD 54,572.33 million, with an estimated CAGR of 21.6% between 2022 and 2027 [23,24,27].

The main key players contributing to the global landscape of the CBD market are: Cannoid LLC (Denver, TX, USA), Canopy Growth Corp (Toronto, ON, Canada), Charlottes Web Holdings Inc. (Louisville, CO, USA), Cronos Group Inc. (Toronto, ON, Canada), Elixinol (Sydney, Australia), Endoca BV (Amsterdam, The Netherlands), Folium Biosciences (Colorado Springs, CO, USA), Isodiol International Inc. (London, UK), Medical Marijuana Inc. (Vista, CA, USA), Medterra CBD (Irvine, CA, USA), NuLeaf Naturals LLC (Denver, TX, USA), PharmaHemp (Ljubljana, Slovenia), Tikun Olam (Miami, FL, USA), Tilray Brands Inc. (New York, NY, USA), VIVO Cannabis Inc. (Napanee, ON, Canada), Aurora Cannabis Inc. (Edmonton, AB, Canada), and Cannabis Science Inc. (Colorado Springs, CO, USA).

Despite the implementation of severe penalties for illegal drugs in the MENA region, transformative shifts in trends are improbable within the actual context. This is primarily attributed to the absence of viable alternative livelihoods for drug producers, inadequate demand-side reduction initiatives, and a lack of efficient cross-border collaboration. The persistent nature of drug trafficking, coupled with its interdependence with fragile regions and terrorist organizations, not only contributes to the region’s inherent insecurity but also fosters a symbiotic relationship between drug trade and consumption. Consequently, this dynamic exacerbates the already precarious political landscape in the MENA region and amplifies the security challenges it poses to the EU. That is why the transition to medical and industrial hemp is of great importance [28,29].

We believe that this transition helps in curtailing the financing of extremists groups and alleviating security concerns. However, there is a growing concerns about the evolving market dynamics, specifically the aggressive competition among for-profit cannabis companies from the global North vying to dominate the rapidly expanding multibillion-dollar global cannabis market [22].

People who currently rely on the illicit market for their livelihoods, including those in the Beqaa region of Lebanon, should not be left behind in this historic transition. Nevertheless, given the existing chronic institutional paralysis in Lebanon and the influence of illicit market players on governance, there is a significant challenge in applying Law 178, which legalizes medicinal and industrial cannabis in Lebanon.

While several countries have expressed interest in utilizing the rapidly opening licit spaces in the global market for alternative development projects for cannabis farmers, to date, these efforts have not been successful in Lebanon.

Establishing Local and Regional Supply Chains

Industrial hemp requires the establishment of regional and local supply chains for raw and processed materials. Due to the high transportation costs for shipping and the varying climates and soil types that affect the yield of cannabis cultivation, there is an economic incentive to process and manufacture hemp products in proximity to their source farms. This practice enhances the economic value of regional produce when traded at international or national levels. In comparison to shipping raw resources to distant processing sites, local production of higher-value goods and materials brings greater economic benefits to the community’s farmers and manufacturers. These motivations contribute to social sustainability by retaining money within the local area.
3.4. The Economic Crisis and the Flourishing Drug Production in Lebanon

Amid unprecedented economic crises, Syria and Lebanon have seen the emergence of a flourishing drug production and smuggling industry. Not only do drug revenues serve as a significant income source, but they also hold importance for certain factions within Lebanon. This issue poses a potential threat to the already fragile stability of the region. The prevalence of drug trafficking in Syria and, to a greater extent, Lebanon is not a recent phenomenon. As far back as the 1950s and 1960s, Lebanon was recognized as a recreational cannabis source, a crop that continues to be cultivated there. The drug trade has historically provided income for various organizations [30].

The economic crises in Syria and Lebanon, exacerbated since 2019 and compounded by governance limitations, have contributed to the escalation of this phenomenon. Exploiting the poverty of local residents, drug lords capitalize on individuals willing to engage in the drug industry and trade to support their families. In these countries, illegal drug exports generate a presumably larger dollar value than legal exports. Moreover, in mid-2021, drug smuggling from Lebanon led to a severe crisis in relations with Saudi Arabia and other Gulf states, following a series of thwarted smuggling attempts [30].

Fearing potential harm to the agricultural sector, which primarily exports to the Arabian Peninsula, the Lebanese government took measures to enhance security supervision and prevent smuggling. Despite lifting the ban, smuggling persisted, underscoring the complex challenges posed by the illicit drug trade in the region.

3.5. The Legal Framework for Cannabis in Lebanon

Seeking to modernize its agricultural and pharmaceutical industries to boost economic growth, the Lebanese parliament passed Law No. 178, published on 4 June 2020. Despite this progressive step, the issuance of the necessary regulatory decrees has stalled, leaving the actualization of the cannabis sector pending. The delay is partly attributed to objections from some political parties on religious grounds and a broader governmental inertia due to the absence of a president, which has brought the executive branch to a halt. The law is structured into eight sections: The first part provides general provisions and definitions of key terms. The second part concerns the establishment of a regulatory authority to ensure industry compliance with legal standards. The third section deals with the processes of licensing, oversight, and control. The fourth section outlines the regulations for exporting and importing cannabis products. The fifth part addresses the resolution of conflicts and litigation. The sixth section details the repercussions for behavioral, administrative, and criminal violations. The seventh section covers the financial and tax stipulations related to the cannabis industry. Finally, the eighth part offers concluding remarks, sealing the legislative framework.

Key Aspects of Law No. 178

1. General Provisions:
   - Defines the cannabis plant and its derivatives, including the psychoactive THC and non-narcotic CBD.
   - Establishes the regulatory authority, its structure, and its roles, including the appointment of a committee to assess licensing compliance.

2. The Regulatory Authority:
   - Charged with implementing and enforcing the law, determining cultivation areas, and setting substance levels.
   - Tasks include developing a national strategy for cannabis, advising sectors, granting licenses, and preventing monopolization.
   - The authority is also responsible for creating an electronic database for monitoring and regulating the industry.

3. Management Structure:
   - Managed by a board of directors and a general manager.
The board comprises seven members, representing various ministries and experts in related fields.

4. Licensing:
- The authority has exclusive rights to issue licenses for cultivation and related operations.
- Types of licenses include importation, cultivation, manufacturing, research, and exportation, among others.
- Entities eligible for licenses include Lebanese pharmaceutical and industrial companies, foreign companies, cooperatives, individual farmers, and research institutions.
- Licenses are issued for three years and include specific conditions, with a renewal process in place.

5. License Application and Renewal:
- Applications are evaluated for compliance with legal standards, and decisions are made within sixty working days.
- The authority must provide clear reasoning for any rejection, and applicants have the right to appeal.

6. Oversight and Compliance:
- Regular inspections ensure adherence to license conditions and industry standards.
- The law emphasizes transparency and traceability from seed importation to product sale.
- Licensed entities must maintain detailed records accessible to the authority and preserved for ten years.

7. Import and Export Operations:
- Entities must comply with the conditions for importation and exportation, including submitting detailed operational plans to the authority.
- Annual estimates and periodic data must be provided to both the authority and the International Narcotics Control Board.

8. Record-Keeping and Penalties:
- A specialized register, overseen by the General Director, logs all transactions and losses, with strict prohibitions on record alterations.
- Criminal penalties for violations include imprisonment, fines, and license revocation.

- Companies are required to fund awareness campaigns and support rehabilitation initiatives.
- Personnel implementing the law are subject to existing tax laws.

10. Justifying Reasons:
- The law aims to provide economic benefits, support sustainable development, and align with global trends in regulating cannabis cultivation.

In brief, Law No. 178 seeks to regulate cannabis cultivation in Lebanon for medical and industrial purposes, offering economic opportunities while ensuring public health and legal compliance. It establishes a structured approach to licensing, monitoring, and enforcement, with clear guidelines for operation and penalties for non-compliance.

4. Research Gap

Research on the economic advantage of hemp for medicinal and industrial use has been widely explored in the West. However, a significant research gap has been identified, especially in the MENA region, with no available data or research published in that context. Consequently, there is a high need to glean insight into the potential of hemp agriculture in the MENA region, especially in Lebanon, which has been suffering from an economic crisis since 2019 and is in dire need of innovative solutions. To that end, we thought of replacing
an immoral product of no net economic value with a more moral and profitable product such as hemp to achieve the needed economic efficiency.

5. Results

According to the US National Hemp Report published in April 2023, in 2022, the average selling price in the US was USD 18 per kg of dry flower [31]. If we assume a low boundary of ~350 harvested plants per dunam based on standard agricultural practices that factor ~1.5 m plant by 1.8 m row spacing and an average of 0.6 kg of dry flower per plant, a total of 210 kg of dry flower per dunam is expected to be harvested in Lebanon [32,33]. Based on these estimations, a total of ~USD 3780 per dunam is estimated to be the current selling price of the harvested hemp produced in Lebanon. Our estimation appears to be conservative vis-à-vis a 2019–2020 study done by the College of Agriculture, Health, and Natural Resources at the University of Connecticut that estimated a total selling price of harvested hemp ~USD 6000 per dunam based on a prevailing price of ~USD 21.4 per kg of dry flower in 2019 and ~280 kg of harvested dry flower per dunam [32]. If we factor in ~USD 400 for seeds and seedling cost per dunam (based on the prevailing cost of feminized seeds imported from a reputable supplier in the US, including shipping and handling), and a combined pre-harvesting, harvesting, and post-harvesting cost of ~USD 975 (USD 4.64 /kg × 210 kg/dunam), a total of USD 1375 per dunam is expected to be the total current cost associated with plantation, harvesting, and post-harvesting costs of hemp produce per dunam in Lebanon. Our estimation of similar costs for tobacco and hemp per kg is based on similarities in agricultural practices and needs as well as drying and handling the products. All calculations and data related to the CBA are summarized in Tables 2 and 3.

Table 2. This table summarizes the data on Tobacco business in Lebanon as calculated from data obtained from the state-owned Tobacco Monopoly (Regie).

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total units sold in kg in the Beqaa area</td>
<td>374,053/year</td>
</tr>
<tr>
<td>Average price of one kg of tobacco</td>
<td>USD 4.14/kg</td>
</tr>
<tr>
<td>Total Purchase Value by Regie</td>
<td>$1,458,248.00</td>
</tr>
<tr>
<td>Average production of Kg tobacco</td>
<td>220 kg/dunam</td>
</tr>
<tr>
<td>Revenue for farmers</td>
<td>828 $/dunam</td>
</tr>
<tr>
<td>The Total Revenue of the farmer per Permit: 300 Kg</td>
<td>220 kg/permit × USD 4.14/kg</td>
</tr>
<tr>
<td>Land preparation cost</td>
<td>USD 1129/permit</td>
</tr>
<tr>
<td>Seedlings cost</td>
<td>55 $/dunam</td>
</tr>
<tr>
<td>Planting cost</td>
<td>40 $/dunam</td>
</tr>
<tr>
<td>Post-Planting cost</td>
<td>70 $/dunam</td>
</tr>
<tr>
<td>Harvesting cost</td>
<td>115 $/dunam</td>
</tr>
<tr>
<td>Post-Harvesting cost</td>
<td>70 $/dunam</td>
</tr>
<tr>
<td>Break even or fixed total costs for farmers</td>
<td>375 $/dunam</td>
</tr>
<tr>
<td>Farmers’ Profit</td>
<td>828 – 375 = 453 $/dunam</td>
</tr>
<tr>
<td>Gross Contribution Margins</td>
<td>55%</td>
</tr>
</tbody>
</table>

Based on our calculation, we expect a net profit of ~USD 2405 per dunam in the Beqaa for hemp plantations. If we consider ~8000 dunam of land currently planted with tobacco, a yearly total profit of ~USD 19,240,000 is anticipated if tobacco is replaced by hemp in that area. It is worth mentioning that the newly established monopsony will buy, process, extract, and sell the CBD oil to both local and international markets.
Table 3. This table summarizes the average cost and profit for tobacco and the projected data for hemp.

<table>
<thead>
<tr>
<th></th>
<th>Total Cost (Tobacco) in USD</th>
<th>Average Cost in USD/kg (Tobacco)</th>
<th>Average Cost in USD/kg (Hemp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Purchasing Price</td>
<td>1,458,248</td>
<td>3.78</td>
<td>3.78</td>
</tr>
<tr>
<td>Labor Costs</td>
<td>7481</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Transportation Costs</td>
<td>7500</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Procurement Costs</td>
<td>8000</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Cost of rejects</td>
<td>0.2 × 1,458,248 = 291,650</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Other Costs (including seeds)</td>
<td>3740</td>
<td>0.01</td>
<td>1.91</td>
</tr>
<tr>
<td>Total Cost</td>
<td>1,776,619</td>
<td>4.64</td>
<td>6.54</td>
</tr>
<tr>
<td>Selling price</td>
<td>374,053 − 374,053 × 0.2 × 299,242.4 kg</td>
<td>3.2</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>299,242.4 kg × 3.20 USD/kg = USD 957,376</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Drain/Profit</td>
<td>819,043</td>
<td>−1.44</td>
<td>+11.46</td>
</tr>
</tbody>
</table>

The Average Purchasing price is the cost of Purchased leaf tobacco from the Farmers. Management Costs are the expenses incurred by committees overseeing the purchase of tobacco leaf. Transportation costs encompass the expenses associated with transporting products from the Beqaa to the Sorting Facilities. Processing costs represent the sorting expenses of tobacco leaf. Other costs include expenditures for fumigation of the warehouse, electricity, and miscellaneous items. Losses account for imperfections and waste, constituting approximately 20% of the purchased leaves. The selling price is the actual price that international companies pay to purchase the product from Regie. Net Drain quantifies the economic loss from the tobacco trade; it equals the total costs (purchasing price + transportation costs + processing costs + losses + other costs) minus the selling price.

6. Discussion

Tobacco is becoming increasingly regulated worldwide due to the adverse health effects it poses on individuals and its negative impact on all societies around the globe. In parallel, hemp and hemp-related products have been gaining popularity in the past decade due to their potential benefits in the industrial and pharmaceutical fields. In this work, we have reviewed the literature on the potential advantages and drawbacks of hemp plantations and specifically emphasized the potential financial reward of replacing tobacco plantations with hemp in the Beqaa valley in Lebanon. In a free market, retailers typically source from the most cost-effective producers, leading to potential competition between producers both within countries and internationally. However, Lebanon has proposed a law to regulate the cannabis business through a state-owned entity, functioning as both a monopoly and a monopsony over the sector. This entity is anticipated to purchase the product, add a markup to the whole-sale price, and then distribute it to retailers, ensuring some control and standardization in the process. To gain insight into the potential financial reward of replacing tobacco plantations with hemp, the costs and revenues of tobacco farming were obtained from the state-owned Libanaise des Tabacs & Tombacs (Regie). The remaining data were simulated based on the costs of tobacco plantations, transportation, and processing, and the remaining values were obtained from the literature. Based on our analysis, the kg of dry tobacco was leading to a net drain of USD 1.44 per kg, whereas the hemp dry flower sale is expected to lead to a profit of USD 11.45 per kg. Based on our analysis, even if the price of hemp dry flower goes down to USD 7 per kg (from USD 18 per kg), it is expected that replacing tobacco with hemp plantations is financially beneficial to the farmers and the Lebanese government that is supposed to regulate and oversee the implementation of this operation. If hemp entirely replaces tobacco plantations in the Beqaa area, we estimate that a net profit of USD 2405 per dunam, equivalent to a total of USD 19,240,000 per year, would be generated. In this study, a gap in research has been filled by showing the financial revenue of replacing tobacco plantations with hemp in Lebanon. We believe that this work is a starting point for more elaborate research that sheds light on the feasibility of hemp cultivation and the resulting industry in Lebanon and its possibilities in other neighboring countries. It is necessary to conduct a feasibility study for hemp cultivation and compare it with the profitability of cultivating illegal marijuana to determine if the transition of farmers from illicit crops to the legitimate economy is achievable.
7. Conclusions

This research paper highlights the significance of transitioning from tobacco to hemp cultivation, a move with considerable economic and ethical merit. This switch is crucial to upholding ethical farming practices and securing the livelihoods of the numerous farmers who currently depend on tobacco. The tobacco industry is confronted with numerous challenges that increasingly render its traditional concepts and mode of operation unfeasible. In light of this, the Lebanese government is tasked with identifying alternative crops that can support the livelihoods of tobacco farmers.

The research paper indicates that replacing tobacco with hemp has the potential to yield economic gains. Therefore, it is critical to initiate and support actions that will enable this transition. Implementing such a change will lead to significant alterations in Lebanon’s agricultural practices and economic strategies. This transformation aligns with global ethical standards and promises to provide sustainable and economically beneficial alternatives for tobacco farmers as well as for the nation’s agricultural sector.

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References


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