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Short Commentary

The Characteristics of Quasi-markets for Cannabis and the Need for Their Regulation

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Abstract

The paper attempts to highlight the main characteristics of quasi-markets for cannabis and the need for their regulation. By reviewing some of the existing literature on the legalization of cannabis and intersecting it with economic principles, we assess the social benefits and costs of cannabis legalization through quasi-market institutions. Microeconomics and the principles of green development (GD) provide a well-suited analytical framework for understanding the functioning and developmental path of cannabis quasi-markets. Legalization of cannabis through quasi-markets can not only improve social welfare, but can also liberalize a crucial natural resource for GD.

Keywords: hemp, quasi-markets, green development, cannabis legalization

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1 INTRODUCTION

The global cannabis market exhibited a terrific growth rate of 50.92% in 2020. According to *Fortune*'s estimates, the market's worth is projected to increase from $28.266 billion in 2021 to $197.74 billion in 2028. North America dominates the market, with the US cannabis market valued around $20 billion in 2020, and with Canada emerging as a crucial player in global marijuana legalization. Europe is the second largest market, with several institutional arrangements for the cannabis sector provided by law.

In all cases, the cannabis supply chain consists of several steps, and everyone involved in moving the product along the supply chain is connected to specific market driving forces and stakeholders. The following diagram (see Figure 1) is used to illustrate the cannabis supply chain.

As can be seen from the figure above, both internal and external stakeholders are involved in the supply chain, and several economic sectors interact with cannabis producers, sellers, and consumers to create economic value. Growers, breeders, hemp-derived edible producers, coffee shops, canna-pharmacies, dispensaries and cannabis social clubs, just to mention but a few, are all of a network that is regulated by the public sector and subject to strict licensing requirements. The products can only be supplied by certified growers, retailers must obtain licenses and, in some cases, they can only sell to a limited number of identified and certified consumers.

By reviewing some of the existing literature on the US experience with cannabis[1-3], we can identify some major economic issues in the supply chain that have to be dealt with.

Firstly, regulation of market supply and demand, co-existence of different legal and organizational forms for selling and distributing cannabis (for-profit firms,

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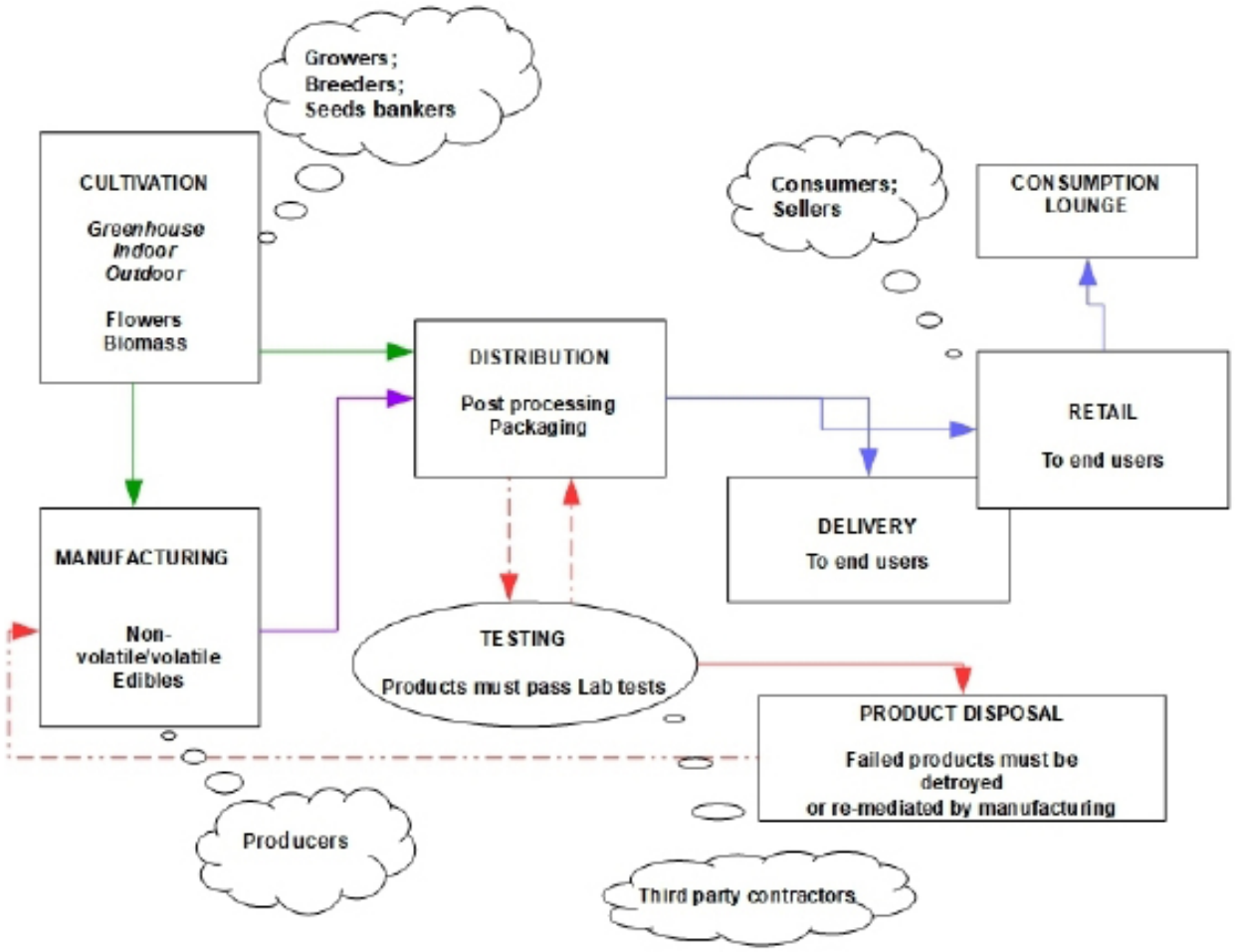

Figure 1. Cannabis supply chain and main stakeholders.

cooperatives, consumer associations) and several social security issues related to the cannabis trade, create *quasi-markets* for cannabis[4].

Secondly, governments mainly adopt a *prescription-license* regulatory model and introduce *sin taxes*, such as those that exist with alcohol and tobacco, to discourage use and raise revenue for monitoring and enforcement. As Hoffer et al.[5] clearly analyzed, as the number of producers and consumers participating in such a *sindustry* (i.e. the sin-related economic sector) increases, two problems arise: (*i*) the *recognition issue,* and (*ii*) the *regressivity issue*. These are discussed separately below.

With respect to the first problem, the implementation of the prescription-license approach requires significant regulatory compliance costs that are usually borne by end-sellers. These costs are related to the screening of consumers/users with access to sale points, enforcement of regulation in areas such as public nuisance, creation of protected environments in which the "public and open" consumption and exchange of marijuana can be avoided, and collection and transfer of sin tax proceeds. Due to high compliance costs, licensed cannabis sellers could have a strong incentive to evade such regulatory costs by selling cannabis below the radar (*smuggling*). Thus, while the sale of cannabis is not illegal *per sè*, many illegal transactions would still be taking place. These would not be subject to compliance regulations, registration and taxation. At that point, there would be an emergence of illicit varieties of sub-standard products, as is the case with the sale of cannabis by organized crime groups. The problems of prohibition, which were initially supposed to be solved through legalization and public regulation, would then resurface.

With respect to the second problem, it should be remembered that by their very nature, excise taxes are *regressive:* low-income consumers have a heavier burden (a larger percentage of their income is taxed) than higher-income consumers. If sin taxes are extremely high, expected punishments for illicit behavior are proportionally modest, and the demand for the product is heavily concentrated among low-income groups, this can create strong incentives for consumers to move into the black market. Moreover, sin taxes on cannabis are normally aimed at reducing overall demand for the product, and not explicitly at managing any type of externality related to cannabis consumption. From a quasi-market perspective, taxation should be aimed at regulating positive and negative production and consumption externalities, rather than merely decreasing consumption.

Lastly, in cannabis quasi-markets, the issue of *home-*

growing needs to be addressed very seriously. Following Colorado's early example[2], suppose that each certified consumer could grow no more than 6 plants at a time, or turn to a case-manager (referred to as the *caregiver*) who can take on the burden of cultivation, then a single caregiver can take care of no more than 5 users with a total of 30 plants. Given the amount of cannabis that can be obtained using advanced technologies over the course of a growing cycle (about 3 months), it is very unlikely that 5 people will be able to consume all the produce from the 30 plants. The excess produce will most likely end up on the black market, and abuses of regulatory measures will be systematic. The same could happen in the case of informal producers or co-operatives that decide to share the costs and crops equally without any motives for profit. These groups could operate outside quasi-market's rules, evade public safety regulations and taxes, and manage to bring excessive production into circulation at prices below those of other sellers. If the quality of home-grown products is slightly above average, a sort of *Gresham's Law* (which states that *good weed drives out bad weed*) would occur, and it would bring with it uncertain market consequences for legal cannabis retailers.

Thus, after the legalization of cannabis and the creation of quasi-markets, the rise of a "*grey economy*" appears more plausible than ever[6]. Therefore, there is a need to ensure that such a grey economy is not flooded with organized crime, used to mask trafficked hard drugs, or governed by violent armed gangs capable of controlling one or more links in the aforementioned supply chain[7].

2 BENEFITS FROM LEGALIZATION

Legalizing cannabis, as has been discussed above, entails considerable institutions-building costs, costs of creating an adequate regulatory compact (*regulatory costs*) and costs of setting-up and running a practical enforcement system (*enforcement costs*). To these costs must be added costs linked to modifications of social customs, value judgments about cannabis as well as costs of education on responsible use of cannabis.

Fortunately, as international experience has shown, the expected benefits of legalization by far outweigh the costs. These are briefly discussed below.

2.1 Benefits in Terms of Public Health

Thanks to tetrahydrocannabinol (THC), cannabis is now one of the most accessible and cheapest psychoactive substances in the world. It competes in the role of mass intoxicant with alcoholic beverages especially among young adults (18-29 years old). Anderson et al.[8] illustrates a clear substitution relation between cannabis and hard liquor consumption: As marijuana availability increases, young adults in Colorado, California and Washington consume less hard liquor, and no longer use hard liquor to get "high". They may increase their consumption of beer, which has been identified as a complementary drink when consuming cannabis, but this does not generate serious public health problems as does heavy drinking. Other studies indicate that the decriminalization of cannabis may reduce the number of suicides, hospitalizations due to the use of cannabis laced with sweetened but dangerous chemicals (such as PCP) and sold by organized crime, or the amount of cigarettes consumed daily by the average smoker[9,10]. To these health benefits must be added other benefits of the second active component in cannabis: cannabidiol (CBD). While not producing psychoactive effects, CBD is beneficial in different types of diseases and can replace, as several researchers have claimed, many chemicals used in modern pharmacology[11]. For instance, it has been proposed that CBD can be used in the treatment of chronic and acute syndromes such as epilepsy, asthma, Crohn's disease, osteoporosis etc. If these claims are confirmed, public health benefits and the resulting reductions in health care spending could be significant.

2.2 Public Safety Benefits

Given the inverse relationship between the availability of cannabis and alcohol use, it follows that legalization of cannabis should result in reduced alcohol consumption, which would have positive secondary effects. Since alcohol abuse leads to serious traffic accidents 20 to 30 times more often than THC, a reduction in alcohol consumption after the decriminalization of cannabis should, as many empirical studies indicate, lead to a 10-15% reduction in fatal motor vehicle accidents[12]. Smoking cannabis makes people drive slower and take fewer risks behind the wheel. Additionally, alcohol abuse is strongly correlated with violent crime, including vandalism and domestic violence. Finally, several studies have found either no or a weak correlation between the availability of cannabis and suicides or attempts to commit suicide[10,13]. Legalizing cannabis could, therefore, reduce the amount of resources that are needed to manage dangerous situations for public safety through law enforcement.

2.3 Benefits in Terms of Public Funds

Taxes generate yield, this is well-known. The question is: how much yield? Let's take the case of Colorado some years ago: With a 15% tax imposed on the final retail price, plus a 10% increase in value added tax (compared to the usual 2.9% for normal goods), a revenue of $2 million was yielded in the first month of decriminalization. However, data collected over the four-year period 2014-2017 by the US Department of Revenue are even more unequivocal. From taxes and license sales, $67 million was collected in 2014, $130 million in 2015, $194 million in 2016, and over $220 million in 2017[2]. According to *New Frontier Data*, public revenue generated from cannabis in US states where cannabis is legal totaled $655 million in 2016 with a forecast of growth to $1.8-2.2 billion by 2020. It is not only possible to divert such resources away from organized

crime, but to use them for public purposes such as improving the national education system or building social housing.

2.4 Other Benefits

Last but not the least, there are benefits linked to the emergence of a dense network of cannabis producers and sellers who are converted from illegal drug dealers into small, or medium-sized businesses by legalization. Cannabis-related spin-off industries can then take off in terms of economic and commercial development, from gardening products to light systems, gadgets for cannabis smokers, edible products (cakes, cookies, herbal teas, etc.) and electronic air and water treatment systems. A constellation of new commercial activities that can sustain economic growth and provide employment would emerge. These emerging entrepreneurs can become true international businesses by accessing credit, receiving financial support, and using transparent or anonymous electronic payment systems.

3 CANNABIS LEGALIZATION AND GREEN DEVELOPMENT (GD)

UN, OECD, and the World Bank have identified the Green Economy as a key driver of long-term change based on the principle of doing "better with less" to preserve environmental capital[14]. According to the *United Nations Environment Program*, converting traditional economic models of production and distribution into green economy models would require substantial investment, about 2% of the annual GDP for several decades. However, if actualized, its benefits in terms of sustainability, reduction of environmental impact by human activities and environmental preservation would be incalculable.

Can the guiding principles of Green Economy be associated with the development of an economic sector of legal cannabis? If so, is it plausible that the Green Economy could be driven by the "cannabis sindustry" as one of the outcomes of regularization? As we present the argument below, the answer to these questions is affirmative.

Let's briefly examine three principles that are currently the pillars of GD. The most popular one is the concept of *circular economy*, i.e., the use of non-linear models of extraction-production-use-disposal that can convert waste from the production-consumption cycle into new productive resources. With circularity, the amount of waste would be reduced dramatically, and natural resources would be fully re-used, resulting in less strain on existing natural resources. Research and businesses are already exploring ways to implement this model: from re-designing products to facilitate the recycling of components that can be re-used as raw materials (*design for disassembly*), to reorganizing production chains from the perspective of circular re-use of the resources contained in each product or the re-evaluation of assets in terms of optimal lifespan. Ultimately, circularity aims to decouple economic growth from resource extraction and, in order to do so, effective decoupling mechanisms are necessary[15,16]. Further, as a result of recent developments in environmental technologies, *natural resource productivity* is one of the key characteristics that should be prioritized when implementing sustainable development strategies[17].

Decoupling highlights the connection between quasi-markets and circular economies. Regulation must provide a proper framework to decouple economic growth from the exhaustion and degradation of natural resources. This requires designing a regulatory compact for cannabis quasi-markets so that the three main dynamics of circularity (i.e., economic development with low environmental impact, social change, and improved living conditions) can thrive. Figure 2 is used to illustrate the circular model of quasi-markets for cannabis inspired to Scheel et al.[15].

Reorienting the energy sector in accordance with global warming problems is a second crucial component of implementing GD paradigms. A transition toward a low-emissions economy is crucial if we do not want global temperatures to become unsustainable. Among the ways that can be used to accomplish this objective are the increased use of clean energies and eco-sustainable fuels, adoption of conservative cultivation methods that reduce concentration levels of carbondioxide in the soil, and rationalization of electricity consumption.

A third feature of GD is its strong focus on ecological efficiency (eco-efficiency), regarding both inputs, i.e. minimizing the amount of energy and raw materials used in production processes, as well as outputs, i.e. minimizing the amount of waste and emissions per unit of product. The entire process of converting (or re-converting) natural resources into manufactured goods must be eco-efficient. Eco-innovative solutions that address critical environmental issues and improve collective behavior of consumption and production in terms of sustainability are critical to achieving this objective. For example, the use of electric cars for car-sharing or the growth of eco-sustainable forms of co-housing are two well-known examples of eco-innovations that enable individual users to meet their needs with fewer impacts on the environment.

As a result of regularization, the cannabis sindustry could be organized and structured in line with the above principles, and this would be an interesting pilot project for the transition to GD. Let us briefly discuss why.

Firstly, cannabis may play a significant role in the circular economy. Rich in proteins, carbohydrates, minerals, and vitamins, seeds are a valuable food resource. Oil extracted from seeds may be used for medical purposes and for producing eco-fuel. In textile production, hemp fiber

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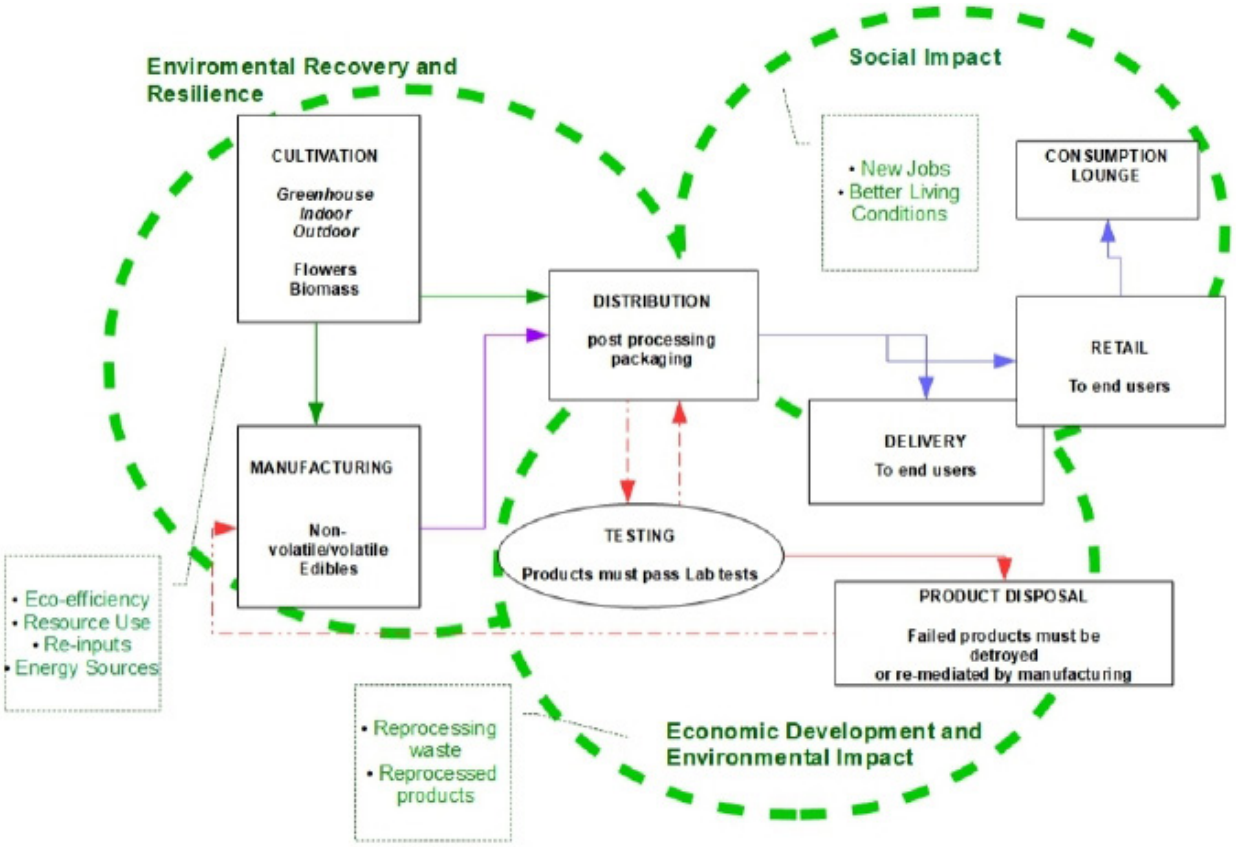

Figure 2. The cannabis sector and circularity.

can replace cotton (that requires four times as much water, pesticides and fertilizers for the same amount of crop) or be used as a natural thermal insulator. The remaining cellulose may be used to make fire-resistant "hemp bricks" (*hempcrete*), which are long-lasting and can absorb carbondioxide. It can also be used to make paper, household products, and cellophane.

Secondly, until the late 19th century, the most widely used fuel to power lamps and tools was a derivative of hemp oil. It was cheap, easy to make, and produced no waste or slag. Using the pyrolysis process, or fermentation without oxygen, cannabis is ideal for producing biofuels from vegetable oils such as ethanol or biodiesel. In the end, a low-emission fuel which is cheap and scalable can be produced. By using eco-fuels in diesel engines, it is possible to obtain an energy source that leaves no carbon footprint. In 1890, Diesel himself had built his famous internal combustion engine, thinking of using biomass fuels. It is true that the powerful lobbies at the time were not of the same opinion, but this does not take away the fact that the automobile industry would have existed without plastic and oil. Henry Ford demonstrated this by developing a car made from hemp fibers and powered by hemp biodiesel in 1941.

Finally, the cultivation of cannabis is more eco-efficient than any other plant in terms of both input and output, given the full recyclability of the plant. The possible uses of every part of the plant are multiple, and various eco-innovative hemp-based solutions are already being tested worldwide. These include but are not limited to prevention of intra-hospital spread of staphylococcal infections with hemp-based textiles that use hemp's anti-bacterial properties, the use of hemp fibers in place of expensive graphene in the development of nanotechnology, and the use of hemp-derived plastics in 3D printing.

These elements make cannabis a crucial natural resource for GD, and cannabis quasi-markets a particularly suitable setting for exploring new avenues for GD.

4 CONCLUSION

As discussed in the preceding sections, legalization of cannabis can not only improve social welfare, but also liberalize a crucial natural resource for green economic development. Further suggestions about how to develop cannabis quasi-markets are noteworthy.

First and foremost, dispensaries need to listen to feedback from customers with a variety of organizational experience to be able to meet broader preferences in the rapidly changing cannabis industry[18]. All forms of recreational use of cannabis should be available for consumers to explore and experiment with[19]. To better understand how value is created in different experiential contexts, future empirical studies are needed.

Second, it is possible to sideline the recreational use of cannabis with the diffusion of knowledge about hemp-derived products and hemp-based production practices. This will lead to significant secondary effects on the national agricultural sector[20].

Finally, the development of web-based applications such as Leafly or Weedpro for sharing knowledge about different genetic varieties and their effects, points to interesting links between cannabis, the internet and communities of users, breeders and growers that share a common culture. Implementing these new virtual spaces will be of the utmost importance.

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Conflicts of Interest
The author declared no conflict of interest.

Author Contribution
Lanzi D solely contributed to this manuscript.

Abbreviation List
CBD, Cannabidiol
eco, Ecological
GD, Green development
THC, Tetrahydrocannabinol

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