Implication of Regulated Cannabis Legalization on Wellbeing and Economic Growth

PhD Proposal

By

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Abstract

Despite its unofficial popularity based on the medicinal, recreational, and industrial benefits, the use of cannabis has not been formally accepted and legalized in most countries. A plausible reason is the persistent misleading social stigma attached to the cannabis plant because of magnification of its adverse effects and a corresponding drastic minimization of its positive benefits. This thesis seeks to address four main research objectives. First, to explore the perception of the public about cannabis use and address any imbalances that may arise due to lop sided public information. Second, to build a model of cannabis potential, and estimate parameters for scenarios where legalization is at the embryonic stages and compare the results to partial and fully legalized regimes. Third, to examine the welfare implication of cannabis use for both medicinal and industrial purposes. Fourth to investigate the hypothetical economic costs and benefits of regulated cannabis legalization in terms of Economic Growth, Sustainable Development, and welfare maximization, based on the Utilitarian Cost-Benefit Analysis (CBA) approach. A phenomenological framework will be used to address the lived experiences of individuals using cannabis and their perception, controlling for researcher's personal bias as well as public views on the plant. The study will develop a model that critically examines three independent policy options – prohibition, decriminalization, or legalization. Each of these options will be assessed based on the utilitarian cost benefit framework to settle on a feasible and beneficial policy options, via a Monte Carlo simulation exercise.

Keywords: Cannabis; CBD; THC; Health; Industry; Economic Growth

1 Introduction

1.1 Background

The unending controversy over the growing use of cannabis has garnered attention within the research fields of public health, psychiatry, and social welfare with little on the economic implications. Despite its illegal status in both the Global North and Global South, cannabis has remained one of the most popular social drugs with varying patterns of use for different purposes – medicinal, industrial and recreational. Knowledge about the plant, its benefits and side effects have been clouded by prejudice and subjective views even among researchers who are either for and or against the use and legalization of cannabis. It is therefore difficult to establish a firm ground on what the actual therapeutic benefits of cannabis are in any clinical experiments, irrespective of strides made in scientific research. In the case of developing countries, there is little knowledge about cannabis, even among practitioners in the field of medicine. Also, those with enough knowledge on the plant are most often unlikely to educate the general public with a well-established caveat. Some plausible reasons for this are the negative social stigma attached to cannabis owing to years of misinformation, deliberate fabrication and outright propaganda by groups in the pharmaceutical, clothing, paper and pulp and other industries that see cannabis as a threat to their bottom lines.

Often when cannabis is mentioned on any platform it is associated with social ills further entrenching the negative views on it without considering any empirical evidence. Despite the abundance of literature on cannabis use, existing clinical studies to (dis)prove the health hazards of cannabis remain limited and fragmented. Considered conjointly, the evidence is inconclusive. On occasions where the literature pointed out the health hazards of the substance, an overdose was recorded (Bachhuber, Saloner, Cunningham, & Barry, 2014; Josephson & Goode, 1971; UNODC, 2017). Also, studies that examined the role of cannabis in violence against other substances like alcohol came to a firm conclusion that alcoholics are more prone to violence with no significant evidence on cannabis use (Humphreys & Torgerson, 1965; In, 1986; Wei, Loeber, & White, 2004). In instances where a positive relationship is noted, such rare cases reveal that these individuals combine cannabis with alcohol, thus, it is quite clear that alcohol users are more likely to be violent (Windle, 1988). Similarly, it is difficult to provide any proof to the psychoactive responses of cannabis, despite the growing rumors and unverified claims. Therefore, establishing a firm stand on the real and potential effects of cannabis among countries that legalized it, those about to, and anti-cannabis countries has reopened the research window for further inquiry on first, people's perception about cannabis

and its use; secondly, welfare implication of cannabis use for medicinal and industrial purposes; third, the comparative costs and benefits of zero, partial and fully legalization, and fourth, the association between regulated cannabis legalization and economic growth.

1.2 Problem Statement

Regulated cannabis legalization for medicinal and industrial uses have remained a great deal of debate for various reasons. While countries who legalized cannabis have reservations about its health and social effects, countries considering the legalization still hold various perceptions about it (Luginbuhl, 2001). Perception has played a key role in most counter-culture human right activities like the legalization of same-sex marriage. Cannabis is a key focus area which presents a debate for and against its legalization. In African countries where legalization is still at the embryonic stage, perception based on religion, culture and unknown beliefs without any verified proofs have played key role in most choices in community and country development.

Most of these views held against cannabis are highly dependent on earlier studies that used somewhat flawed methods to produce misleading conclusions (Goode, 2009). For instance, the cases of Harry J. Anslinger and others who used flawed, non-scientific, politics and racist symbolisms to criminalize cannabis. This has spelt fear among individuals who used cannabis for different purposes which has led to the creation and enforcement of laws that has led to 'wrongful convictions, incarcerations, and deaths both within the United States of America as well as beyond national borders' (Däumichen, 2018). A plausible reason is the persistent misleading social stigma attached to the cannabis plant (Bottorff et al., 2013). This is deep-rooted in its projection of its ‘perceived’ adverse effects and a corresponding drastic minimization of its positive benefits (Kalant, 2016). Critics focused on the perceived negative effects of cannabis on mental health, psychoactive behaviour and social vices without a clear understanding of the positive significant role of regulated cannabis legalization in the fields of medicine and the industrial sector (Svrakic et al., 2012). Some studies vehemently debunk the legalization and use of cannabis for medicinal purposes based on subjective opinions which are completely devoid of any empirical justification and scientific evidence (Bottorff et al., 2013).

Examining the real effect of cannabis on the human mind and body can be rigorously investigated. A deeper understanding of the associated impact of cannabis legalization for medicinal and industrial uses will help reduce the knowledge gap within both research and

policy circles. Consequently, this will provide scholars, policymakers and key stakeholders the edge to fully understand how to sustainably manage the legalization of cannabis in order to minimize the negative effects and maximize the benefits of cannabis and its use for economic growth, sustainable development and improvement in wellbeing. It is important to highlight that there is huge variation among individual traits, psychological setup, family upbringing and social exposure, thus, idiosyncratic cases of effects of cannabis which in most cases are abused cannot be reflective of the reality of the real impact of cannabis. Dealing with such causal relations demand improved scientific controlled experiments to measure at every stage change in human behavior prior to the exposure. To this day, there has not been enough evidence, if any of cannabis use and its effect on some selected illness, psychoactive activities and social disorders.

Studies in Jamaica and Costa Rica where the use of cannabis is prevalent found no significant difference in their physical abilities and no evidence of abnormalities among users. In the case of Jamaica where smokers were detected with high risk of hypoxia, it was observed that these group of cannabis users combined tobacco. It is important to realize some of these studies are fraught with methodological challenges in terms of smaller sample size, selection biases and endogeneity issues (Rubin and Comitas, 1975; Finket al., 1976; Coggins, 1977). The 2012 World Health Organization country report and 2013 Mental Health Report all confirmed that 25% of patients suffered from schizophrenia, schizotypal and delusional disorders with only 9% from psychoactive substances without further breakdown of what substances constitute these psychoactive substances (Curley & Attwood, 2019; UNODC, 2017, 2018). This resonates with a study among college students which concluded that individual's relationship with parents, family background and social values have a significant explanatory power to any a-motivational syndrome found in patients, with little evidence from cannabis use (Borgen, 1973; Mellinger et al., 1976; Miranne, 1979). It is therefore obvious that the number of psychoactive reactions associated with cannabis do not have empirical justifications since it has become almost impossible to decipher any behavioural changes among users and nonusers (Magliozzi, Jr et al., 1983). While the amplified views of proponents against the use of cannabis may appear, evidence to back this claim still remains elusive especially in African countries. Thus, a further inquiry into the perception, welfare implication and the role of cannabis in economic growth is needed to dispel public ignorance, provide answers to medicinal benefits and facts to governments to consider for its regulated legalization.

While the chunk of the attention about cannabis focuses on the negative side, it is noteworthy that the (un)known benefits cannot be overemphasized. The therapeutic potentials as well as cancer chemotherapeutic benefits of this plant are not limited to effective treatments of tetanus, convulsive disorders, neuralgia, migraine, dysmenorrhea, post-partum psychoses, senile insomnia, depression, and gonorrhoea, as well as opium or chloral hydrate addiction. However, individuals dealing with terminal cancer can be treated with cannabis (Grinspoon, 2001; Mikuriya, 1969). Yet, due to the mindset of most pharmaceutical agenda pushed to exert monopoly on some drugs, cannabis has been tagged with mental effects of cannabinoids with little focus on its pharmacological effects (Cohe and Stillman, 1976; Lemberger,1980). As a perfect substitute to agent cisplatin which produces severe nausea and vomiting, cannabis was used to treat patients in cancer chemotherapy. Out of a total of 20 patients, 14 reported definite antiemetic effects from the [1]Tetrahydrocannabinol (THC) with no one from the placebo on the 22 courses of the drug used (Sallan et al, 1975). While clinical experiments highlights the efficiency of the THC, uncertainty about future effects by proponents against cannabis have rather been magnified to ignore the benefits derived. Thus, exploring the welfare implication of cannabis use is imperative to gain a firm ground in the understanding of the real effects.

While the governments of many African countries continually prohibit and criminalize cannabis, Africa provides the most conducive and economically viable environment for the cultivation of the plant. In spite of the prohibitive laws, countries in Africa continue to be among some of the top suppliers as well as transit points for cannabis. The common assertion by individuals against legalization that prohibition helps to reduce trafficking and use is flawed, given that data from countries such as Ghana are among the top countries in Africa where trafficking of this plant is high as well as its use (Curley & Attwood, 2019). While the drug is illegal for recreational uses according to the PNDC law 236, patients who need cannabis for medicinal use can acquire it with a license. Critics highlight the fact that the cost associated with prohibition and criminalization of cannabis is higher than the benefits, given that there is no association between cannabis use and psychoactive or deviant behaviours empirically. In their study, Maier, Mannes, & Koppenhofer (2017) concludes that changes in the crime rate among different states has no relationship with (de)criminalization of cannabis. Instead of

[1] Tetrahydrocannabinol (THC) is one of at least 113 cannabinoids identified in cannabis. THC is the principal psychoactive constituent of cannabis. With chemical name-trans-Δ^9-tetrahydrocannabinol, the term THC also refers to cannabinoid isomers.

maintaining the position to sentence individuals possessing cannabis for either recreational or industrial use, constructing a model of cannabis potential, that will estimate parameters for scenarios where legalization is at the embryonic stages and compare the results to zero, partial and fully legalized regimes is essential. This approach will provide in-depth understanding of the real implication (both negative and positive) of total legalization as against total prohibition and/or partial prohibition. In effect, a stand-alone three policy option in assessing the costs and benefits of cannabis or its absence is essential to rethink the debate at the policy level. Such information will not only affect the legal landscape about the plant, but will affect societal perception and attitude towards cannabis and its use.

Despite the clearly stated punishment (ten years imprisonment in most countries) for people found using cannabis, farmers have now found the plant very lucrative to cultivate due to the rising poverty and the widening inequality gaps. Capitalizing on the advantageous trade route to legalize cannabis, it has been estimated that both medicinal and recreational use will earn a country such as Ghana 326.4 million US dollars by 2023 (The African Cannabis Report, 2019). A further inquiry to measure tangible and intangible (direct and indirect) cost and benefits of legalizing cannabis with regulation will serve as a platform for further dialogue by policymakers. In this light, part of this project is devoted to a cost-benefit analysis of the legalization of cannabis with regulation and how this can translate into tangible economic growth.

1.3 Research questions

In assessing the key issues raised about the legalization of cannabis for medicinal and industrial use, the following questions below will serve as a guide for this project:

1. How does the general public perceive cannabis, its use and users?
2. What is the medical implication of cannabis use?
3. What is the comparative effect of prohibition, decriminalization or regulated legalization of cannabis in Africa?
4. What are the associated costs and benefits of regulated cannabis legalization for medicinal and industrial uses?

The above research questions will be resolved based on their respective theoretical underpinnings that will guide the type of dataset, the structure and content of questionnaire to

be administered. A successful and regulated legalization of cannabis will be solely contingent on people's understanding and perception of the plant and its uses. Thus, a multidimensional view of individual's perception of cannabis will be measured based on personal, cultural, societal and religious opinions. In doing so, Husserl's phenomenological framework that measures lived experiences devoid of any form perception and biases (Husserl, 1970) will be employed to assess the subjective views of individuals who use cannabis. In effect, the individual will be provided with the evidential effect of cannabis based on medicinal, recreational and industrial benefits. In order to measure any deviation of perceived and actual effects of cannabis, questions asked in the first stage will be repeated in order to account of any form of deviation. In effect, the study will have the necessary information to be able to conclude based on socio-demographic and other covariates that an individual is likely to hold a certain perception about cannabis, given the measured factors. This approach in effect tries to measure if an individual's response without actual information on cannabis will be the same, when provided with information on cannabis. This will help to decipher prejudice from ignorance and objectivity, as well as account for any form of psychometric properties among individuals.

In the second research question that measures welfare implication of cannabis, the project will employ well-being measures that transcends beyond the happiness, pleasure and satisfaction and accounts for the personal and social well-being of individuals which is theoretically robust, empirically reliable and policy relevant at the national level. In order to examine the well-being implication of cannabis, the research will draw on data from the demographic health survey, mental health survey and living standard surveys to support primary data that will be specifically focused on the association of cannabis and individuals' perceived quality of life (well-being). This approach is important, given that, total reliance on already-known objective indicators like GDP, education, crime rates, consumption levels among others are not truly reflective of the well-being of the individuals at any given period of time. Studies elsewhere have recorded a negative relationship between economic development and individuals' well-being. In effect, employing both hedonic and eudaimonic measures will provide a true picture in order to inform policy on the real impact of cannabis use and well-being. This objective is also motivated by the findings of existing studies that have highlighted the positive significant impact of cannabis on deadly and non-communicable diseases such as cancer, tetanus, convulsive disorders, neuralgia, migraine, dysmenorrhea, post-partum psychoses, senile insomnia, depression, and gonorrhoea, as well as opium or chloral hydrate addiction.

African countries lack the human resource, infrastructure and financial wherewithal to roll out robust orthodox medical systems. All indicators of health care outcomes and human development puts Africa at the bottom of the league tables. Addressing the numerous health challenges related to access, equity, depth and breadth of coverage require significant social engineering and a complete rethink of the present paradigm. This is the point where research of this nature that helps to illuminate the role of indigenous plants in health care, and the provision of relatively cheaper and easily available complementary solutions become prominent.

It becomes costly for African countries which records annual budget deficit to spend on enforcing cannabis possession laws, given that they need separate budgets for policing, adjudication and sentencing. Above all, the law spells out a ten-year jail period for anyone possessing cannabis (Curley & Attwood, 2019). In similar vein, government's budget for the prisons department for administrative, physical and psychological needs on prisoners sentenced as a result of possessing cannabis will be on the rise. On the other hand, reviewing the economic benefits of legalizing cannabis for either medicinal, recreational and industrial uses is an option that earns the country extra points to defray part, if not all of the budget deficit encountered annually. Thus, this study develops a model that will carefully analyse the zero, partial and total legalization of cannabis by highlighting all the related costs and benefits to the country.

In terms of the role of cannabis and economic growth, it is important to realize that despite the government prohibition of the plant, revenue from regulated cannabis legalization for medicinal and recreation use has been significant. For instance, Miron, (2005) highlighted that $7.7 billion spent to enforce prohibition annually will be saved by the US government in terms of reduced use of law enforcement, reduction in cost to the criminal court system, and the reduced cost of corrections regarding incarcerating individuals. In terms of revenue generation, the study concludes that cannabis is estimated to generate $2.4 billion annually if taxed like any other consumable, whereas a tax revenue of $6.2 billion will be yielded annually if taxed using the rates of alcohol and tobacco. While the observed revenue from cannabis legalization is significant, there are no significant differences among States that legalized cannabis compared to States that consider the plant illegal (Maier et al., 2017). In Ghana for example, cannabis is estimated to generate $326.4 million by 2023 if legalized (The African Cannabis Report, 2019). The missing piece which has called forth this study is the cost associated with

regulated legalization. Also, there is likelihood of misspecification given that there is no reliable data on cannabis cultivation as well as the cost associated with the plant at the individual and country level. Thus employing cost-benefit analysis, from a Monte Carlo simulated datasets, the necessary conclusions will be considered to examine the viability and feasibility of regulated cannabis legalization.

1.3 Research objectives

This project seeks to investigate the real effect of regulated cannabis legalization in Africa. Specifically, the research will:

1. Assess the à priori perception and posteriori experience of medical cannabis use among individuals.
2. Investigate the medical implication of cannabis use among users.
3. Conduct a cost-benefit policy analysis of prohibition, decriminalization and regulated legalization of medical and industrial cannabis.
4. Provide a model of cannabis utilisation to guide present and future legalisations for successful cannabis industry

2 Empirical Review and Conceptual Model for Cannabis Policy Options

In order to shift public and societal perception about the medicinal, recreational and the industrial use of cannabis, it is important to highlight the benefits of this plant as well as informing individuals who focus on the impacts of high THC that producing cannabinoid-rich cannabis plant is enormously beneficial and enough to resolve all human medical, recreational and industrial needs. This provides the basis of dialogue concerning its legalization. In effect, this section reviews empirically scientific works on the benefits of cannabis, provides knowledge to clarify public ignorance on the subject as well as construct a model for three policy options on the legalization.

In the field of medicine, cannabis has been found as one of the important plants with significant health benefits with little or no psychoactive effects when the desired doses are given. In their study, Pacher and Kunos (2013) realized that when the activities of endocannabinoid system is carefully modulated, the therapeutic benefits that could be derived from it is promising. This helps to cure a broad range of diseases like; obesity/metabolic syndrome; cachexia; chemotherapy-induced nausea and vomiting; and tissue injury; neurodegenerative,

cardiovascular and inflammatory disorders; pain, among other diseases. Even though the study observed some levels of complications in issues like obesity, these were due to challenges with little knowledge in the field. Thus, more research in this area is required for efficient use of cannabis in all human health needs. Thus the role of cannabis in the endocannabinoid system drifts from only rebalancing the physical build-up and break-down to fighting diseases and injuries (Bachhuber et al., 2014; Vandrey et al., 2015). Bonn-Miller, Babson, & Vandrey (2014) used a convenient sampling technique to examine the specific coping strategy motivations, the frequency of both cannabis and alcohol use, and mental health among patients dealing with post-traumatic stress disorder (PTSD). They concluded that patients rely on cannabis to cope with their conditions, have good sleep, and also to reduce the propensity of suicide (Bonn-Miller et al., 2014). Relying on opioids for treatment exposes such individuals to opioid-related addictions and death, given the adverse effects of these opioids (Bachhuber et al., 2014; Pedersen & Skardhamar, 2010). Their work resonates with the study by Lim, See, & Lee (2017) and another independent research by Swift, Gates, & Dillon (2005) who both examined the impact of cannabis on PTSD.

In another area of pressing health need which has not received full recovery from pharmaceutical products, cannabis became the first organic anti-pharmacological product to cure epilepsy with zero or little (manageable) side effects. It has now been generally accepted that cannabis is the best cure for individuals (mostly children) with epilepsy (Devinsky et al., 2016; Kaplan, Offermann, Sievers, & Comi, 2017; Russo, 2017; Saade & Joshi, 2015; Sulak, Saneto and Goldstein, 2017; Viggiano et al., 2016). In their study, Tzadok et al. (2016) concluded that "CBD treatment yielded a significant positive effect on seizure load. Most of the children (66/74, 89%) reported reduction in seizure frequency: 13 (18%) reported 75–100% reduction, 25 (34%) reported 50–75% reduction, 9 (12%) reported 25–50% reduction, and 19 (26%) reported <25% reduction." They also realized an improvement in behaviour and alertness among epilepsy patients treated with cannabis, with a significant enhancement in their language, communication, motor skills and sleeping order. However, few cases of negative reactions which include somnolence, fatigue, gastrointestinal disturbances and irritability were recorded. This led to the termination of the therapy among these five patients. Despite the contextual nature of these studies involving different patients with dissimilar health issues at different rates of severity, there was a consensus that CBD-rich cannabis used to treat seizure among children between infant to age 18 is significantly effective to give them a relieved life.

It is important to highlight that the current significant benefits of cannabis in the field of medicine is not close to the actual potency of the plant, given that this is an emerging field and research is still growing to uncover more about the plant. The delay in such realization is deep-rooted in the fact that this plant has been rendered illegal for a long period of time due to the fabrication and outright propaganda by groups in the pharmaceutical, clothing, paper and pulp and other industries that see cannabis as a threat to their bottom lines (Svrakic et al., 2012). Thus, the war against cannabis is more political than scientific, without any form of moral hegemony established (Bottorff et al., 2013; Goode, 2009; Maier et al., 2017; Stringer & Maggard, 2016). Therefore it is fair to conclude that any form of policy to prohibit cannabis is nothing close to its implication, given the fact that studies on cannabis and crime have not found any form of association between these two (see Maier et al., 2017; Pedersen & Skardhamar, 2010).

For a plant to have about 143 and 190 million users globally, which represents between 3.3% and 4.4% of the adult population (UNODC, 2017, 2018, 2019), illegal status should not be an option. On the other hand, studies that examined the cost benefit analysis of cannabis legalization forecasted that legalizing cannabis will rather reduce crime and black market related transactions and crime (Shanahan and Ritter, 2014). A plausible reason for this conclusion could be the fact that individuals who use cannabis are able to purchase it in shops with license to trade it. In effect, mobilizing revenue becomes easy since tax evasion is no more an option. It is now clear that the reservations held about cannabis is more for individuals who use it for recreational purposes to 'get high' (Bottorff et al., 2013; Hall & Lynskey, 2016). This point can be counter-argued since regulated legalization will ensure that a balanced or CBD-rich ratio of production is emphasized to modulate the strains from a THC-rich cannabis (Roitman, Mechoulam, Cooper-Kazaz, & Shalev, 2014).

In order to gain a full understanding of the industrial cultivation of cannabis, it is important to begin the argument with a consideration of the demand side of the plant. In the industrial sector, the role of cannabis cannot be overemphasized. This has led to its demand in the pharmaceutical, clothing, fibre, paper, pulp and oil among other industries. Therefore it is worth spending time to further discuss its role in the industrial sector. In the paper industry, cannabis has been found to be the most efficient raw material with the highest quality. An acre of cannabis can produce as much paper equivalent to three acres of a normal paper producing tree. Additionally, paper made from cannabis will last up to 150 years before crumbling as

compared to paper from normal trees. Above all, whenever [2]"a paper made of cannabis is torn or wet, all one needs to do is set the damp pieces the way they should be and let them dry" (Luginbuhl, 2001).

Between the periods 2008 -2009, the government of Pakistan has invested about US $9 billion to import energy after the country experienced severe economic downturn as a result of insufficient power supply. This has led to shutting down of major industries like the textile, and small-scale businesses. After realizing the potential benefits of cannabis as a form of energy supply - biofuel energy with little or no adverse environmental implications, the Pakistan resorted to this approach. This was not only a breakthrough for the country nor only provided an alternative power supply for the country, however, it has saved the country fortunes from importation of energy while ensuring a clean and sustainable supply to restore the issue of climate change (Rehman, Rashid, Saif, Mahmood, & Han, 2013). In similar vein, Ghana, South Africa and many Africa countries are also characterized with intermittent power supply which can equally resort to this approach used by Pakistan, when cannabis is legalized for its industrial benefits.

A study by Karus & Vogt (2004) also highlighted that within the Euro zone, cannabis has contributed significantly to the paper and pulp industries with modest contribution in the automotive industry. Furthermore, the study observed that about 95% of the cannabis produced are mostly used as animal bedding. In the agricultural sector, cannabis has been found to be environmentally resilient to withstand any form of harsh weather conditions with significant economic benefits. Cannabis has been found to be one of the few plants that has roots deep enough for percolation and nutrient cycling. When grown densely, it naturally prevents the growth of weeds around it without any investment in weedicides, pesticides as well as herbicides. Cannabis has also been found to serve as a pesticide whenever it is cycled with any cereal by farmers who embark on crop rotation. Specifically, it helps reduce up to 80 percent of the damaging nematode cyst that destroys soybeans (Luginbuhl, 2001). Such benefits from cannabis is a timely and convenient plant for Africa which is grappling with poor yields in agriculture and high losses in production, even though agriculture has remained the bedrock of the continent millennia.

[2] This conclusion was made by Herer, Jack. In his work “TI1e Emperor Wears No Clothes. Van Nuys CA.: HEMP Publishing, 1993. (Kenex@kent.net.) "Re: a student with hemp questions:' E-mail to April Luginbuhl (aprillu@yahoo.com). 1 July 1999” cited by Luginbuhl (2001)

The above review that summarizes few of the major studies on the medicinal, recreational and industrial benefits of cannabis with rich argument to carefully examine deeper the hidden treasures of the plant. While these studies have enlightened us enough, it is important to acknowledge that the cases observed focused on countries in the global north which are mostly developed countries. Thus, a study from Africa will be deeply appreciated given that it provides a different contextual argument on cannabis. This will cut across public perception, based on the phenomenological framework, lived experiences will be assessed. Also, a model to examine different policy options like prohibition, decriminalization and legalization is essential, and finally, performing a cost-benefit analysis of its regulated legalization will be very useful to contribute to the existing emerging knowledge in research and policy circles.

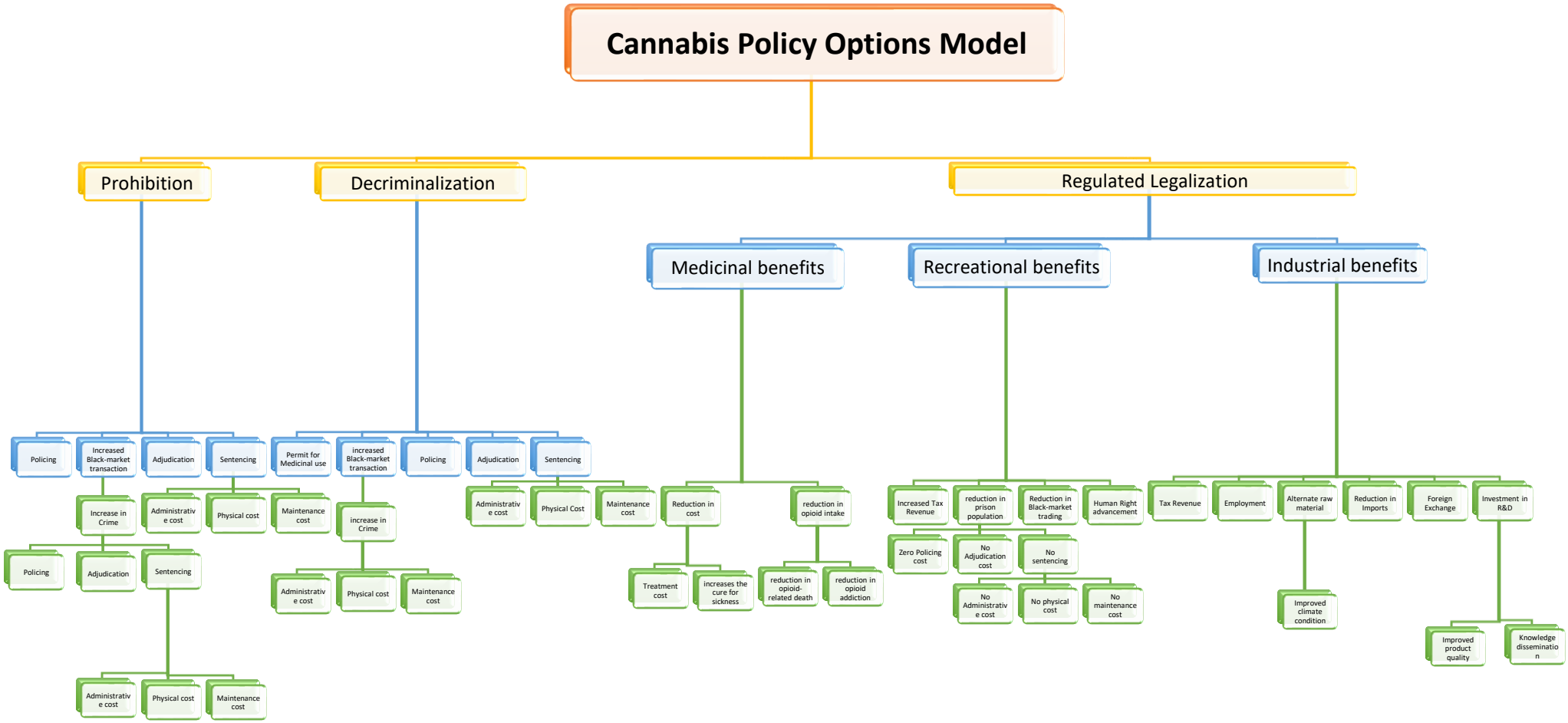
The model below provides different policy options for either prohibition, decriminalization or legalization of cannabis in developing countries by critically analysing the costs and benefits associated with each policy option. This provides a deep understanding on the real impact of either prohibition, decriminalization or legalization in order to inform policy rethinking on cannabis in Africa. In the case of prohibition due to the several non-evident consequences attributed to the plant, governments spend resources on policing, adjudication at the law court and sentencing cannabis-related 'criminals'. Since the law stipulates that anyone found with cannabis for recreational or industrial uses is automatically guilty and per the law, is given a 10-year jail sentence, governments will devote resources for administrative, physical and maintenance costs for a cannabis-related prisoner for 10 years. This act will not only deprive individuals of their fundamental human rights, however, this becomes a high cost for the entire household with a prisoner, given their psychic, pecuniary and non-pecuniary costs. The loss of both human and social capital and its effect on the household as well as the societal stigma about such individuals are issues that government cannot carefully manage. The related benefits associated with prohibition is mostly attributed to reduction in psychoactive issues due to substance cannabis abuse.

Monetizing such costs against the benefits of prohibition will provide a vivid information how the feasibility of employing such policy option. Based on the utilitarian approach, the decision is not efficient, feasible and viable when compared to the benefits of decriminalizing cannabis countries consistently record annual budget deficits. Also, the illicit status of the plant means trading in the black market will be on the rise. This incidence will rather increase the propensity of social vices which are cannabis-unrelated, however, due to the fact that they form part of

products with illegal status, any form of crime will wrongfully be attributed to cannabis. In effect, the prohibition policy option basically stipulates that cannabis related issues will lead to rise in black market operations, cost of policing, adjudication and sentencing incurred by the government as against a benefit of reduction in cannabis-related psychoactive issues by individuals who abuse cannabis.

The second policy option – decriminalization holds much more flexible status than the former, since individuals possessing cannabis under this policy option are lawfully not considered guilty of any crime when they hold the necessary permit. The challenge with this option is its bureaucratic nature since the application of permit, the waiting period and the resources involved before using cannabis becomes a disincentive for individuals using it for medicine, recreation and/or for industrial purposes. Taking this part into consideration, it unequivocally mimics the first policy option – prohibition which will still cost the country. In light of this, decriminalization policy option will benefit the country through the regulated use of cannabis for medicinal, recreational and/or industrial uses to reduce any form of cannabis abuse that will lead to psychoactive issues. Due to bureaucracies involved in securing permits for cannabis use, there will be a surge in black market operations which will increase crime rates, cost of policing, adjudication and sentencing incurred by the government as against a benefit of reduction in cannabis-related psychoactive issues by individuals who abuse cannabis.

The last policy option which is regulated legalization holds the view that cannabis becomes fully legalized to exploit its medicinal, recreational and industrial benefits to the fullest, while regulating its use among individuals who do not qualify to use. This approach does not only generate tax revenue, foreign exchange, and other benefits for the country, but also provides the country with options in the field of biofuel for power supply. In terms of the manufacturing sector, cannabis has greater potentials for transforming the sector to improve and enhance the quality of already existing locally made products as well as introducing new ones. While this study does not assume that this approach does not come with challenges, it will provide a detailed analysis of every cost attributed to its regulation for a win-win policy for Africa. The envisaged cost associated with cannabis legalization is the abuse by individuals. Despite this, it is important that this study highlight the fact that there is no addiction in any substance, however, addiction is a health issue which must be dealt with singularly rather than attributing some products with addiction issues. Cannabis therefore has no addictive substance in it, and must be treated like any other product ideologically and objectively in this assessment.



Source: Constructed by Author, (2020)

3 Data and Identification Strategy

This research will draw on both secondary and primary data sources to answer the various research questions. In order to measure the perception about cannabis and its use, primary data will be collected in different stages on the socio-demographic background like age, sex, ethnicity, religious background, education level, income among other control variables of individual respondents in order to estimate if there is any significant differences among individuals on their views of cannabis use. In the second stage of data collection, both the health and socioeconomic impact of cannabis will be revealed to individual respondents to address their ignorance. Following this, the third stage interview will repeat the first part of the questions on perceptions about cannabis in order to record any form of deviations. The purpose of this approach is to address biasness in terms of prejudice with or without information about the real impact of cannabis use. This provides information on whether individuals hold either objective or overly sentimental views about cannabis and its use. In order to provide deep-rooted analysis, crime data alongside side data from the mental health survey will be carefully reviewed to present key statistics on share of mental health issues linked to cannabis as well as cannabis-related crime cases (if there is any).

In terms of estimation of perception, it is important to consider different levels of perception by individual respondents for different purposes (be it medicinal, recreational or industrial) without clustering the effect into a binary response. In doing so, Husserl's transcendental constitutive phenomenological framework will be adopted to examine the lived experiences of individuals using cannabis as against the societal perception. Given that this objective seeks to understand the pure subjective nature and personal experiences of individual's using cannabis, this approach will be followed to measure consciousness. This approach provides a vivid description without obscuring preconception or hypothetical speculation (Dukes, 1984; Husserl, 1970; Sanders, 1982). Husserl's phenomenological framework is able to bracket the researcher's perception, subjective views and personal biases about cannabis and its use from the actual experiences from the individuals who use it. In effect, Husserl's eidetic reduction approach is used to deepen our understanding about the real experiences of cannabis and its use without preconception. This is a form of a paradigm shift from societal facts about cannabis mostly gloomed with biases to essence of using the plant from the user's viewpoint. This framework helps the researcher and society to suspend all forms of abeyance of belief systems about cannabis, its use and effects into the transcendental world. In all, the phenomenological approach used in understanding consciousness and alternate dimension in human

psychological makeup and cannabis use is able to draw a line between perception without understanding the meaning and essence of individual's decision to use it as a result of insight gained from personally experiencing cannabis. This is referred to as 'imaginary variation' (Husserl, 1970).

Given that consciousness of cannabis is not random, however, intentional which cannot be achieved based on perception but through experience, this framework best suits the study in explaining lived experiences of cannabis use. Based on the above assertion, some key questions will be raised. Would cannabis still be considered bad if the medicinal benefits are known to society? Will society continue to hold negative perception about cannabis, even when they get to know there are no negative health and psychoactive implications? Above all, will the government continue to consider cannabis plant illegal if the economic benefits are made known to cabinet? This approach will best be achieved through a pure qualitative in-depth interview as well as quantitative data which will be analyzed viz-a-viz existing information on cannabis and its use. Doing this will provide the platform to construct an edited synthesis written protocol in order to conduct a meaningful analysis to construct a situated structure which will integrate all forms of analyses to generate an overall general structure to assess lived experiences of cannabis, its use and effects alongside perception. Thus, the appropriate identification strategy for the first research objective is a multinomial logistic regression model. Given the categorical nature of the dependent variable, the mmultinomial logistic model will be used to predict the probability perceiving cannabis to be a very bad, bad, good and/or very good, given the covariates. Compared to other estimating models, multinomial logistic model is chosen over the conventional Ordinary Least Square (OLS) and Logit models due to the categorical nature of the dependent variables. Also, unlike discriminant function analysis, this model does not assume normality, linearity, or homoscedasticity, thus, it is seen as an attractive approach (Hedeker, 2003; Kwak & Clayton-Matthews, 2002). Below is the illustration of multinomial logistic regression where vectors: $Y = (y_1 + \ldots + y_{1+k})^T$ where $y_i = 0$ for all *i* where $y_j = 1$ with a corresponding probability p_j. In effect, multinomial model is given as

$$P_i = \frac{exp(Z^{(i)^T} x)}{1 + \sum_{j=1}^{k} exp(Z^{(j)^T} x)} \quad for\ i = 1, \ldots, k \qquad (1)$$

$$P_{k+1} = \frac{1}{1 + \sum_{j=1}^{k} exp(Z^{(j)^T} x)} \quad (2)$$

Where $x = (x_1 + \ldots + x_m)^T$ represents set of covariates, with $Z^{(i)}$ representing parameters to the *i-th* outcome category. Below is the maximum likelihood estimation

$$log \prod_{j=1}^{k+1} p_j{}^{y_j} = 1 + \sum_{j=1}^{k} y_j Z^{(j)^T} x - \left[1 + \sum_{j=1}^{k} exp(Z^{(j)^T} x)\right] \quad (3)$$

In equation (3), $Z = (Z_1^{(1)}, \ldots, Z_m^{(1)}, \ldots, Z_1^{(k)}, \ldots, Z_m^{(k)})^T$ represents the *mk* parameters of where the upper limit corresponds with the outcome category and the lower limit corresponding with the covariates.

Similar to the first research questions, estimating the well-being of individuals drawing on data from survey data that focuses on the self-reported well-being of individuals, the implication of cannabis will be estimated with the same multinomial logistic model. This will employ both hedonic and eudaimonic measures to provide a true picture of the real impact of cannabis among users. In order to resolve the issue of causality, selected patients who rely on cannabis for treatment alongside their counterparts who use other pharmacological approach will be assessed to estimate the efficacy of the treatment. This possibly mimics a controlled experiment in the absence of natural experiment.

The final stage of this research will estimate the cost – benefit of regulated cannabis legalization. In doing this, the project will identify the costs and benefits associated with regulated cannabis legalization. Specifically, we will evaluate the costs and benefits (be it social/private, direct/indirect, tangible/intangible) associated with the legalization at market price or shadow price. Following this, we will determine whether this initiative is socially or economically viable based on the investment criteria and the possibility of extending the use of cannabis in other revenue-oriented sectors of the economy.

Thus the study will undertake comprehensive technical, economic, socio-cultural, institutional and financial appraisals. The technical appraisal will focus on how the legalization will be formulated and implemented in terms of resource requirement for commercialization, technology employed in cultivation, location, supply and value chain systems. Also, the economic appraisal is a key tool that applies dollar value on any decision. It will consider the

effect of cannabis legalization on the economy at large, thus providing vital information to policymakers at various levels of government. It will furthermore take into account a wide range of sources of funding as well as cost and benefits quantified in monetary terms that will accrue from the legalization of cannabis to the society as a whole. The socio-cultural appraisal will determine whether the societal values as well as the cultural norms of the country conflict with regulated legalization of cannabis. This also examines coherence and consistency with government's agenda. Issues such as government policies, institutions, management and staff that will play instrumental role in assessing the feasibility and viability of this project will be considered under the institutional appraisal. Financial appraisal will involve assessment of the financial impact, judgment of efficient resource use, assessment of incentives, provision of a sound financing plan, and coordination of financial contribution and assessment of financial management competence of the entire legalization of cannabis. The main objective of this appraisal is to determine the requirements of funds/timing and the expected returns on the legalization of cannabis from different perspectives.

In terms of estimation, the study will employ the Net Present Value (NPV) and Benefit Cost Ratio (BCR). The former will estimate the difference between the present value benefit and present value of all monetary value of cannabis legalization. This approach is chosen over other estimation methods because it incorporates any variation in the discount rate over a period of time. Given the volatile nature of the economic indicators like exchange rate and interest rates, this approach is suitable to account for any (un)predicted changes. The discount rate also informs key players who are interested in investing in cannabis production a for either medicinal, recreational or industrial use. This is illustrated in the equations below:

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1 + r)^t}, where t = 1, \dots, n \quad (4)$$

$$BCR = \sum_{t=1}^{n} \left(\frac{B_t}{(1 + r)^t}\right) / \sum_{t=1}^{n} \left(\frac{C_t}{(1 + r)^t}\right), where = 1, \dots, n \quad (5)$$

In both equations (4) and (5) above, B_t and C_t represent Benefit and Cost over time (t) whereas $\frac{1}{(1+r)^t}$ represents the discounting factor with (r) as the discount rate and (n) as the expected lifespan of the legalization. For a decision to be taken based on equation (4), cannabis will be legalized if NPV > 0 and rejected if otherwise. With regards to the Benefit Cost Ratio, this will

represent the present value of all future benefits from cannabis legalization divided by the present value of all associated cost to cannabis legalization. In order to legalize cannabis based on equation (5), if the BCR ≥ 1, then it is desirable to legalize cannabis since the present value of benefit exceeds or equals the present value of cost.

4 Impact/Contribution

The research will provide a methodologically robust, and empirically relevant contribution to the literature on cannabis using a theoretically appropriate approach. Given the contextual, and contentious nature of cannabis and information disconnect among Africans, the study also addresses the misleading and uniformed views about cannabis, and will further proceed to provide best practices in its use. Also, due to the unending controversies in countries that have legalized and those yet to consider such decisions for medicinal, industrial and recreational purposes, it is very imperative to give keen attention to the cannabis plant within research and policy circles, with much focus on its benefits, cost and how to embark on a regulated legalization as well as sustainable management. This research does not only examine the significance of cannabis legalization, however, it also estimate the relative importance of cannabis as against other driving substances that influence individuals' (ab)normal behaviour following the use of cannabis. In effect, this research addresses perception issues; provides information on the welfare implication of cannabis use, as well as estimates the costs and benefits of legalizing cannabis for medicinal, recreational and industrial use.

5 Output/Dissemination

The project will produce three academic journal articles. Likely refereed journals for publication are Journal of African Economics, Journal of Indigenous and Ancestral Studies, International Journal of Drug Policy among others. Also, interim and final reports will be delivered to CAPSI as per the requirement. Since research in any field is pointless and fruitless if the findings and recommendation do not inform policy through communication and research uptake activities, these papers will be presented at seminars, symposiums and international conferences, particularly CAPSI biannual conference and the annual African Review of Economics and Finance Conference. Additionally, policy briefs, blogs, factsheets and infographics will be part of the deliverables in order to first engage the larger audience on the objective of the project; enhance the visibility of the sponsors as well as educate the general public.

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