UNIVERSITY OF KWAZULU-NATAL

An Economic Evaluation of Alternate Cannabis Policy Options - Towards a Cost-Benefit Analysis

By

Tachin Ramnath

209525163

A dissertation submitted in partial fulfilment of the requirements for the degree Master of Commerce in Economics

School of Accounting, Economics and Finance

College of Law and Management Studies

Supervisor: Ms Jessica Schroenn Goebel

2015

DECLARATION

I …*Tachin Ramnath*… declare that

(i) The research reported in this dissertation/thesis, except where otherwise indicated, is my original research.

(ii) This dissertation/thesis has not been submitted for any degree or examination at any other university.

(iii) This dissertation/thesis does not contain other person's data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

(iv) This dissertation/thesis does not contain other person's writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

   a) their words have been re-written but the general information attributed to them has been referenced:
   b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

(v) This dissertation/thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation/thesis and in the References sections.

Signature:

Date: 11/12/15

ACKNOWLEDGEMENTS

I would like to thank God for seeing me through this dissertation.

None of this would have been possible without the help and guidance of my supervisor Jessica. I will forever be grateful to you. I would also like to thank Candice for her constant support and motivation, my greatest thanks goes to you Candice. I am grateful to my parents, Jay and Usha, for being patient with me and for their endless motivation and support. My sisters Levisha and Verona also played a huge role in the process of this dissertation and I am truly appreciative for you in my life.

ABSTRACT

This thesis takes the form of a policy debate regarding alternate cannabis policy options. It will adopt the cost-benefit analysis theory and framework to inform this debate.

It is said that cannabis had been used for multiple purposes (spiritual, medicinal and recreational) since early mankind. The first international drug control treaty came into effect in 1912 which aimed to control substances such as opium and coca only. However, with support from the US and Italy in particular, it was argued that cannabis be recognised as a dangerous and dependence-producing drug and was therefore contested that cannabis be added to this Drug Convention.

Only in 1961, with the revision of the International Drug Convention, was cannabis confirmed to have aspects that posed risks of abuse and dependence and was therefore added to the treaty. It was also in this year that South Africa became a signatory to this multilateral agreement.

The international consensus however, has changed considerably over the past few years, with examples of legalisation illustrated by countries such as Uruguay, and ironically, the US (Colorado and Washington).

The efforts of the United Nations aiming to reduce, and ultimately eliminate cannabis abuse paradoxically coincide with the increasingly popularity and widespread use. It is estimated that approximately 4% of the world's population has used or consumed cannabis, with the US and UK recording the highest increases over the past few decades. Further in SA, cannabis is considered to be the most abused illicit substance and it is estimated that approximately 6.3% of the population consume it.

Currently there is a vigorous international debate around the legalization of cannabis, which is based on the fact that control efforts have largely failed. In addition, evidence suggests that restrictive drug control policies have had a very limited impact on the overall level of usage. Therefore, this thesis aims to identify and analyse the different policy options available regarding cannabis and to identify and highlight a wide range of costs and benefits associated with two policy options, that is, an illegal model versus a regulated-legalised model, in the hope of informing this debate.

TABLE OF CONTENTS

CHAPTER THREE: COST BENEFIT ANALYSIS THEORY AND APPLICATION

CHAPTER FOUR: THE COSTS OF A PROHIBITION POLICY OPTION

CHAPTER FIVE: COSTS AND BENEFITS IN A LEGALISED REGULATED MARKET

LIST OF TABLES AND FIGURES

TABLES

FIGURES

LIST OF ACRONYMS

AIDS	Acquired Immuno-Deficiency Syndrome
AUD	Australian Dollars
AUPA	African Union Plan of Action
BC	Before Christ
BCR	benefit-cost ratio
CBA	Cost Benefit Analysis
CBD	Cannabidiol
CMA	cost–minimization analysis
CV	Contingent Valuation
DAFF	Department of Agriculture, Forestry and Fisheries
DC	District of Columbia
DSD	Department of Social Development
DFA	Department of Finance and Administration
FARS	Fatality Analysis Reporting System
HSRC	Human Sciences Research Council
IDC	International Drug Convention
IOC	International Opium Convention
IOP	intra-ocular pressure
LSD	Lysergic acid diethylamide
MCC	Medical Control Council
MDMA	methylene-dioxy-meth-amphetamine
MERIT	Magistrates Early Referral into Treatment
MIB	Medical Innovation Bill
ND	No Date
NDLEA	National Drug Law Enforcement Agencies
NDMP	National Drug Master Plan

NORML	National Organisation for the Reform of Marijuana Laws
NPV	net present value
NSB	Net Social Benefit
OECD	Organisation for Economic Co-operation and Development
PCT	potential compensation test
RDP	Reconstruction and Development Programme
RIA	Regulatory Impact Analysis
SACDA	South African Central Drug Authority
SADC	Southern African Development Community
SANCA	South African National Council on Alcoholism
THC	tetrahydrocannabinol
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
UNODC	United Nations Office on Drugs and Crime
US	United States
USD	United States Dollar
VOSL	Value of Statistical Life
WHO	World Health Organization
WTA	Willingness to Accept
WTP	Willingness to Pay

CHAPTER ONE

INTRODUCTION

1.1 Background

There is a lot of controversy that surrounds the cannabis plant. For many people cannabis has been used for multiple purposes including spiritual, medicinal and recreational since early mankind. For others cannabis is viewed as nothing more than a wasteful mind altering drug, capable of causing destruction and damage to the lives of people who consume it.

The first international drug control treaty came into effect in 1912 and only aimed to control substances such as opium and coca. However, with support from the US and Italy in particular,it was argued that cannabis be recognised as a dangerous and dependence-producing drug and it was therefore contested that cannabis be added to this Drug Convention. Only in 1961, with the revision of the International Drug Convention, was cannabis added to this treaty. This multilateral agreement was considered a milestone in the history of international drug control as it successfully drew the majority of the world's governments into adopting a common drug strategy, of which South Africa is also a part of.

However, prior to the construction of this multilateral regime, cannabis was subject to a range of prohibition-based control measures in certain nations such as the United States US) and South Africa (Bewley-Taylor et al., 2014). It is said that these measures were generally implemented as a means of social control of particular ethnic groups (Bewley-Taylor et al., 2014).

In the early 1900's, there was a large influx of Mexicans workers crossing the US borders. Driven by the widespread use particularly among this ethnic group, cannabis was then classified as a "dangerous underground drug", which led California to become the first state in the US to outlaw possession. It was also in the early 1900's that the first anti-cannabis campaign began in the US (Bewley-Taylor et al., 2014).

In South Africa, cannabis had been used widely, prior to the arrival of the Dutch. The aim of apartheid laws was to segregate people of different ethnic groups and similarly it is argued that the laws against cannabis served to reduce contact between the whites and the non-whites (Paterson, 2009 and du Plessis et al., 2013).

Given cannabis had been used widely by the non-white population, the white population were certain that cannabis laws would be resisted. This meant the non-whites would be non-compliant with the laws (and hence resistance to authorities), which then allowed for a means to take advantage of the popularity and therefore led to increases in the severity of cannabis penalties. It is therefore argued that cannabis laws in South Africa were implemented on the basis of social control of ethnic groups, which underpinned the apartheid regime (Paterson, 2009 and du Plessis et al., 2013).

At the time cannabis was being contested, the US had acquired a "newfound superpower" status within the United Nations (UN) and it was said that they exploited their position, becoming the dominant nation pushing for cannabis to be added to the international convention (Bewley-Taylor et al., 2014). It is therefore said, that the stringent control of cannabis at an international level, had been based on politically driven and emotionally charged arguments, mainly by the US, rather than on scientific and economically based reasoning. However, this may not be enough to discredit the basis of prohibition but it does bring out the arguments for legalisation in a new light and does credit an economic investigation.

Recently, the international consensus has been changing considerably, with a growing number of westernised countries moving towards legalisation of the plant. Examples of reform are exemplified by countries such as the Uruguay, Spain, Portugal and ironically the US. These changes in laws have been driven by vigorous debates around which policy option (i.e. prohibited verse legalised) should be adopted, with voluminous arguments in support of each.

1.2 Cannabis Policy as an Economic Problem

A case for prohibition can be made by understanding the social cost that drug use places on society. Opponents of a legalised policy argue that, if cannabis is legalised there would be dramatic increases in consumption levels especially among the youth, as it would send a false indication that it is now acceptable to consume cannabis. It is also argued that human capital accumulation will deteriorate given that cannabis negatively impairs the cognitive and learning abilities, which will have far-reaching negative effects on society. In addition, it is said that cannabis use will drive up health care costs, given the negative effects that accrue from use, such as dependence, mental and physical illnesses, and drug-related accidents and crime, are also said to increase. Therefore, a case for prohibition can be made on the grounds that restricting drug use would increase social welfare, given the external cost imposed by drug use on society.

However, the case for prohibition may fail to realise that drug restrictions also impose costs on society. Supporters of a legalised model put forward arguments that coercive polices create a huge black market from which criminals benefit, it also creates discrimination and stigmatisation, which lowers the probability of drug users gaining employment as well as obtaining treatment. Also, it is said that the policy objective of prohibition does not justify the cost placed on the criminal justice system, and instead uses up scarce resources of enforcement. Further, supporters of a legalised framework point to fact that control efforts have largely failed, given that international evidence indicates that restrictive drug policies have had a very limited impact on the overall levels of drug usage. It is estimated that between 2.8 and 4.5 percent of the world's population consumes cannabis, with the US and United Kingdom (UK) recording the highest increases over the past few decades (UNODC, 2011). Further, in SA, cannabis is considered to be the most abused illicit substance and the year 2013/14 showed one of the highest increases in patients treated for cannabis use and abuse (Kruger et al., 2014).

The case for viewing the societal cost that prohibition places can be linked to the work of Ronald Coase in the 1960's (Wilkins and Scrimgeour, 2000). Coase made an economic argument for viewing an externality from the "other side of the coin" that is, viewing the external cost that restricting drug consumption imposes as well, rather than just viewing the externalities that drug consumption places on society. The Coasean theory implies that and economically efficient solution should be achieved regardless of which party imposes the externality (Wilkins and Scrimgeour, 2000). Therefore, regardless of whether drug use (legalisation) or its prohibition creates the externalities, the economically efficient solution would be the outcome which minimises these costs to all parties. Coase further argued that in the absence of transaction costs, as long as property rights are clearly defined, efficient outcomes could be achieved through market processes, i.e. private voluntary negotiation (Wilkins and Scrimgeour, 2000).

Coase's work has important implications for cases where private voluntary negotiation (market solutions) will not resolve externality problems (such as in the case of drug use). Here, the implication is that efficient (and therefore economically desirable) laws are those that bring about adjustment to the externality at the lowest cost to society (regardless of considerations of 'blame' or moral responsibility etc.). This principle has informed the approach taken in this study: it recognises that cannabis consumption imposes external costs on society, but also that a policy of prohibition, likewise entails costs; the question then is which policy option is best (imposes the least costs) on society as a whole?

Therefore, given that there are differing views on the societal impact that a policy change will have, a precise method or framework is needed in order to understand which policy option will provide the more economically efficient outcome (the greatest benefit at the lowest cost to society).

Economic analysis can be very useful when developing policies and therefore a systematic assessment which accounts for the potential impacts of the different policy options would be necessary in informing this debate (Shanahan, 2011 and Shanahan and Ritter, 2012). One tool that policymakers have at their disposal is that of Cost Benefit Analysis (CBA), as it provides a framework in which to value and rank alternatives according to the total costs imposed on society (OECD, 2008).

In addition, previous research in the field of cannabis policies has mainly focused on one or two specific aspects of a policy change. For example, the impact on criminal justice resources (Bates, 2004; Miron, 2005 and Shepard and Blackely, 2007), the effect legalisation would have on consumption (Pacula and Lundberg, 2014; Bretteville-Jensen, 2006a and Kilmer, 2010) or production costs in a legalised market (Caulkins, 2010). However, very few researchers have attempted to combine a *wide range* of the potential impacts of a policy change. Also, there have been limited attempts to determine whom the costs and benefits accrue to, as well as which individuals and preferences should be taken into account in an event of a policy change. Further, there has been minimal research done on cannabis policies in South Africa.

1.3 Aim and Objectives

Therefore, this dissertation aims to identify and analyse the different policy options available regarding cannabis and to identify and highlight a wide range of costs and benefits associated with two policy options, that is, an illegal model versus a regulated-legalised model, in the hope of informing the debate.

The objectives are:

a. To understand cannabis use as an economic problem, by identifying reasons for and possible external costs of its use;

b. To identify the different policy options regarding cannabis (and the underlying rationale guiding these approaches) by reviewing international policy;

c. To identify the probable costs and benefits of prohibition and legalisation as policy alternatives;

d. To investigate the distribution of such costs and benefits and consider whose preferences should be included in a CBA.

1.4 Structure of the Dissertation

The remainder of Chapter One provides a brief history of cannabis and will identify the rationale for the consumption of the plant. Chapter Two will provide an analysis of the different policy options available regarding cannabis from a recreational drug point of view, drawing on an overview of cannabis policy experiences across several countries. Chapter Three outlines the economic theory that will be used in the dissertation and will justify the use of CBA. Although a full-blown CBA is beyond the scope of this study, the intention is to identify and explore the most significant costs and benefits which would be included in a CBA, based on international findings from relevant empirical studies. Chapter Four will set out the various costs of a prohibition based policy and will identify whose preferences should be accounted for in a CBA. Chapter Five will identify the probable cost and benefits in a legalised regulated market and will categorise the cost and benefits according to the parties affected by the policy change. Chapter Six will conclude the dissertation and provide some recommendations based on the findings of the study.

1.5 What is Cannabis?

Cannabis is a seed-born, tall upright stemmed plant. The leaves are serrated and divided with hair like fibres (Roussell, 2012). Biologically, cannabis is known as Cannabis sativa, which is an annual herbaceous plant, with genes that belongs to the Cannabaceae family (Roussell, 2012).

Hemp and marijuana are often socially and legally confused. Technically, they are both Cannabis sativa and are identical except, they differ in their physical structure as well as their chemical content (Roussell, 2012). Other than the chemical content of the plants, the social and legal aspect of the difference between hemp and marijuana is where the main misperception arises. This causes great difficultly for the law, which is generally guided by mutually exclusive, arranged classifications.

As mentioned, both these plants are Cannabis sativa and differ in their physical structure as well as their degree of natural tetrahydrocannabinol (THC). To amplify matters, THC is also a prescribed medical substance, thereby making the legality surrounding cannabis further misconstrued (Roussell, 2012).

Given that cannabis is found in different parts of the world, arguments arise as to the exact categorisation of the plant. The more common belief is that, Cannabis Sativa is the only species and Africana, Americana and Indica are all variants which belong to the Sativa species. Others argue that these variants are instead species in their own right (Roussell, 2012).

It is believed that things such as soil, moisture, breeding method and climate all contribute to the potency (the chemical content) of cannabis and hot upland climates especially, positively influence the potency of the plant (Roussell, 2012). There are over 400 identified chemicals in the plant with THC and Cannabidiol (CBD)being the most sought-after chemicals. Cannabis also has a male and female variation, thereby making them dioecious plants (Roussell, 2012).

Delta-9-THC is believed to be the main mind-altering composite in cannabis, with other chemicals having a much less harmful effect. In addition, the most THC is found in the flowering, as well as in the top leaves of the female variation of the plant (Roussell, 2012). On average, the THC levels are around 7.5 percent but it should be noted that female plants, which are bred without pollination, is considered as one of the most potent, with THC levels of around 24 percent (Roussell, 2012).

1.6 History and Origin of Cannabis

Cannabis is the only plant in the world that can be used medically, for its fibre, as well as taken as a drug. People have used cannabis throughout history as a source of food, industrial fibre, medicine, recreation and for religious purposes (Ames, 1958). Cannabis was first scientifically classified in 1735 as Cannabis Sativa, which means "cultivated" cannabis and therefore indicates the close relationship with mankind.

One of the first uses of cannabis dates back to 2737 BC, where the Chinese were believed to have used the plant for its medical properties (Ames, 1958).

Other references of cannabis use dates back to 650 BC, where the Indians used the plant for medical and spiritual reasons. Further, the 13th century saw the introduction of hemp as a raw material to make cloth in Central and Southern Europe and even fine Italian linen was made from this fibre (Ames, 1958).

The 15th century saw the publishing of the book R-HYA, which was written by the Chinese, making them the first people to document the use of cannabis. Cannabis was referred as "ma" ("maw") which meant "endearing" or "valuable" (Ames, 1958). The Book of Drugs which was written by Shen Nung, a Chinese emperor, in around 2737 BC, was also among one of the first known books to be written regarding cannabis use. According to the book, cannabis was prescribed for various illnesses, such as, absentmindedness, malaria, gas, pains and gout. The Chinese used cannabis for medical purposes as well as to produce fibre, for which they used to make clothes. In addition, at around 500 BC, the Chinese began documenting the negative effects of the cannabis plant. It was found that young children became disrespectful and "wild" when cannabis was used for recreational purposes. This lead to the plant being called a "liberator of sin" and this was why cannabis was banned in China but was later legalised because of its widespread use (Ames, 1958).

The other group of people that was also familiar with cannabis was the Greek. They generally used hemp in cakes, which were narcotic when eaten excessively (Ames, 1958). Also, the Greeks used cannabis in their Scythian customs where they would burn the seeds and leaves of the plant to produce smoke in their steam baths. It was said that when the smoke was inhaled, it would create hyperactive emotions (Ames, 1958).

As mentioned above, the Indians were another group of people that used cannabis for centuries, as it played an integral part of many religious acts and ceremonies. Many Hindus considered it to be a holy plant with various tails about its origin (Ames, 1958). Some believe that the great Lord Shiva extracted the plant from the ocean and all the Gods would shake, mix and churn it in order to extract the "liquid" from it. One of their religious book, the Rig Veda, as well as many other scriptures described the uses of Soma (which is a variant of cannabis). Early papers discuss the collection of resin from the plant, which is said to be used in many Indian rituals. A lot of the holy value attached to the plant was because of the belief that it calms and clears the head, and stimulates the brain (Ames, 1958).

Further, cannabis plays an important role in the African religion. Even though the plant is not indigenous to the African continent, its uses are extensive and form part of many cultural traditions, religious activities as well as used for medical purposes (SACDA, 2004 and Peltzer, 2007). It has been grown in Egypt for more than a thousand years and its existence in Central and Southern Africa traces to the 14th century. In Ethiopia, evidence of ceramic smoke pipes with hints of cannabis was discovered. In other parts of Africa, such as North Africa, cannabis affected literature, music and even architecture. Some rooms in the houses in North Africa was reserved for "kif" (another term for cannabis) and it was in these areas that people would gather to dance, sing and tell stories.

The Hottentots group used the plant as a remedy for snake bites and the Sotho's used it to aid in child birth as well as for illnesses like malaria, blood poisoning, anthrax and for black-water fever (SACDA, 2004).

The use of cannabis in South Africa developed quite early, even before the Europeans arrived. African women were said to smoke the plant before giving birth and the seeds of the plant was ground with mealie-pap and given to children as they were developing (Peltzer & Ramlagan, 2007). Although there is no cast in stone evidence regarding the first arrival of cannabis Sativa onto the African continent, it is considered to have entered the continent by way of importation of the plant by Saudi Arabian and Indian merchants (SACDA, 2004; Peltzer & Ramlagan, 2007).

The plant was initially a useful plant for a multitude of tasks, mainly centred on cultural, religious and medicinal purposes. Cannabis is known by a variety of names in South Africa, for example, poison, zol, smack, gangha and weed, whereby location is the key to the multitude of variance when it comes to the name (SACDA, 2004). There are even areas established such as, The Dagga Boere Farm Stall, Daggafontein, Daggakraal which has an historical link to dagga (du Plessiset al., 2013).

In many Africa counties, including South Africa, cannabis was most probably grown wildly and has been cultivated and used for sedative purposes for many years (SACDA, 2004 and du Plessiset al., 2013). According to South African Central Drug Authority (SACDA) (2004), it was said that cannabis was already being smoked by indigenous groups like the Khoikhoi and the San before the whites settled in the Cape of Good Hope in 1652. It was only in the early 1900's, that cannabis became illegal and was incorporated into the Medical, Dental and Pharmacy Act, No. 13 (Perkel, 2005). Another important observation that became apparent in 1998 at a meeting of, Heads of National Drug Law Enforcement Agencies in Africa was that South Africa was one of the major producers of cannabis in the world (SACDA, 2004; du Plessis et al., 2013).

1.7 The Rationale for Use

1.7.1 Recreational

The main psychoactive ingredient in cannabis is Delta-9-THC. It is the most sought after compound in the plant and that is what is responsible for the "high" that people experience (du Plessiset al., 2013). When THC enters the body, it accumulates in the body's fatty tissue and quickly spreads to the brain and other connected tissues. In less than ten minutes, THC levels reach its peak in the blood and falls to less than 5 percent after sixty minutes. The mind-altering effects can last from two up to seven hours (du Plessiset al., 2013).

There are various ways in which THC can enter the blood. The most common is to crush and smoke the dried leaves of the plant (du Plessiset al., 2013). Other ways include mixing it with food and drinks for ingesting purposes. In South Africa, cannabis is most commonly smoked (Peltzer, 2007). It was also found to use the processed plant in their food and drinks and in some instances cannabis was added to other drugs, like cocaine and heroin, to produce more intense effects. In South Africa particularly, it is blended with other crushed drugs such as methaqualone tablets, which is referred to as "white pipe" (Peltzer, 2007). In other parts of the world, cannabis was used to produced hashish (a cannabis derivative), which is done by scraping off the resin from the leaves of the plant, which they then compress and smoke (du Plessiset al., 2013).

1.7.2 Medical

Various studies have shown that there has been a long history of cannabis being used for medical purposes (Joy et al., 1999; Piper, 2005 andBaxter and Baker, 2012). For centuries, countries including India, South America, Egypt and Malaysia are among many that have used the cannabis plant for the treatment of a variety of illnesses. It was said to aid in ailments such as cancer, asthma, epilepsy, heart attacks as well as multiple sclerosis. Further, the early 1800's saw physicians in the US using the plants extract for medical and recreational purposes however, the Marijuana Tax Act, introduced in 1937, lead to the prohibition of the plant (Piper, 2005). Nonetheless, 1937 also saw some forms of cannabis still being listed in therapeutic drugs of the United States Pharmacopeia and National Formulary. Before the year 1937, a nerve tonic that was produced from the plant was also legally being sold in the South African market (Piper, 2005).

Prior to its ban in US, cannabis had been documented to treat over a hundred health conditions. In 1996, California became the first state in the US to endorse the medical use of cannabis (du Plessis et al., 2013).

The Act affords legal protection to patients diagnosed with any illness, where the medical use of cannabis has been recommended and deemed appropriate by medical practitioners. Some of the approved conditions in California included Acquired Immuo-Deficiency Syndrome (AIDS), anorexia, glaucoma and muscle spasms. A few years later, several other states also began legalising the medical use of cannabis and currently, there are more than twenty states in North America alone adopting a medical cannabis policy however, states differ slightly on their approved conditions (du Plessiset al., 2013).

There are many illnesses that cannabis is said to be useful for which include AIDS-related wasting, glaucoma, anti-asthmatic effect, muscle-relaxant effect, anti-seizure and anti-depressant effect, analgesia and cancer.

Studies show that THC found in cannabis is useful in relieving extreme cases of vomiting and nausea that are associated with chemotherapy (Baxter and Baker, 2012). For example, in Canada, between the late 1970's and early 1980's, cannabis was used by many patients for its medical properties in treating vomiting and nausea in cancer chemotherapy. Also certain trails showed that over 50 percent of cancer patients reported that cannabis was more effective in relieving vomiting and nausea than any other medicine they have tried (Baxter and Baker, 2012).

Some studies found that Drocannabinol (a chemical found in cannabis) was able to stimulate the appetite of people with AIDS, thereby enabling them to gain weight (Baxter and Baker, 2012). Other studies however, found that Droncannabinol had a psychoactive effect which some patients disliked. Although, it is said that cannabis is extremely effective in stimulating patient's appetites, especially for those who are in the more severe stages of the disease.

Glaucoma comes apparent when intra-ocular pressure (IOP) is elevated and if IOP is not treated, it can lead to blindness (Baxter and Baker, 2012). Research has found a 25 percent reduction in IOP when Drocannabinol was taken orally but the effects are short-lived, for only three to four hours. It should be emphasized that although cannabis is not a cure for IOP or is unable to cure blindness, it helps by lowering the IOP associated with glaucoma.

Some studies have also found that if cannabis is smoked over short periods of time, it improves breathing in patients suffering with asthma (du Plessiset al., 2013). This is because the smoke from the plant leads to bronchodilation, which simply means that the smoke expands the air passages thereby producing an anti-asthmatic effect.

Multiple sclerosis is a muscle disorder whereby patients suffer from muscle spasms. Research has revealed that these muscle spasms are relieved in patients who use the cannabis plant however; others argue that there are too few clinical trials to prove the effectiveness of this hypothesis (du Plessiset al., 2013).

Cannabis has also been said to assist in preventing epileptic seizures and this is due to the convulsing and anti-convulsing properties of the plant (Baxter and Baker, 2012). Great Britain provides evidence of the anti-depressant effect of cannabis and synthetic cannabinoids owing to euphoria derived when using the plant.

A small number of clinical trials have found that drocannabinol, as well as some other cannabinoids; have an anodyne (soothing) effect, equivalent to 60 milligrams of codeine. This was particularly true for chronic and acute post-operative pain (Baxter and Baker, 2012). However, some of the patients were found to experience psychotropic effects from the cannabinoids. Caution is warned in interpreting these results, since the pain-relieving properties of cannabis has not been carefully studied or compared with other anodynes such as aspirin-type drugs, which produced anti-nausea effects.

1.7.3 Industrial

Hemp is one of the most important fibre crops, both for South Africa and the rest of the world. It has been cultivated longer than any other fibre crop and there seems to be an exhaustive list of benefits of the hemp plant (du Plessiset al., 2013). Its fibre is being used in various industries, such as clothing and textile, cosmetics and with recent developments even in the energy sector. However, because of its association with 'cannabis', hemp has become illegal in many countries. For the same reason, hemp has been illegal in South Africa since 1903, when 'dagga' prohibition was passed (du Plessiset al., 2013).

The plant has been used for a wide variety of purposes. It is used to make over 25 000 consumer products, from hemp apparel and accessories to house-wares and hempseed oil cosmetics. Hemp is cultivated in many countries, including, China, Canada, Russia, the US, and several European countries. In these countries, hemp farming is regulated (du Plessis et al., 2013).

It was found that cloth can be woven from the fibre of the plant, in Canada for example, the bulk of their cotton is manufactured from hemp (du Plessis et al., 2013). Interestingly, the first famous Levis jean was manufactured from hemp. However, the complexities, such as equipment being in short supply and the excessive amount of manual labour surrounding the conversion of hemp into a usable form of fibre, lead to the plant being replaced by alternative sources of fibre.

In China, one of the first sources of paper was made from hemp (du Plessiset al., 2013). The main difference between paper made from fibre and pulp lies in their texture, where paper made form fibre is more tough, rough and strong whereas, the paper manufactured from pulp is softer, thicker and less strong. Pulp paper however, is much easier to produce and is the type of paper that can be used on a daily basis.

For decades, hemp has also been grown and used for medical purposes in South Africa and since the dagga prohibition was passed in 1903, hemp has been illegal. However, the South Africa government, together with the private sector are engaging in an attempt to legalise hemp, with the aim of commercialising the plant. Currently though, the plant is used primarily for research purposes (du Plessiset al., 2013).

China, Ukraine, Romania and Poland are among the largest producers of hemp in the world (DAFF, 2011). Around 26 countries permit the commercialised cultivation of hemp with Germany and the UK being the major producers of the hemp plant in Western Europe. According to the Department of Agriculture, Forestry and Fisheries (DAFF) (2011), very few African countries are involved in the production of hemp, mainly due to legislative issues surrounding the plant, which is especially true in South Africa.

The demand for hemp products worldwide have increased by 233 percent between 2009 and 2011 and hemp imports in South Africa alone have increased by half a million from 2009 to 2010 (DAFF, 2011). In 2011, the European Union and many South African companies were planning a R25 million five year project to boost hemp cultivation in South Africa. Projects were discussed in the Eastern Cape for sustainable hemp production that will produce jobs and income in impoverished and poverty-stricken areas (DAFF, 2011).

South Africa is a net importer of the plant. The hemp seed and fibre are the main materials that are imported, given the low levels of production in South Africa. This is due to the fact that hemp is illegal to grow and produce in the country however, because hemp products are in great demand, producers in South Africa buy raw materials from other countries where hemp is produced legally and in much larger quantities. They then process the hemp seed and fibre into finished goods and export the goods to the rest of the world (DAFF, 2011).

1.7.4 Cultural

There are many religions around the world that use cannabis as part of their rituals. The Rastafari religion has been practiced for more than seven decades. The Rastarfarians follow the Nazarene Code and accredit the bible as a core source of their religious material (Prince V President of the Law Society of the Cape of Good Hope (CCT 36/00) (2002) ZACC 1). Two core components to the Rastafari religion is meditation and reasoning. Meditation is essentially a contemplative exercise, which requires the use of cannabis, while this is usually confined to use in the quarters of your own household, it is common to engage in this contemplative exercise with other Rastafarians at religious congregations or meetings (Prince V President of the Law Society of the Cape of Good Hope (CCT 36/00) (2002) ZACC 1).

People in India have been said to consume cannabis, given its association with the Lord Shiva. It is believed that the God consumed Bhang (which is cannabis leaves mixed with milk) during his meditation and contemplation practices in the mountains (Ames, 1958). It is also believed that drinking of Bhang will cleanse the body, remove evil and unite people, provided it was consumed under the religious rites however, if it was not consumed under the codes of religion, it was believed to be a sin. These are some of the reasons why in the current day, Hindus consume cannabis at certain festivals like Shivaratri. Cannabis is also used in many African traditions, the Khoisan are said to use it during religious rituals for blessings (Ames, 1958).

1.8 Summary

Even though it had been identified that cannabis prohibition has been based on politically driven arguments, policy is thought to be necessary, mainly because of the social costs that are imposed by drug use. Such costs include, drug-related accidental harms, drug-related crime and health care costs, to name a few and this will be re-looked at in depth in Chapter Five.

CHAPTER TWO

POLICY OPTIONS

2.1 Introduction

In Chapter One, the economic problem was set out and the rationale for the consumption of cannabis identified. The aim of this chapter is to provide an overview of some of the different international policy options applied in various parts of the world. This is important as it sets out the foundation for which two policy options will be selected for comparison and is therefore necessary before the discussion of the economic theory and the relevance of CBA, which is set out in Chapter 3.The chapter will conclude with the selection and motivation of two alternative policies that will be evaluated.

2.2 An Overview of Various International Policy Options

The laws and regulations surrounding cannabis differ from country to country and in some cases even within countries. There are many legislative approaches that countries have to choose from, these range from strictly prohibited policies (whereby all activities relating to cannabis are illegal), to fully legalised policies (whereby activities relating to cannabis are legal and either regulated in terms of production, availability and use), or totally unregulated (whereby no restrictions apply).

The first international drug control treaty came into effect in 1912, which aimed to control substances such as coca and opium (SACDA, 2004 and du Plessis et al., 2013). In the year 1925, hashish (a cannabis derivative) was contested to be added to the International Opium Convention. The sub-committee of the convention recommended that Indian hemp and its derivatives may only be used for medical and scientific purposes. However, India and a few other countries objected to the recommendations, stating that Indian hemp was used for many cultural and social customs. They also argued that the prevalence of wild-growing cannabis would make controls difficult to enforce. It was due to these objections that the recommendations never made it to the final 1925 treaty.

Only in 1961 with the implementation of the United Nations Single Convention on Narcotic Drugs, was the cannabis plant considered a substance which had aspects that posed a serious risk of abuse and dependence (du Plessis et al., 2013). This convention was considered a milestone in the history of international drug control, as it was adopted and implemented by many countries around the world (including South Africa),

which then allowed for a common drug strategy across countries (Kruger et al., 2014). Being a member of this convention meant that countries could adopt special control measures which they deemed necessary, such as prohibiting the use of cannabis, although these control measures were based on the constitutional limitations of a particular country (Shanahan, 2011).

Even though the UN provided a classification of narcotic drugs, the controlling and management of cannabis, varies substantially from country to country and it remains largely controversial (Shanahan, 2011). There are numerous examples of the discrepancies among countries regarding the laws and how the laws are interpreted and implemented, which will be discussed later in this chapter.

2.2.1 Terminology of Different Approaches

There are some common phrases used to describe various policy regimes. Examples include strictly prohibited, criminal, decriminalisation, depenalization, regulated legalisation and total legalisation (Shanahan, 2011 and du Plessiset al., 2013). Strictly prohibited and criminal are often used interchangeably and refer to situations where no mediating policies exist for cannabis (i.e. the production, sale and use are prohibited with major fines or imprisonment attached to it). Decriminalisation and depenalisation, which are also used interchangeably, are policy situations which generally lie in the middle of the policy spectrum (i.e. between strictly prohibited and total legalisation). These refer to situations where cannabis is illegal by law but some form of conciliation is offered, for example, not prosecuting users for small quantities, civil penalties (such as minor fines and community service), cautioning users and or referring them to treatment. In the Netherlands, this is referred to as *de facto* regulation, whereby cannabis related activities are prohibited by law however; the law is not enforced when it comes to possession and use of small quantities. Regulated legalisation (recently introduced in Colorado and Washington) is a situation where cannabis is legal to produce, supply and use; however, limits on quantities and levels of potency do exist. Total legalisation or unregulated availability, is where no legal restrictions apply to any cannabis related activities (Shanahan, 2011 and du Plessis et al., 2013).

2.2.1.1 Strictly Prohibited, Total Prohibition, Criminalised

Under the prohibition policy, any activity that is related to cannabis is considered illegal and persons participating in these activities could, under criminal law, be prosecuted, be charged with a fine and if found guilty, have a recorded criminal conviction.

The motive behind this kind of policy is to encourage tighter police responses so as to reduce the availability of cannabis as well as to raise the prices of the drug, given the social costs attached to consumption. Below are some of the countries which impose these coercive policies.

South Africa

The South African law currently regards and treats cannabis as an illegal and dependence-producing drug. There are various Acts which support and provide a legal framework for reducing the demand and supply of illicit substances. Below are some of the main Acts to consider with regards to the illegality of cannabis.

The Drug and Trafficking Act 140 of 1992 - This Act specifies that the possession and the dealing of illegal drugs as offences and punishable in criminal law. According to this Act, possession of illegal drugs is punishable up to 15 years while dealing is punishable up to 25 years in prison. The Act also prohibits the supply of any substance to someone suspected of manufacturing illegal drugs. Further, the act prohibits any person from converting property that he/she knows or suspects to be gained from proceeds of drug trafficking (5(b), *Drugs and Drug Trafficking Act.* No 140 of 1992).

The term "deal in", in relation to a drug, is explained in Section 1 of the Drugs and Drug Trafficking Act, which includes performing any act that is associated with the cultivation, manufacture, collection, administration, sale, supply, prescription, transhipment, importation, or exportation of the drug (5(b), *Drugs and Drug Trafficking Act.* No 140 of 1992).

In addition, Part 3 of Schedule 2 of the Act specifies cannabis (dagga) as the full plant or any portion or product thereof as an adverse dependence-producing substance, except for dronabinol, as this compound provides medical benefits. Further, any person who contravenes Section 5 (b) will be found guilty of an offence in terms of Section 13 (f) of the Act (5(b), *Drugs and Drug Trafficking Act.* No 140 of 1992).

Other Acts

- The Criminal Procedure Act 51 of 1977
- The Prevention and Treatment of Drug Dependency Act 20 of 1992 (as amended)
- The Medicines and Related Substances Control Act 101 of 1965
- Extradition Act 67 of 1962 and the Extradition Amendment Act 77 of 1966
- The International Co-operation in Criminal Matters Act 75 of 1996
- The Proceeds of Crime Act 76 of 1996
- The Financial Intelligence Act of 2001

- The Institute for Drugs-Free Sports Act 14 of 1997 (NDMP, 2012; SANCA, 2014).

Japan

In Japan, drug use is viewed as an admission of deep seated evil and the treatment of this offence has serious consequences. According to the Japanese cannabis Control Law, possession of cannabis can yield up to 5 years imprisonment, together with community service. The law is relatively lenient on first time offenders, with prosecution of about 6 months in prison. With regards to foreigners in possession of cannabis, imprisonment is unlikely however; the Japanese authorities enforce deportation measures, together with banning the offender from visiting the country in the future (Green, 2012).

United Arab Emirates

One of the most extreme regulations surrounding cannabis usage is the United Arab Emirates (UAE). The country's strict laws prosecute the slightest trace of cannabis for which there is a minimum of 4 years imprisonment. There is clearly a "no tolerance" attitude adopted in this country, as even traces of cannabis found in the blood or urine are also considered as "possession" in the UAE (Green, 2012).

Malaysia

Malaysia is another country that strictly prohibits cannabis. According to the regulation in Malaysia, possession of cannabis could result in a fine to the maximum of 20 000 ringgit and up to 5 years imprisonment (Green, 2012). Possession of more than 50 grams of cannabis will yield at least 5 years in prison, with the possibility of a lashing of about 10 strikes. The cultivation of cannabis may result in life imprisonment. The implication of the sale of cannabis in Malaysia may even lead to the death penalty (Green, 2012).

Indonesia

Indonesia is another illustration of where cannabis is strictly prohibited. According to the drug laws in Indonesia, possession of cannabis may result in up to 4 years imprisonment. In addition, the importation of cannabis into the country, either accidentally or purposefully can yield between 5 and 15 years in prison (Green, 2012).

2.2.1.2 Decriminalisation, Depenalisation and *de facto* regulation

Under a decriminalised system, all activities relating to the use of cannabis are illegal although the actual enforcement of laws differs considerably from what is on the statute

(du Plessis et al., 2013). In general decriminalisation refers to situations where criminal penalties for personal possession are not acted upon although it is still illegal to supply, distribute and consume cannabis by law.

Netherlands

The Netherlands is one of the most apparent examples of a decriminalised system in which, according to the principal drug law, the Opium Act, cannabis is strictly prohibited (SACDA, 2004). Under this law, the sale, supply, cultivation, manufacture and possession of cannabis is illegal and there is a maximum imprisonment time of six months if found in possession of the drug. However, enforcing the law for possession of small quantities of the drug, particularly for personal consumption, is not viewed as a key priority, given that emphasis of the legislative culture is on individual freedom and on the well-being of all citizens (SACDA, 2004).

According to the Dutch guidelines, the use and possession of less than five grams of cannabis is not criminalised (Shanahan, 2011). The "official/unofficial" sales channel for cannabis in the Netherlands is due to the existence of their "coffee shops" although this is effective under strict conditions. This kind of law is usually known as *de facto* legalisation. The law in Netherlands stipulates that it is illegal to grow or supply cannabis, but it is legal to buy cannabis. However, the cultivation, importation and exportation of cannabis are still illegal activities and shops are limited in possession of up to 500 grams of cannabis at any point in time (Shanahan, 2011).

Australia

Australia is another country where the cultivation, supply, possession and use of cannabis are prohibited. There are however four states, that is, South Australia, Western Australia, Northern Territory and Australian Capital Territory, where civil fine programmes exists for the possession of small quantities of cannabis (SACDA, 2004). These states differ in the manner in which they deal with possession of cannabis in terms of a fine, the quantity of cannabis allowable and an amount based on police discretion. Other states of Australia like Victoria, New South Wales and Queensland, have cannabis cautioning systems.

The legislative focus is on both supply and demand reduction and various "diversionary" drug courts and treatment programmes are in place, with emphasise placed on harm minimisation of drug use (SACDA, 2004).

Canada

The Public Prosecution Service has the key responsibility when it comes to prosecution in Canada. Since 1996, some drug offences received conditional sentencing which occurs when the offender pleads guilty; he/she may be given treatment or community service (SACDA, 2004). Even though the number of offences for possession of cannabis have increased over the years, the prosecution rates in some parts of the country have declined to as low as 35 percent (Shanahan, 2011). The legislative approach taken is to focus on both supply and demand reduction with emphasise placed on rehabilitation and treatment, and even though possession is regarded as a criminal offence, prosecutors have the discretion to determine the outcome of an offence (SACDA, 2004).

Russia and Sweden

Countries like Russia and Sweden explain how varying motivations and processes could result in similar responses. Russia changed their laws in 2004, regarding the possession of cannabis, given that cannabis offences was placing a huge burden on the courts (Shanahan, 2011). Prosecution of an offence includes a fine or community service. In Sweden on the other hand, the main objective of the country was to have a "zero tolerance" approach regarding drug use, which steered them to enforce measures such as increased penalties, authority for the police to conduct urine-tests of suspects and the existence of many drug treatment programmes, which offenders can be forced to attend (SACDA, 2004). Even though measures were put in place to have a drug free society, possession of cannabis for private use is considered as insignificant and the offence results in a fine of which the amount is dependent on the offender's income (Shanahan, 2011). It is therefore clear that although countries may have varying reasons for adopting a particular policy, their responses may in fact be the same (Shanahan, 2011). In this case Russia, the objective was to reduce the administrative burden on the courts, whereas Sweden adopted a drug free approach however; both countries resorted to more liberal approaches for the possession of cannabis.

Austria and Finland

The difference between the intent and actual outcomes of law is evident in Austria as well, whereby the possession of cannabis is illegal (Shanahan, 2011). The possession, production or supply of cannabis can result in prosecution of up to 6 months imprisonment or payment of a fine. However, prosecution is disregarded in cases where the quantity found in possession is small, it does not involve a minor and it is not for trading purposes.

Finland is another example of a country whereby cannabis use is considered to be a criminal offence. An ordinary cannabis offence can result in a maximum of 2 years' imprisonment however, the possession of cannabis for personal use leads to a fine, and in some cases prosecution may be waived when the offence is considered insignificant or if the offender has sought treatment (Shanahan, 2011).

United States and South America

Along similar lines, the US law enforces total prohibition of cannabis in certain states although each state has its own drug method of control (SACDA, 2004). Certain states allow for decriminalisation for the possession of cannabis for personal usage, regrading it either as a minor offence or treating it as civil offence. Most states have drug courts and treatment programmes in place, given the rising rate of offences, and according to the SACDA (2004), this came about because traditional law enforcement polices where seen as ineffective.

In the recent past, some countries in South America also saw the liberalisation of certain drug policies (Reuter et al., 2010). In Argentina for example, the prosecution of a 19 year old for possession of 2 grams of cannabis, which resulted in 45 days imprisonment, was challenged by the Supreme Court of Argentina which then ruled that it is unlawful to prosecute the personal use of cannabis going forward (Reuter et al., 2010). In Mexico, a bill was approved by the Senate to decriminalise the possession of small quantities of cannabis that is for private use (Shanahan, 2011). This bill is in line with what police was already doing, which was, ignoring the possession of small quantities. The reason for the police actions was due to their overextended resources in an effort of dealing with the constant drug wars (Shanahan, 2011).

From all the countries that were discussed above, it is clear that even though numerous countries adopt programmes that are in line with international treaties, the intent and implementation of the laws however, vary from country to country. Several countries make provision for possible imprisonment and others adopt either formal or informal alternatives such as fines, treatment or community service.

Countries have been reasonable in their response by upholding cannabis as illegal, however, some fail to implement the law (Netherlands), others give discretion to the police (Australia and France) and some give authority to the prosecution agency to decide on the appropriate punishment (Canada).

2.2.1.3 Regulated Legalisation

The selection of countries and states below allow for the possession and consumption of cannabis for personal use. This effectively means that there are policies in place which allow for a controlled legal market for cannabis, whereby consumers can purchase cannabis for personal use as long as it is from a legal, safe source, together with limitations on quantities.

Uruguay

The first country to legalise the cultivation, sale and consumption of marijuana was Uruguay, which acts as a revolutionary social experiment that other countries debating drug liberalisation will be watching carefully. The government bill was approved in favour of cannabis legalisation which sets the framework for regulating the growing, sale and consumption of marijuana, with the main objective of acquiring the business from criminals in the country (Castaldi and Llambias, 2013). The law states that any person over the age of 18 who is registered with the government database (which is used to monitor the consumer's usage) can purchase up to 40 grams of cannabis per month (Castaldi and Llambias, 2013).

The Uruguayan president has stated, "We've given this market as a gift to the drug traffickers and that is more destructive socially than the drug itself, because it rots the whole of society". He therefore supported the decision of regulating cannabis by stating that this initiative aimed to regulate and tax an already existing market which was being run by criminals (Castaldi and Llambias, 2013).

USA

The District of Columbia (DC) and four other states have legalised the recreational use of marijuana. In Alaska, the purchase, possession and transportation of up to one ounce or six plants of marijuana is allowed for those 21 years and older. A similar measure was adopted in Oregon where adults are allowed to possess a maximum of one ounce of marijuana in public and up to 8 ounces in their homes.

a. Washington

On 6 December 2012, Initiative 502 received 56 percent of votes which led to cannabis being legalised in the state of Washington (NORML, 2015a). According to this regulation, an adult is allowed to be in possession of up to one ounce of cannabis, up to 72 ounces of cannabis-infused product in liquid form and up to 16 ounces of cannabis-infused product in solid form for private consumption.

However, the consumption of cannabis in public is subjected to a fine and the law also prohibits advertising in areas where the youth are frequently present (NORML, 2015a). Supports of this initiative point to the fact that cannabis prohibition has failed, together with the dangers posed by the huge American black market (New Approach, ND). The City Attorney's office had refocussed their attention to the more serious issues like increasing their budgets and shifting resources towards fighting more serious crimes. The tax revenue gained is said to provide education on the harms of cannabis use as well as to enhance school-based prevention programs. The revenues will also be used to enhance health care systems and to supplement the state general budget (New Approach, N.D).

b. Colorado

On 10 December 2012, Amendment 64 was approved by 55 percent of Colorado voters, which stipulates that the personal use of cannabis to be legalised with the commercial manufacture and sale of the plant to be regulated by the state policymakers (NORML, 2015b). A maximum of one ounce for private use, private cultivation of up to 6 plants (with a maximum of 3 mature plants) and the transfer of less than one ounce for no remuneration, results in no penalty being imposed. However, possession of between 1 and 2 ounces is punishable with a fine of $100 and the offender summoned and has to appear in court (NORML, 2015b). In the case of distributing of cannabis, less than one ounce for no remuneration is not punishable and the retail sale of cannabis is regulated by state-licenced entities who are permitted to sell to individuals 21 years and older (NORML, 2015b).

Supporters claim that the idea of fairness and freedom of choice should justify the legalisation of cannabis. They make a point that tobacco, alcohol and even candy bars and soda have negative consequences from consumption so, allowing these products to be legally consumed, unfairly favours the producers of these legal products. Supporters also point to the huge tax revenues, which are proposed to be used for school construction (Shane, 2014).

c. Alaska

In February 2015, the Ballot Measure 2 was approved, by a 52 percent vote, in Alaska (NORML, 2015c). Under this measure, the possession and cultivation of cannabis is permitted and untaxed provided the possession of up to one ounce and cultivation of up to 6 plants was intended for personal use. However, the commercial production and the retail sale of cannabis were subjected to licensing and taxation.

The Alaskan residents have been able to possess and cultivate cannabis in small quantities since 1975 however, prior to 2015, the law did not allow for a legal market for the production and sale of cannabis (NORML, 2015c). The possession of up to one ounce of marijuana and the cultivation of no more than 6 months are allowable for personal use, with the sharing of the less than one ounce or 6 plants for private use of individuals over the age of 21, is also permitted in the legislation (NORML, 2015c). Supporters of Ballot claim that cannabis prohibition has failed and that a more sensible approach is needed. They believe that cannabis should be taxed like alcohol which will honour the rights of personal freedom, create employment and allow enforcement resources to be used more effectively (Bickford, 2014).

d. Oregon and District of Colombia (Washington DC)

On 1 July 2015, Measure 91 was approved by 56 percent of voters in Oregon. Under this law, the cultivation of up to four plants and the possession of up to eight ounces of cannabis are permitted at any given time (NORML, 2015d). The public possession of one ounce or less is not punishable however; usage in public will be subject to a fine of up to $1000(USD) and home-gown cannabis is also allowable and not punishable (NORML, 2015d).

As of 2016, the retail sale of cannabis will be regulated by state-licensed entities that are permitted to sell to individuals 21 years and older and any sale by unlicensed entities will also subject to criminal penalties (Crombie, 2014). The US Constitution stipulated Colombia as an exclusive jurisdiction and therefore does not form part of any US state. On 26 February 2015, Initiative 71 was approved by 69 percent of voters in Washington DC which allows for the possession of up two ounces of cannabis and the cultivation of no more than 6 plants (NORML, 2015e). However, the initiative currently does not make provision for the regulation of a commercial cannabis market but the City Council is considering implementing a separate legislation to account for the commercial production and retail sale of marijuana for adults (NORML, 2015e).

The section above had identified the different policy options regarding cannabis by reviewing international policy environment. The next section ties up these changes in laws by analysing the underlying rationale guiding these approaches.

2.3 Putting the Changes in Laws into Context

2.3.1 Guiding principles of good regulation

A broad definition of regulation is an intervention or measure that is made by government which seeks to change or alter the behaviour of individuals in society. It can be used to either restrict people's behaviour (like the compulsory use of a seatbelt) or it can give people rights (like by providing equal opportunities) (Better Regulations Task Force, 2003).

In order to maintain economic, environment and social standards, regulations are vital. Outcomes such as health hazards, monopolised prices, the free-rider effect and poor quality standards may well prevail without regulations. Therefore, not regulating or even poor quality regulations can place substantial costs on society and can lead to unnecessary complications. However, economists often point to the fact that regulations are costly and therefore governments need to work systematically in order to ensure regulations meet the needs of a country and are of a high standard (OECD, 2008).

Cannabis use imposes external costs on people other than the user (such as drug-related crime) and some unforeseen private costs on users themselves too (because of lack of information, dependence etc.). This is a kind of market failure and creates the rationale for regulations in the first place (which is why it is an economic problem).

However, if laws are not viewed as valid or necessary, compliance with such laws may be low and therefore enforcement may be needed. Examples of such laws include, speeding, the use of cell phones while driving and drunk driving (prior to random breathalyses been introduced). Therefore, enforcement is vital in order to ensure such laws are not perceived as invalid or unreasonable.

Also, if the penalties associated with certain regulations are viewed as too severe, the actual enforcement of such regulations may not occur (Shanahan, 2011). This was evident in the section above (2.2.1.2) where various countries found the penalties of cannabis laws to be too severe and therefore opted for alternative, less server punishments. A case in point is from Argentina, where the prosecution of a 19 year old for 2 grams of cannabis was deemed too severe and led the court to decide that it is unlawful to prosecute for personal use. The

Argentine Supreme Court of justice also believed that criminal penalties are too invasive and that government should not intrude into the private lives of citizens (Reuter et al., 2010).

According to the Better Regulation Task Force (2003) when enforcing regulations, the perceived problem or risk must also be proportionate to the policy solution and it should justify the associated compliance costs. An example of non-proportionate compliance costs can be made in countries like Russia and Mexico, where they found that cannabis offences were placing too much pressure on criminal justice resources and therefore decided to issue fines and community service instead.

Also all options that could aid in achieving a policy objective should be considered, as some alternatives may be more effective and cheaper to apply (Better Regulation Task Force, 2003). There should be a systematic review of regulations in order to test if the regulations are still necessary and effective and if it is found to be ineffective, it should be modified or even eliminated altogether. This aspect is evident in many US states, where they believed that enforcement where ineffective which therefore led them to implement civil penalties, fines and rehabilitation programs instead. Australia and Canada believed that demand reduction approaches where just as important and therefore shifted their attention to providing education and treatment programs instead of harsh criminal penalties.

According to the Better Regulation Task Force (2003) there should also be an assessment of the trade-off between the costs and benefits of a regulation. And there should be freedom of allowance for individuals to make informed decisions and judgements, within reason, about the risks in question. The potential tax revenues from the sale of cannabis has been one of the most cited benefits under legalisation and one of the main driving forces behind policy changes in the US (Shanahan, 2011). This sort of regulation does create risks involving the health of citizens; however, removing all risks when devising regulations is impractical and in some cases almost impossible (Better Regulation Task Force, 2003). There may well be a trade-off between tax revenues, saved resources and increased health care cost. Balancing out this trade-off could be one of the keys to efficient regulation.

2.3.2 Coasean Application

These changes in laws can be linked back to the Coasean theory outlined in Chapter One, which implies that an economically efficient solution should be achieved, regardless of which party imposes the externality. That is, whether drug use (legalisation) or non-drug use (prohibition) creates the externalities; an economically efficient solution should be achieved.

A key inference that drives the theory is that, it may not lead to an economically efficient outcome by simply regulating the externalities (of drug use) out of existence but rather, put laws and regulations in place in such a way that an efficient solution can be achieved for society. This has been evident as many countries changed their regulatory frameworks (i.e. transferred the right to drug users) simply to improve on the efficiency of laws. Many countries decriminalised small amounts of cannabis in order to save resources while others resorted to legalisation and imposed other laws (such as limits on quantities and age restrictions) which in effect, resulted in more economically efficient regulations. Evidence of these efficiency gains are discussed in section 2.3.3 below.

In the presence of an externality, there are going to be "losers" irrespective of the policy or law - i.e. there will be costs. For economic efficiency reasons, decision-makers should choose the policy that minimizes those costs; however, interwoven within this, there are the arguments about whose rights should "count" or how conflicting rights (gains) and losses should be weighted. These arguments will be addressed in Chapter Four.

2.3.3 The Effects of Changes in Policy – Evidence from Washington and Colorado
The aim of the Coasean theory is to achieve an economically efficient solution or outcome, regardless of which party imposes the externality. In what follows is evidence from the US of changes in regulation which led to more efficient outcomes. This section looks at some of the socio-economic effects of legalising cannabis in Washington and Colorado.

Arrests and Judicial Savings
Since the legalisation of cannabis is Washington, it was established that the number of court filings has dropped by 98 percent (Drug Policy Alliance, 2015b). This reduction in court filings was for adults 21 years and older for low level cannabis offences. In addition, between the years 2011 and 2014, there has been a reduction in the number of cannabis-related convictions from 575 to 111, a decline of 81 percent (Drug Policy Alliance, 2015b). Also in Colorado, the number of cannabis possession arrests fell from 9011 in 2010 to a projected 1464 in 2014, indicating an 84 percent reduction that has unfolded (Drug Policy Alliance, 2015a). Given that these arrests cost approximately US$300 each, it highlights the massive savings that the state is currently benefitting from with regard to possession alone. Furthermore, the number of arrests relating to the cultivation and distribution of cannabis has fallen by more than 90 percent (Drug Policy Alliance, 2015a).

Decrease in Crime Rates

Another benefit that both Washington and Colorado have been experiencing is a decrease in crime rates. Since 2012, Washington saw a fall in the violent crime rate and the overall crime rate reached record lows. The state has seen a 10 percent decline in the crime rate between 2011 and 2014, a 13 percent decline in the murder rate, a 6 percent decline in the number of burglaries and property crimes rates remained fairly steady in the same period. Although the causation of these numbers has not been established, it can be said that legalisation of cannabis in these states has not resulted in an increase in crime as some researchers suggested (Shanahan, 2011 and Drug Policy Alliance, 2015b). Colorado saw a similar pattern with a decrease in property and violent crime in 2014. The overall property crime fell by 8.9 percent, burglaries fell by 9.5 percent and violent crimes decreased by 2.2 percent between 2013 and 2014 (Drug Policy Alliance, 2015a).

Tax Revenues Generated

The third benefit that the states of Washington and Colorado have been seeing is that of increased tax revenues. In Washington, approximately US$83 million tax revenue has accrued from the retail sale of cannabis and this is excluding revenue generated from fees and licenses (Drug Policy Alliance, 2015b). The additional tax revenue generated from retail sales of cannabis is being used to fund youth and adult drug education, substance abuse prevention and treatment programmes, academic research and evaluation of effects of cannabis legalisation in the state as well as community health care services (Drug Policy Alliance, 2015b). In Colorado, there has been US$40.9 million tax revenue generated from the retail sales of cannabis in under one year and this amount is excluding the revenue from medical cannabis fees and licenses. Of the total revenue collected, the state has set aside US$2.5 million towards increasing the number of health care professionals in public schools in the state (Drug Policy Alliance, 2015a). Furthermore, the state awarded US$975 000 to schools to hire health care professionals since they suffer from shortages due to budget cuts (Drug Policy Alliance, 2015a). The focus of the health care professionals will be mainly on mental health support programs and to educate students about drug use.

Youth Prevention Efforts

In Washington, since the legalisation of cannabis, there was not been an increase in the usage rates of the youth, there have been no new significant trends in the youth usage and the youth usage has remained stable (Drug Policy Alliance, 2015b). Between 2012 and 2014, the usage rates of 8th and 10th graders decreased slightly while it was unchanged for 12th and 16th graders.

In order to ensure usage rates do not raise among the youth, tax revenue generated from the retail sales of cannabis is being used to fund an education website which is being maintained by the state's Alcohol & Drug Abuse Institute (Drug Policy Alliance, 2015b). In Colorado, there has been an allocation of more than US$8 million tax revenue (generated for retail sales of cannabis) towards youth prevention and education as well as development programs in the community. In addition to the US$2.5 million allocated to mental health care professionals in the state's schools, cannabis tax revenues have been directed to fund youth services programs which provide mentoring and focus on drug prevention and school retention. Furthermore, US$4.3 million is set aside to fund outreach programs in schools for students who consume cannabis (Drug Policy Alliance, 2015a).

Crash Risk Remained Stable

These states have also seen improvements in the traffic fatalities since the legalisation of cannabis. Since the first year after cannabis legalisation, Washington has experienced a decline in the number of traffic fatalities. Although the data is not yet available, preliminary figures indicate that the number of traffic fatalities has remained stable both nationally and in the state (Drug Policy Alliance, 2015b). Even though the causation cannot be established, it can be said that since the legalisation of cannabis for those aged 21 and over, the traffic fatalities have not increased. The state of Colorado saw a similar pattern with a 3 percent decline in traffic fatalities from 449 in 2013 to 436 in 2014. This was not anticipated since it had been predicted that legalising cannabis would increase traffic fatalities (Reuter et al., 2010 and Bryan et al., 2011). However, the evidence suggests otherwise indicating a probable positive downward trend in the future (Drug Policy Alliance, 2015a).

Economic Benefits

The state of Colorado is the fastest growing in the US and is experiencing the lowest unemployment rate in 6 years (Drug Policy Alliance, 2015a). Since the legalisation of cannabis, 16 000 people have been licensed to work in the cannabis industry. After analysing the economic impact of two dispensaries in Colorado, economist Jack Strauss has established that the average wage in the industry is US$17 per hour. In addition, he found that the two dispensaries accounted for 280 jobs and US$30 million of total economic output between 1 January and 30 June 2014. Furthermore, it was found that in comparison to a typical restaurant or retail store, the two dispensaries contributed 10 times more in taxes (Drug Policy Alliance, 2015a). These findings are indicative of the potential of the cannabis industry to contribute to the economic growth of the US.

2.4 Selection and Motivation of Alternatives to be evaluated

As evident in the section (2.2), current regulation measures indicate a shift in global cannabis policies away from prohibited policies and more towards regulated legalised options. According to Miron (2005), the replacement of cannabis prohibition, with a regulated legalized policy option, would result in increased savings and tax revenue amounting to approximately $14 billion per annum in the USA. This report was endorsed by more than 500 economists, of which include three Nobel Laureates in economics: Dr Milton Friedman, Dr Vernon Smith and Dr George Akerlof. These economists have questioned the rationality of prohibition based policies as they believe that the benefits that could be derived would favour a regulated legalised option (du Plessis et al., 2013).

In South Africa, particularly, the conclusions reached regarding the Cannabis Proposition Paper in 2013, was that current prohibition based laws be reviewed and appropriate reforms should be applied (du Plessis et al., 2013). Also, with regards to the Cannabis Round Table Discussions in 2015, it was said that a "cost analysis should be conducted in South Africa on the economic implications of cannabis use…with a view of seeing how they can contribute to the economy" (CDA and HSRC, 2015).

Therefore, due to the economic benefits proposed by the Miron (2005) report, together with the conclusions reached in the 2013 Cannabis Proposition Paper and the 2015 Cannabis Round Table Discussions, the chosen policy options that will be evaluated are the prohibited (which is the status quo in South Africa) and the legalized regulated option. This will be done by comparing the costs and benefits of moving away from a prohibited policy towards a legalized regulated policy.

2.5 Summary

The chapter provided an overview of some of the different international policy options applied in various parts of the world (i.e. prohibited, decriminalised and regulated options) and put the different laws into perspective, by analysing the underlying rationale guiding these approaches. The Coasean theory of efficient regulations was then linked to the changes in laws in Washington and Colorado, whereby evidence of more efficient economic outcomes were presented. Some of the main outcomes which accrued to these states include criminal justice savings, tax revenues which funded various government initiatives and other economic benefits such as reductions in unemployment. This chapter also provided a foundation for the two policy options that was selected for comparison. Chapter Three will discuss the economic theory and the relevance of CBA in comparing cannabis policies.

CHAPTER THREE

COST BENEFIT ANALYSIS THEORY AND APPLICATIONS

3.1 Introduction

In Chapter Two, the South African policy environment regarding cannabis was set out. The chapter also provided policy alternatives concerning the recreational aspect of cannabis. The aim of Chapter Three is to show how CBA would be appropriate in driving the research question which was set out in Chapter One. This chapter will explain the history as well as the economic foundations of CBA. The chapter also aims to provide various methods that can be used to evaluate policy alternatives and provides a justification for why CBA is relevant when evaluating cannabis policies.

3.2 What is CBA?

CBA, also referred to as benefit-cost analysis, is a logical way or process of estimating and comparing the costs and benefits of alternative options (for example, project decisions or policies) (Shanahan and Ritter, 2012). It is a technique used to determine which option will be most beneficial to society at large. The broad aim of CBA is to determine which alternative to choose with the objective of maximising social welfare. This is done by comparing the total expected benefits of each option against the total expected costs in order to identify which outweighs the other and to what extent (Shanahan and Ritter, 2012 and Belfield, 2012).

One of the main objectives of a CBA is to monetise all of the costs and benefits associated with a policy or regulation with the aim of supporting the social decision making process. The way in which this will unfold is conditional on evidence regarding the efficient allocation of resources in cases where private markets fail to achieve a comparable outcome (Shanahan and Ritter, 2012).

In the existence of market failures, prices may not be a true reflection of the opportunity cost of the good. Policy makers may thus fail to take into consideration all of the costs and benefits of a particular policy option and as a result the best possible outcome may not be achieved, resulting in an inefficient allocation of resources (Shanahan and Ritter, 2012 and Belfield, 2012). The use of CBA is therefore essential in cases of efficient allocation since CBA deals with issues surrounding allocative efficiency which accounts for the overall efficient allocation of resources.

CBA is an appropriate framework to adopt in cases where there are several and contradictory outcomes of a policy option (Shanahan, 2011 and Shanahan and Ritter, 2012). In the case of cannabis policy in particular, both these criteria are applicable which may warrant the use of CBA. The choice between the two policy options (legal verses illegal) does not fit in with the private market framework and there are several and conflicting outcomes among the options such as, the enjoyment derived from the use of cannabis versus the reduction in education attainment as well as health risks associated with using cannabis (Shanahan, 2011 and Shanahan and Ritter, 2012).

The CBA framework and its underlying theory stems from welfare economics and usually addresses normative questions, that is, what should be, as opposed to positive economics, which is generally about predicting outcomes (Smith, 2011; Shanahan, 2011 andBelfield 2012). In the context of CBA, there are two fundamental assumptions, that is, (i) social welfare stems from the welfare or utilities of individuals in society and (ii) individuals are the best judges of their own welfare. The primary objective of welfare economics is to act as a rational, principled framework when making decisions of whether one state is socially desirable compared to another (Shanahan, 2011 and Shanahan and Ritter, 2012). In other words, in welfare economics, the aim is to determine the attractiveness of a specific outcome in terms of an ethical criterion rather than random values quantified by individuals.

3.3 The History of CBA

The year 1808 saw the first recognition of CBA which was recommended by the USA Secretary of the Treasury, Albert Gallatin, when he compared the costs and benefits in assessing water projects (Smith, 2011). The US Army Corps of Engineers and the US federal water agencies were among the first to use CBA methodology, followed by Jules Dupuit, a French engineer, in the 1840's in his work on cost-benefit models. The use of CBA in the US Army Corps was mainly to assist in reaching an agreement to avoid governmental conflict associated with ad-hoc investment allocations (Smith, 2011).

The development of CBA unfolded due to increased research and interest in the field. The US Flood Control Act in 1936 indicated that the costs and benefits associated with water resource projects be evaluated fully, which gave rise to additional research on the subject of CBA. Further, in 1950, the Proposed Practices for Economic Analysis of River Basin Projects known as "the green book" provided a guideline to the CBA procedure which was formulated by a subcommittee of the US Federal Interagency River Basin Committee (Smith, 2011).

Over the past few decades, the research and literature on CBA has advanced greatly and currently CBA is considered to be one of the most relied upon tools in policy evaluation (Smith, 2011 and Shanahan, 2011).

It is important to note that there a two types of CBA that are adopted in both public and private sectors, which are Economic CBA and Financial CBA (Smith, 2011). Economic CBA is more regularly piloted in governmental agencies when assessing the social welfare implications of a proposed plan, whereas Financial CBA is generally used in the private sector and is implemented when determining whether a project is commercially viable or not. The government and international institutions also use Financial CBA when the output of a project is expected to be traded on the market. Financial CBA is arguably the easier component of the process, since the costs and benefits can be measured accurately and monetised by assessing market behaviour and pricing. It should be pointed out that even though a distinction is made between the Economic and Financial CBA, Financial CBA is an essential and integrated component of Economic CBA (Smith, 2011).

An Economic CBA would be the appropriate process for evaluating cannabis policy, since it is a comprehensive methodology that aims to evaluate the monetary costs incurred and the benefits to be derived by individuals. Economic CBA can also be used to assess other proposals such as, environmental effects or any project where the overall societal implications or the social value needs to be accounted for (Smith, 2011 andBelfield 2012).

One major complication in conducting a CBA is when attempting to monetise non-market goods. In the case of cannabis policy for example, the stigma associated with having a criminal record or the benefits derived from the consumption of cannabis could pose estimation challenges (Shanahan and Ritter, 2012). It is for this reason that efficient and accurate estimation techniques are needed, together with a concrete justification for all methods that would be employed (Alder, 2007).

3.4 The Theoretical Foundations of CBA

The underlying theoretical framework of CBA is welfare theory. The reasoning behind this theory is when conducting economic analysis, governments emphasis should be placed on the overall wellbeing of society at large instead on the potential profits that could be derived from a project.

The aim of economic analysis, and hence CBA, is to account for the overall effect of a project. It considers all of the costs and benefits regardless of whether it is present or not in the market (Smith, 2011).

When measuring the welfare of society in the case of distorted market prices, it often results in the use of shadow pricing as a method of evaluation (Smith, 2011 and Belfield 2012). Further, in conducting a CBA, price distortions are accounted for, which is due to discounting and aggregating of all the potential costs and benefits of a particular project.

3.5 Conceptual Foundations of CBA

Some of the terms used to explain the economic foundations of CBA are welfare, wellbeing and utility. The term welfare and wellbeing generally talks to the contentedness, the general health and the happiness of a person or a group of people, whereas utility refers to the relative satisfaction of people (Smith, 2011). Utility is an economic measure which ranks, in arbitrary units, a person's or a group of people's preferences. It is assumed that a person will always choose the bundle of goods under completeness, reflexivity and transitivity so as to maximise their utility (Smith, 2011). Given the definition of welfare, wellbeing and utility, all of these terms can be used to illustrate how a move from one state to another, can affect a person or a group of people as it is effectively a change in their overall happiness.

The fundamental assumption which underpins welfare, wellbeing and utility is that of human preferences, and in the context of CBA, preference is an underlying assumption (Smith, 2011). Understandably, it is believed that in the presence of scarce resources, choices have to be made and the basis of choices ultimately depends on ones preferences. The term preference, for a person, refers to whether a person favours option A over option B, or vice versa (Alder, 2007 and Smith, 2011). In addition, the preference of an individual is believed to be taken for the source of value. In other words, if a person's welfare, wellbeing or utility is greater in one state compared to another, it is equivalent to saying that person will prefer that particular state. In the context of CBA, human preferences are aggregated and act as a representation of "social" preferences, either for or against a specific option (Alder, 2007 and Smith, 2011).

In order to measure preference, the willingness to pay (WTP) and the willingness to accept (WTA) criteria are adopted, which provides a method of monetisation of a person's utility under varying circumstances and situations (Alder, 2007; Smith, 2011 and Belfield 2012). If one was to analyse a change in the environment, from one state to another, the measure for preferences can be adopted based on a person's WTP for a beneficial outcome or WTA to be compensated for an undesirable situation. In the case of a person revealing the monetary sum that they would be willing to pay to avoid an outcome, the use of the WTP criteria will also be appropriate. The WTP and WTA criteria can be used to understand the theories of equivalent and compensating variation as a means to monetise a welfare change, which was introduced in 1943 by John H. Hicks (Smith, 2011).

Aggregation assumes that individual preferences will integrate towards social preferences, and will therefore act as a true representation of changes in welfare (Alder, 2007 and Smith, 2011). The sum of all individual costs will be a representation of the social cost and likewise, the sum of all the individual benefits will characterise the social benefit. The measurement of social preferences originated from the use of the Pareto criterion (Smith, 2011).

3.5.1 Pareto Optimality

The principal concept underlying CBA is that of Pareto efficiency or Pareto Optimality. Under a Pareto optimal outcome, a person is not left better off without making another person worse off from an initial position, to a new alternate position (Alder, 2007; Shanahan and Ritter, 2012). In other words, Pareto optimality refers to a state whereby one person cannot increase their utility without decreasing the utility of another person.

One of the first measures that economists used when measuring welfare effects when analysing an alternative, was that of Pareto unanimity criteria or the compensation principle. In 1896, Vilfredo Pareto presented a welfare criterion which was known as Pareto optimality or Pareto efficiency. Further, it was shown that the achievement of a Pareto improvement in an economy could occur in a situation where one person could be made better off, without making another worse off through a reallocation of resources (Alder, 2007) which is commonly referred to as a Pareto superior outcome (Shanahan, 2011).

In light of this, a policy change, for example, the legalisation of cannabis from its alternate illegal policy, will not yield a Pareto optimal outcome if one policy option results in a great number of people benefitting (from the freedom to consume cannabis), while a handful of individuals are made worse off (such as children reducing their educational attainment level as a result of being exposed to cannabis from a young age).

However, the Pareto unanimity criterion was not very useful in most instances (Alder, 2007 and Shanahan, 2011). Pareto unanimity was conditional on very unlikely circumstances and the reality of a Pareto criterion made it challenging for a project to be accepted based on the Pareto improvement concept. In the case of a policy change, it would be almost impossible to introduce an alternate policy which is in keeping with the basic Pareto criterion (Shanahan, 2011).

As welfare economics developed, the introduction of the Potential Pareto criterion or the Kaldor-Hicks criterion came into being, which supported a more practical application, as compared to the basic Pareto criterion (Shanahan, 2011).

The assumption that utility could be directly comparable across individuals posed problems with the basic Pareto criterion. In 1939, Kaldor established that by assessing the aggregate real income (or aggregate real gain) and accepting projects in cases where aggregate real income increased, then the problem of individual comparisons could be avoided (Shanahan, 2011 and Shanahan and Ritter, 2012). Kaldor stated that in an instance where the monetary gains exceeded the monetary losses, it would mean that a desirable outcome is achieved. Hicks then recognised Kaldor's findings which resulted in the Kaldor-Hicks criterion or the Potential Pareto criterion, which was also referred to as the compensation principle (Shanahan, 2011). According to this criterion, it is believed that if a person benefitted from a change in welfare, and if that person could potentially compensate those individuals who are worse off, then there is an overall increase in wellbeing and that an overall improvement in welfare would be achieved (Alder, 2007; Shanahan, 2011 and Shanahan and Ritter, 2012).

The fact of compensation occurring in actuality was irrelevant; instead, what mattered was to determine a hypothetical case of whether the winners could compensate the losers (Alder, 2007; Shanahan, 2011). The Kaldor-Hicks criterion did not stipulate that there would be a "real" reallocation of resources. A test, referred to as the potential compensation test (PCT), was used and if the project passed the PCT, then it would be considered as being an allocative efficient outcome (Shanahan, 2011). In other words, the PCT test aimed to identify if the potential winners would be able to offer sufficient income to the potential losers, so that the losers would be as well off as they were in their initial state.

The important rule for economists when deciding on a policy option, was thus that if a policy led to an increase in aggregate real income or benefits, then the issue of the comparability of people's utility was insignificant since in almost all instances of a change, some people are better off together with others being worse off (Shanahan, 2011 and Shanahan and Ritter, 2012).

Given that social welfare is made up of an aggregation of individuals' utility in society, restrictive policies imply that a person lacks the choice of consuming cannabis, suggesting that welfare is compromised as compared to the alternate policy, which allows for freedom of choice (Shanahan and Ritter, 2012). The current policy of prohibition should only be favoured over the legalised option if the social benefits (i.e. reduced costs due to lower cannabis use) of prohibition more than compensate for the welfare lost by individuals being restricted from choice.

Or with reference to the legalised policy, if those who gain from legalisation (such as being able to consume cannabis) could more than compensate those who lose (such as children's decrease in educational attainment as a result of being exposed to cannabis), then legalisation would be favoured and would be considered an allocatively efficient outcome.

The drawback of the Kaldor-Hicks criterion is that there is lack of consideration of who benefits and who loses, and this notion becomes ethically challenging as the gains could accrue to the wealthy at the expense of the poor, or the young at the expense of the old. Kaldor argued though that the issue surrounding equity was beyond the scope of CBA and that the primary objective of CBA is to achieve efficiency, leaving politicians to deal with the equity portion (Shanahan, 2011 and Belfield 2012).

3.6 The Primary Goal of CBA

3.6.1 The Decision Rule of a CBA

The main aim of CBA is to detect the projects, interventions or policies which have the highest net social benefit (NSB) (Smith, 2011 and Shanahan, 2011). The NSB is defined as the sum of all benefits minus the sum of all the cost and is represented mathematically as:

Given i = 1… I possible investments, over t time periods

$$NSB_i = \sum_{t=1}^{n} \frac{b_i(t) - c_i(t)}{(1+r)^{t-1}}$$

where:

$b_i(t)$ = benefits in money terms derived in year t

$c_i(t)$ costs in money terms in year t

$1/(1+r)$ = discount factor at annual interest rate r

n = lifetime of project

After calculating the NSB, the interventions that have a greater than zero NSB are ranked from lowest to highest and the intervention with the highest NSB will be the preferred option.

The benefit-cost ratio (BCR) is another commonly used rule in choosing a policy or intervention, whereby the BCR is merely the present value of all the benefits divided by the present value of all the costs. The rule applied when using the BCR, is that in order for an intervention to be accepted, the BCR must be greater than one. When in a position of either accepting or rejecting an intervention, the BCR may prove sufficient however, when choosing between mutually exclusive alternatives, the BCR and the NSB may yield different results (Shanahan, 2011).

The BCR is also extremely sensitive to how costs are specified. For example, if the (dis)benefits are included to the costs or added in the benefits, it may yield very different recommendations (Shanahan, 2011 andShanahan and Ritter, 2012). Therefore, it is suggested that the NSB rule be used as it avoids the issue of making arbitrary decisions, especially in the case of mutually exclusive alternatives like that of cannabis policies. On the cost side of the equation, the opportunity costs of resources are included and on the benefit side, items that are utility-bearing change (either positive or negative) are included (Shanahan, 2011 andShanahan and Ritter, 2012).

3.7 The General Steps and Procedures in a CBA

The CBA process has several steps of which the number, order and the way in which these steps are carried out, are not consistently agreed upon. Some writers combine the various stages and each of them place different degrees of importance on each step (Smith, 2011). This literature review will follow steps used by Shanahan (2011) and will set out the CBA procedure into nine steps under the following headings:

a. Clarifying the question of interest and the context

b. Clarifying the policy options including the base line comparator

c. Clarifying the scope and objectives of the study including identifying the constraints or boundaries of the CBA i.e. identifying requirements of the CBA

d. Identifying possible welfare impacts (costs and benefits)

e. Setting out the assumptions

f. Quantifying and valuing the costs and benefits

g. Discounting future values to obtain present values

h. Testing for uncertainty and risk

i. Calculating the net present value and interpreting the findings

An explanation of the general steps in the CBA procedure will follow below.

a. Clarifying the question of interest and the context

The first step of the CBA procedure is that of identifying and defining the potential alternatives as precisely as possible (Smith, 2011). The task of defining the alternatives or project in question may seem obvious as a prerequisite but its importance and its role in the procedure could not be emphasized enough. It is imperative that this step is investigated and researched thoroughly. A CBA can be conducted prior to a potential project in order to determine the worthiness of the project or it could be used after the implementation of a project in order to assess the usefulness and efficacy of a completed project (Belfield ,2012).

According to the World Health Organization (WHO) (2006), there should be a well-defined question modelled in an answerable from (i.e. clearly stating the hypothesis that will be tested). The policy question as a whole is, which alternative (i.e. prohibit based policy verses a regulated legalised policy) will derive a greater net social benefit. The economic importance of the question also needs to be stated and this has been set out in Chapter One.

Another important aspect is to clearly define who and what will be involved in the analysis (WHO, 2006). In the case of a shift to a legalised regulated policy, it will include the cannabis consumer, the grower, the distributor, the retailer and government. It will also include the wider society (given the tax) and productivity losses, the family members of consumers and other people affected by drug-related accidents and crimes.

The form of the evaluation that will be adopted for example, CBA or another approach like cost–minimization analysis (CMA), must be clearly stated and justified (WHO, 2006). The evaluation method which this study focuses on is CBA and the justification for using it to evaluated cannabis policies is presented in the section (3.8) below.

The role of the policy analyst is to ask the right questions in order to determine the framework for the span of the analysis. To do this, the analyst is required to identify the feasibility of alternatives in the context of the policy or project in question, which leads to the next step in the CBA procedure.

b. Clarifying the policy options including the base line comparator

In this step, the analyst is required to identify if there exists a variety of policy options or if only one potential project is being considered. Once the policies that will be compared have been chosen, it is vital to provide a full description of each technologically viable solution and its implementation (WHO, 2006). In order to assess the relevance and commonality of the results of the economic analysis under differing settings, implementers, policy-makers and researchers require knowledge of the intervention or project design. All of the relevant alternatives must be incorporated and the no-action choices should not be disregarded. This will enable decision makers to adjust the policy to incorporate it to different conditions (WHO, 2006).

In order to allow the reader the opportunity to assess the relevance of a particular policy in a different context, the alternative interventions should be described in sufficient detail (WHO, 2006). Factors that the analyst should look at are the affordability, the technological appropriateness and the social acceptability of alternatives. Ideally, the policy analyst should compare feasibility policies that have an implementation timeframe of between five and ten years. In addition, the analysis should take into account the costs and benefits of the policies whilst placing it in context, so as to assist in specific decision making (WHO, 2006).

A comprehensive description of the competing alternatives was set out in Chapter Two. This dissertation aims to evaluate cannabis policies from a recreational perspective. The competing policies in this regard are that of the strictly prohibited, the decriminalised and the regulated legalised option. The strictly prohibited verses the regulated legalised option was chosen for analysis and the justification for it was presented in Chapter Two section (2.5). In terms of the policy context, the geographical area of South Africa was selected, as this is an area where cannabis is currently illegal.

c. Clarifying the scope and objectives of the study including identifying the constraints or boundaries of the CBA.

The basis of an economic evaluation study which measures the efficiency of an option is to be in a position to provide evidence of the effectiveness of the chosen options. If, for instance, a new option is not effective or beneficial in any way, there is no real point in conducting an efficiency assessment of that particular option (WHO, 2006 and Shanahan, 2011).

In the case of a new option having the same effectiveness as the current option, then a cost-comparison of the project may prove worthwhile in order to determine if the new option is more or less costly, and in the event of it being less costly, will substantiate an economic evaluation (WHO, 2006).

Once the chosen options and level of effectiveness are established, the next thing would be to define the boundaries of the analysis. There could be various resource inputs as well as a broad-spectrum of consequences; it all depends on the nature of the project on hand. It should be noted that the size and nature of the projects consequences can change over time since there may be secondary effects associated with the projects immediate effects. It is therefore essential to identify at the beginning of an economic analysis what the potential inputs are and to determine the potential consequences, which of them should be measured, who these fall on and what is the time period (WHO, 2006 and Shanahan, 2011). In deciding which costs and benefits to include, it is important to account for the fact that no bias should come into play. The boundaries should take into account the research question as well as the nature of the options. It should be acknowledged that there are cost implications associated with conducting the analysis with different boundaries.

The effectiveness of the policy alternatives were established in Chapter One, whereby the economic problem had been set out. For example, supporters of a legalised framework argue that massive costs saving could accrue to the government through a reduction in criminal justice costs (Bates, 2004; Miron, 2005; Shepard and Blackley, 2007 and Reuter et al., 2010) and these freed up resources could be redeployed to fight other, more serious crimes. Also great revenues can be derived through the sale and taxation of cannabis (Miron, 2005; Miron, 2010 and Shanahan, 2011) which could be used to provide education and awareness of the dangers of consumption as well as in other concerning policy domains.

According to Shanahan (2011), some of the key constraints involved in a full blown CBA includes, the potential continental and international political consequences of adopting a legalised framework. Also the impacts related to the remaining illegal activities such as importation and exportation of cannabis would have a significant effect on the final outcome of a CBA. Another major constraint is the potential impact of other substances such as tobacco, alcohol and other drugs, and the extent to which these substances complement cannabis.

d. Identifying possible welfare impacts (costs and benefits)

The process of computing the flows of the costs and benefits involved in a project occurs in the physical quantification of impacts (Smith, 2011 and Shanahan, 2011). One of the main objectives of this process is identifying when and over what timeframe specific impacts will occur. In the instance of policy analysis, for example, it may be necessary to carry out a Regulatory Impact Analysis (RIA) - which is a method of systematically identifying and assessing the expected effects of a suggested regulation, with the aim of identifying who will be affected and in what way (OECD, 2008). In the case of being unable to assess impacts directly, proxies and other techniques and tools can be adopted in order to derive estimates. The other option will be to qualitatively measure those impacts and implement a ranking system, which will rank the impacts according to their order of importance.

According tothe WHO (2006), all the important and relevant costs and consequences for each alternative must be identified. And in order to include only the most relevant impacts in an analysis, a presentation of a full range of all the costs and consequences should be provided. The aim of Chapter Four and Chapter Five is to present a wide range of costs and benefits associated with a prohibited-based policy and legalised regulated option respectively.

e. Setting out the assumptions

Once the analyst has identified the items that need to be measured, the measurement process should be stipulated with the aim of appropriately capturing the resource inputs and consequences thereof (WHO, 2006). The assumptions made here should be clearly stated and may be subject to later sensitivity analysis (WHO, 2006; Shanahan, 2011). For example, analysing the effect of legalisation will entail making assumptions about the demand response, the future health-related consequences, the effects on human capital accumulation and drug-related accidents.

The importance of this step forms the foundation for the valuations that will be calculated later on in the procedure. In addition, the representation of the results in terms of physical units, allows for a recalculation which incorporates different input combinations and prices that may be present in other contexts.

The principal outcome measure should be clearly defined for the economic evaluation, for example, the willingness to pay as a measure to avoid stigma or highest grade passed as a proxy for educational attainment. In addition, the intervention impacts and the economic consequences should be measured in physical units, as this is used in the valuation in monetary terms.

Further, the methods that were used in estimating the quantities of unit costs should be provided (WHO, 2006). For example, in estimating the cost of policing, one can approximate the average number of hours of police time that is required for all cannabis related activities and then multiply that figure by the average cost of an hour of police time.

f. Quantifying and valuing the costs and benefits

One of the most significant steps of the CBA procedure is that of effective and accurate monetary valuation (Smith, 2011). This step involves quantifying the impacts into a common unit of measurement, in a policy case; it can be in money terms. There are various complications associated in assigning monetary values to impacts, which include correcting for distortions in market prices, estimation of effects in the absence of prices and predicting the value of flows which extend into the future. The use of opportunity costs, to determine the resource implications of alternatives, provides some assurance that the resource implications of non-marketable goods are practicable included (Shanahan, 2011).

In order for the costs and consequences to be valued correctly, the methods used in estimating the unit costs must be provided the exchange rate and prices of the goods and services that were applicable and used at the time of valuation must be recorded, the details of any inflation or currency conversion adjustments must be given and the method used in the valuation of the consequences as well as the subjects for whom the valuations were made must be made available (as mentioned above) (WHO, 2006).

The resources that are affected or used by an intervention must be valued in order to account for the overall economic impact of that intervention (WHO, 2006). For example, under legalisation, there would be direct costs associated with the production of cannabis as well as the regulation costs such as the enforcement of cannabis quality standards, age restrictions and restrictions on the places cannabis may be consumed. It is for this reason that the justification of the sources that were used for the economic valuation must be provided. An example of sources used in the quantification of regulations may include the cost associated with tobacco control as a proxy, given that tobacco and cannabis are likely to follow similar regulation activities.

g. Discounting future values to obtain present values

In order to reflect the value that society places on resources over time, the future costs and impacts should be adjusted (Shanahan, 2011). The term "time preference" means a unit of currency today is worth more now than in the future, owing to the existence of interest rates.

In some cases, the time preference can relate to the fact that some individuals will prefer to consume now compared to in the future (known as the "pure rate of time preferences"), while others may prefer having a higher level of real income now, given that their nominal value of money will decline over time. Another case is that some individuals may prefer consumption today because of the chances of death or the technological advances which may make goods obsolete in the future. It is for these reasons that the future costs and benefits need be discounted to the present, by an appropriate discount rate, a rate which is a true reflection of society's time preference (WHO, 2006).

To answer the question, whether costs and impacts are adjusted for differential timing, the time period over which the costs and benefits are considered, the discount rates and the choice of rates should be reported and justified where appropriate (WHO, 2006).

h. Testing for uncertainty and risk

There are a limited number of interventions that policy-makers can finance and they rarely have the opportunity to reallocate the sector budgets (WHO, 2006). Generally, the costs and impacts of new interventions are hypothetical in nature and what's more, is that there exists a great deal of measurement error in assessing the costs and impacts of an intervention (WHO, 2006). Both these problems create a lot of uncertainty in CBA. Examples of uncertainties which may affect the CBA outcomes of a legalised regulated market include the demand responses, as this will directly impact the magnitude of certain costs and benefits. This is discussed in section (5.2). There are also uncertainties with regards to what portion of internal costs should be excluded from the CBA. This is because of the assumptions of full information, rational decision makers and developed decision making abilities, which underpin the exclusion of internal costs. This is discussed in section (4.2). There are further uncertainties involving the long term consequences of cannabis consumption. Statistical methods are used to infer relationships about cannabis consumption and various illnesses, given that it is unethical and infeasible to conduct controlled trials whereby humans are observed for the long term effects of cannabis. This creates problems of endogeneity bias which creates uncertainties relating to the impact of these illnesses in a CBA and is discussed in section (5.7).

It is for this reason that an "incremental cost-benefit ratio" (benefit-cost ratio) should be presented (WHO, 2006). This ratio illustrates a comparison of the costs and impacts of the current interventions against the costs and impacts of the proposed, alternative interventions (as discussed above). This ratio provides policy-makers with an indication of whether to increase or decrease the budgets.

According to the WHO (2006), the incremental analysis should be reported whereby comparisons of the relevant alternatives are shown. The details of the models used in a study and the approach of any sensitivity analysis should also be provided.

It is therefore imperative to identify the types and levels of uncertainty, as well as determine the influential variables in order to conduct an uncertainty analysis. This would normally involve the presentation of the results of a CBA under alternative data inputs for included variables, as well as choice of varying boundaries (such as the inclusion or exclusion of variables) (WHO, 2006).

i. Calculating the net present value and interpreting the findings.

The net present value of an investment can be described as the present value of all future values from net benefits (after deducting costs). Benefits are predicted to integrate over time which will extend into years pass the start date. Therefore, in order for all the impacts to be measured in a common "unit", the costs and benefits that will occur sometime in the future will need to be discounted. Simply, the net present value process permits the appraiser to calculate the present value of an intervention or policy option, which will include all of its associated future costs and benefits by discounting the costs and benefits from the time period in which they occur (WHO, 2006).

When calculating the net present value of an intervention, the present or discounted value the costs are subtracted from the present or discounted value of the benefits.

The general rule to apply when using the net present value assessments is to accept a project when the net present value is greater than zero. When choosing between alternate projects, the one with the highest net present value should be the accepted one. This step addresses the concluding question of, did the study include all the issues of concern. The answer to the original research question should be provided together with important conclusions that were drawn from the data and the appropriate qualifications or reservations highlighted. Vital outcomes should be presented in an aggregated, as well as in a disaggregated form. In addition, the prices (unit costs) of the resources should be reported separately from the quantities of the resources. Lastly, in order to allow for the interpretation of the results in the correct context, and to permit for generalisation to other contexts, accompanying data should be provided to the decision maker (WHO, 2006).

It is imperative that the results obtained are presented and interpreted accurately in order for it to be useful in CBA. The summary measures of the costs and impacts, their accompanied qualifications and the confidence ranges on the benefit-cost ratios, are also generally requested by decision makers, in order for them to appropriately interpret the results presented. Policy-makers also need to be assured and ascertain that the analysis has been conducted objectively and with minimal bias or risk of misleading conclusions (WHO, 2006).

3.8 Rationale for using CBA

This section justifies the use of CBA to evaluate welfare changes, and considers some critiques of the CBA methodology. The section also aims to state the alternate methods of evaluating policy options and specifies the rationale for choosing the CBA framework with regards to cannabis policy.

Questions that come up quite often in policy evaluation are, what does a good regulation look like and how can we tell a good regulation when we see one? Some postulate that CBA is a very useful tool that can be used to separate the good from the bad and effectively separates the socially useful from the wasteful policies, which can be tied back to the Coasean argument that efficient laws are those that bring about adjustments (to externalities) at lowest cost (OECD, 2008).

However, for decades, there have been fierce debates surrounding the theoretical foundations of CBA in academic literature. Opponents of CBA have identified major flaws in the theoretical justification of CBA but it was the likes of Eric Posner and Matthew Adler who thoroughly worked, in a series of law reviews, on the particulars for its defence (Shanahan, 2011).

The general defence put forward by supporters of CBA under economic theory was that it provides a direct measure of efficiency (Shanahan, 2011). The reason for this is that an intervention that meets the requirements of a CBA is considered efficient in the view of economics, when it maximises the overall welfare of society.

In a general manner, CBA can be seen to offer a neat mathematical equation as a means of dealing with messy social issues. Even though there is much support for CBA, it is often and currently still criticized, for example, the inadequacy of willingness to pay as a measure of value (Sienden et al., 2006). Critiques also argue that estimates will likely be inaccurate (given imperfect information and wealth effects as defences). It is also believed that there is massive cost involved in undertaking such analysis (Sienden et al., 2006).

According to Adler and Posner (2006) as cited by Sienden et al. (2006), the focus is on decoupling CBA from overall welfare. Instead of arguing that CBA measures overall welfare directly, they postulate that even in theory, the fit between CBA and the overall welfare, merely serves as a rough approximation. Even still, they believe the rough estimates act as a sufficient proxy for policy decision makers (Sienden et al., 2006).

Adler and Posner's argument is broken down into two parts. The first part involves convincing the reader that focus should be on overall welfare. They simply stated that concentrating on overall welfare is a more morally relevant criterion compared to others (Siendenet al., 2006).

The second part of their argument states that, although CBA does not provide a direct measure of overall welfare, it acts as a close enough proxy to make it useful. Adler and Posner also highlight a significant difference between a moral criterion and a decision procedure. They state that in the case of a moral criterion, it identifies the features of an outcome which makes it morally better or worse than its counterparts, while a decision procedure is regarded as a technique used for making choices. By these explanations, Adler and Posner identify overall welfare as a moral criterion and stated that CBA is simply a decision procedure. However, given that a decision procedure tracks the moral criterion of overall welfare quite well, Adler and Posner conclude that CBA is a decent decision procedure which is "morally justified" (Siendenet al., 2006).

With regards to some of the critiques such as the welfare effect, Adler and Posner (2009) suggested that it could be solved by adjusting the preferences of the rich and poor through the use of distributive weights. They also recognise that CBA can be expensive but defended this by maintaining that direct implementation of interventions would be much more expensive and impractical (Adler and Posner, 2009).

3.8.1 Alternatives to CBA Evaluation

Generally, when the intervention or setting of the intervention is complex in nature, the evaluation becomes problematic (Shanahan and Ritter, 2012). There are a number of evaluation techniques available when undertaking a policy change which may impact government regulation, health, education and personal preferences. Since the underlying objective is to assess relatively, the social costs and benefits of two cannabis policies, the methodology considered must allow for combining the probable benefits across various sectors (Shanahan and Ritter, 2012).

According to Adler and Posner (2006) as cited by Shanahan (2011), there are four types of methods that can be used for policy analysis which include, non-welfare focussed, welfare narrowly focussed, welfare widely focussed and a hybrid methodology.

The non-welfare focussed evaluation method does not take into account the assessment of societal costs and benefits. One assessment method under the first category is that of financial evaluation which aim is to determine the net financial benefit or loss to an agent instead of the net financial benefit or loss to society (Australia DFA, 2006: 27-29). Financial evaluations are concerned with the cash inflows and outflows of an agent of which we are interested in the net cash flow.

Financial analysis is useful when markets are competitive and when most of the costs and benefits are reflected in market prices. It also becomes important when governments have financial objectives or responsibilities to uphold or when a pure financial decision is to be made (such as a comparison of various procurement methods) (Australia DFA, 2006).

Under a financial evaluation, external costs and benefits are not taken into account. The main difference between a financial and cost/benefit analysis is that while the financial analysis objective is to analyse the net financial impact of a proposal on the agent, the CBA aims to maximise the social returns to the economy's resources (Australia DFA, 2006). The financial analysis looks at market prices, includes transfer payments, and excludes income distribution effects and externalities. Whereas the CBA looks at opportunity costs, includes externalities, excludes transfer payments, and notes income and distribution effects (but does not incorporate it into the analysis).

Although financial analysis assesses the return on particular projects, it does not evaluate the wider societal impacts, and thus fails to meet the objective of evaluating a policy change.

Another method under the first category is that of feasibility analysis, which determines whether a project could be undertaken with available resources (Shanahan, 2011). This method also does not meet the objective of evaluating a policy change which will bring wide-ranging impacts as in the case of marijuana legislation.

The second category of methods is the welfare narrowly focussed, whereby "narrow" represents the choice of an outcome measure. In this evaluation methodology, the focus is on a small cluster of measures of wellbeing, while all other outcomes are disregarded. If one was to consider for example three projects, one of which the outcome is a gain in the quality of life, another life-years saved and the third being educational attainment, even though all are relevant when looking at social welfare, the narrow focus or when looked at individually, fails the objective of a societal approach for a policy option that extends across multiple sectors (criminal justice, health and education). While these individual studies outcomes may be a component of what is considered in analysing societal welfare, the fact that they might not have a common factor does not allow for then to be summed together and therefore would not be applicable in dealing with cannabis policy.

The welfare widely focussed approach is the method of evaluation under which CBA is categorised, as with equilibrium analysis. However, equilibrium analysis is used in cases that deal with macroeconomic issues like the designing of a tax system, which is not of particular use in addressing the cannabis policy options that this paper aims to evaluate. Likewise, CBA will not be useful when evaluating macroeconomic issues.

The last category reflects a choice between CBA, cost effectiveness analysis (CEA) and cost-utility analysis.

The CEA method measures benefits in terms of effectiveness (physical units) instead of monetary terms such as measuring the cost per child educated or life saved (Australia DFA, 2006: 30).   It becomes particularly valuable when it is difficult to quantify benefits in monetary terms. The costs however, are expressed in monetary terms. The cost-effectiveness of a project can therefore be measured by calculating the cost-effectiveness ratio which is given by:

$$CE = \frac{C}{E}$$

where CE refers to the cost-effectiveness, C is the cost measured in currency and E is effectiveness which is measured in physical units.

In the case of determining if a new project is preferred to the current project, an incremental cost-effectiveness ratio (ICER) can be used. The ICER is given by:

$$ICER = \frac{C_n - C_c}{E_n - E_c}$$

where ICER is the incremental cost-effectiveness ratio, C_n and E_n are the cost and effectiveness of the new project and C_c and E_c are the cost and effectiveness of the current project respectively. In interpreting the ICER, the higher the ratio, the lower is the cost-effectiveness and thereafter, the alternative projects can be ranked according to the level of cost-effectiveness.

CEA is differs from CBA in a variety of respects. Under CEA, benefits are not expressed in monetary terms and it therefore does not provide an absolute measure of the benefit to society or to the economy (Australia DFA, 2006). Further, the various alternatives or options need to be similar in order to be evaluated. CEA is only useful when measuring a single natural outcome (for example, life-years saved) and is therefore not appropriate when there are many cost and benefits as in the case of cannabis policy.

Cost-utility analysis on the other hand takes into account the wider cost and benefits; however, it only accounts for health-related productivity changes, which is not suitable in a policy analysis that involves multiple sectors.

Therefore, CBA was chosen as the method of evaluation on the basis that it accounts for a broader set of events or outcomes across multiple sectors and aims to maximise the social returns on an economy's resources (Australia DFA, 2006; Shanahan, 2011 and Shanahan and Ritter, 2012). The broader outcomes of a cannabis policy change include effects on the range of economic and social costs linked to cannabis consumption (e.g. psychosis, cannabis use disorder, mortality and morbidity, poor educational attainment and stigma), and external impacts (positive or negative) across multiple sectors such as health, education and the criminal justice system.

3.9 Summary

This chapter showed how CBA is an appropriate theoretical framework that can be use when evaluating policy alternatives. The broad aim of CBA is to determine which alternative to choose with the objective of maximising social welfare.

In the existence of market failures, prices may not be a true reflection of the opportunity cost of the good which may result in an inefficient allocation of resources. The use of CBA is therefore essential in cases of efficient allocation since CBA deals with issues surrounding allocative efficiency which accounts for the overall efficient allocation of resources. The principal concept underlying CBA is that of Pareto Optimality which refers to a state whereby one person cannot increase their utility without decreasing the utility of another person. The main aim of CBA is to detect the projects, interventions or policies which have the highest net social benefit.

The chapter also provided a history of the use of CBA and it was discovered that CBA was first used by the US in the year 1808 in order to compared costs and benefits when assessing water projects. The CBA steps and procedures were also explained and were set out into nine steps.

The rationale for using CBA when evaluating cannabis policies was also provided and the justification was that CBA accounts for a broader set of events or outcomes (i.e. cannabis consumption, psychosis, educational attainment etc.) across multiple sectors such as health, education and the criminal justice system.

CHAPTER FOUR

THE COSTS OF A PROHIBITION POLICY OPTION

4.1 Introduction

In Chapter Three an analysis of the CBA theory and framework was presented. The chapter also presented different methods for evaluating alternatives together with the rationale for using CBA to compare cannabis policy alternatives. The aim of Chapter Four is to provide a basis for comparing the two policy options which is that of the existing prohibition based policy and the alternative of a legal and regulated option. Prohibition policy is thought to be necessary, mainly because of the social costs that are imposed by drug use such drug-related accidental harms and crimes and also because of the unintended person costs imposed.

This chapter begins the process by identifying the costs associated with a prohibited policy while Chapter Five deals with the legalised regulated option. The identification of the probable welfare effects is the fourth step of the CBA procedure which had been identified in the previous chapter. The chapter also aims to explore the research question of whose preferences should be taken into account as well as what costs and benefits should form part of the CBA calculation.

4.2 Internal and External Costs

The effects of a shift into a regulated market can be split into internal and external costs and benefits which are experienced by drug users and society at large (Bryan et al., 2011: 51). The reason for this difference stems from the microeconomic view of rational consumption behaviour. The assumption of rational consumption behaviour suggests that a balance would be found by the drug user in terms of the enjoyment and the associated costs of drug use, given that the drug user has full information and is fully capable of making rational decisions. However, a drug user who acts in his/her own interest will not account for the costs that are imposed upon others as a result of their drug use (Bryan et al., 2011).

So in order to correctly account for the effects on social welfare a distinction needs to be made between internal and external costs of drug use. An internal consequence is borne by the drug user himself/herself and some examples include the enjoyment derived from consumption as well as any adverse effects on wellbeing and health which streams from their drug use.

On the other hand, external consequences are those that impact others such drug-related crime, distress caused to family members, medical treatment costs as well as drug-related accidental harm to others. These external consequences impact others who have no say in the decision making process of cannabis consumption and therefore need to be accounted for in a CBA.

Since the revealed preference assumption assumes that the drug user makes a rational decision with respect to their drug use, all internal costs should be excluded from the cost-benefit calculation (Bryan et al., 2011: 52). However, it should be noted that this statement is underpinned by strong assumptions of perfect information, rational behaviour and developed decision-making abilities, which creates a level of uncertainty with respect to the calculation (Bretteville-Jensen, 2006b and Bryan et al., 2011). It is worth exploring the implications of departures from these assumptions briefly here before proceeding to identify costs and benefits.

Imperfect information

The revealed preference argument relies on two assumptions which are that the drug user is fully informed of all the risks associated with consumption, and that the drug user can modify their consumption accordingly, since the negative consequences of consumption are realised quickly and are easily reversible (Bryan et al., 2011: 52). However, it should be noted that the latter assumption is not particularly applicable to cannabis consumption, since the long term effects of say cardio-vascular illness and psychotic illnesses are unlikely to prevail quickly and are also unlikely to be reversible (Bryan et al., 2011 and Bretteville-Jensen, 2006b). Therefore, users' access to full, accurate health information is a critical requirement of the decision not to account for the internal harm from a CBA perspective.

Failures of 'rationality' (i.e. the decisions that would conflict with consumers 'true' evaluation of welfare)

It is expected that a rational person will account for the consequences of their drug use in terms of quality of life, their future income streams and the their overall life expectancy (Bretteville-Jensen, 2006b: 503). However, the view of rationality which underlies the revealed preference principle is challenged by behavioural economics (Bryan et al., 2011:

52). There are two issues regarding choices about risky (drug) consumption which include time and risks. Time is an issue because the consequences are revealed far into the future, and risk because the adverse consequences are not perfectly predictable.

With regards to time, neoclassical economic models assume consistent intertemporal discounting to account for situations where consumption consequences are distributed over time, and emphasises expected utility to account for unpredictable outcomes (Bryan et al., 2011). However, empirical evidence has challenged both of these assumptions. Hyperbolic discounting has been accepted against consistent time-discounting given that consumers make choices today which they do not see themselves doing in the future or they make decisions today without taking the future consequences in to account (Bryan et al., 2011; Bretteville-Jensen, 2006b). This behaviour is referred to as myopic (Bretteville-Jensen, 2006b) and was found in drug dependent individuals (Bryan et al., 2011).

The risk aspect is also problematic. There are risks and consequences associated with cannabis use such as criminal penalties and long term illnesses. According to Bryan et al. (2011), there exists experimental evidence of an overreaction to small risks which leads to the increasing acceptability of alternate theories of risky decision making, such as prospect theory.

The temporally inconsistent decision-making and overreaction to small risks work in opposite directions. The temporally inconsistent decision-making may lead people to consume drugs irrespective of the regret they may have in the future, whereas overreaction to small risks may act as a barrier to drug use (Bryan et al., 2011).

Undeveloped or impaired decision-making

The ability to make decisions may differ from person to person, specifically among people of different age groups. These abilities depend heavily on learning from experiences, observing the experience of others and particularly, on the cognitive skills of an individual (Bryan et al., 2011: 52-53). Young people for example may not have fully developed decision-making abilities and this is a group where prevalence of cannabis use is very high. Also there are the people who suffer from mental illnesses where again decision-making abilities are impaired, and according to Bryan et al. (2011), this is also a group where prevalence of use is relatively high. There are therefore specific concerns with regards to not accounting for at least a portion of internal costs which accrue to mentally impaired individuals as well as the young, where informed decision making may not always prevail.

4.3 Social Costs and Transfers

One of the main arguments proponents of a legalised framework put forward is that of tax revenues that can be generated from the sale of cannabis. For example, the Miron (2005) report, (which had been endorsed by over five hundred distinguished economist), estimates tax revenues in the US, of over six billion dollars per year given the tax rates are set close to that of tobacco and alcohol. While this estimate may arguably be accurate, the actual treatment of indirect tax revenues in a CBA framework should be ignored (Bryan et al., 2011 and Shanahan, 2011). This is because tax revenue generated for the government is not a net social benefit as it is merely a transfer of resources from cannabis users to the government. This is a loss to the taxpayer and it should therefore not be included in the measures of a net social benefit.

However, Shanahan, (2011) also argues that a transfer of revenues from illegal dealers to the government (in a legal framework) is a gain to society, but only a proportion of this is a net gain. This is because at least some portion of the revenues generated by dealers would have been used to fund their living expenses (which results in at least some portion of transfers to government from dealers and consequently a net gain). Therefore she argues that not all revenue transfers to government from deals in a legal market should be included as net gain but it is justifiable to consider at least a portion as part of the social benefit calculation.

The distinction between transfers of resources between individuals in society, and a change in total resources that is generated by society, is easily confused. Another good example to illustrate this point can be made by looking at drug-related acquisitive crimes. If we analyse a "pure" theft, it is simply a transfer from the legal owner to the new illegal owner and therefore one should also account for the thief's benefit. Although this may be regarded as being morally incorrect, there is strictly no loss to society. In reality however, thefts are never "pure" in that the victim of the crime will always incur other additional costs such as psychological distress and property damage. Generally though, the theft of property is treated and viewed as a total loss to society which is not defensible unless moral weights can be placed on measuring social welfare (Bryan et al., 2011: 52-54).

There is, however, an exception to the exclusion of transfers and that refers to the treatment of taxes and social benefits related to earnings. In the case of a policy change which alters an individual's earnings (such as imprisonment), the offender will experience a loss of the post-tax portion of earnings which is an internal cost (as discussed above) and therefore should be excluded in estimating the social cost. However, since society loses a portion of output that the individual would have produced and delivered in the form of taxes, this external cost will have to be included as part of the social cost (Bryan et al., 2011).

4.4 Cost of a Prohibition Policy Option

4.4.1 Enforcement costs

A key argument of supporters of a legalised framework is the resources that would be saved by the criminal justice system no longer having to enforce laws (Bates, 2004; Shepard and Blackley, 2007 and Bryan et al., 2011). Enforcement costs can be separated into three main phases which are policing costs, court procedure costs and costs associated with the implementation of sentences imposed by the courts.

In the case where police action is required, for example cannabis use offences and even in cases where warnings are issued, there will be unit costs associated with such policing. In addition, the supply side offences (such as the dealers of cannabis) also need to be taken into account. However, it is important to note that the marginal cost of cannabis dealing could prove challenging, given that drug dealers are often part of gangs whose predominant focus is on other drugs, such as cocaine and heroin (Shanahan, 2011: 81-84).

Enforcement costs are generally calculated using one of two methods. The first method involves using aggregate costs of policing drugs offences for a given financial year, also known as macro costing (Shanahan, 2011). The aggregate figure which is derived during the estimation of policing costs (which results from drug offences) is then divided by the total number of drug offences recorded, which yields an average cost per offence. This average cost could then be multiplied by the number of offences to get the total expenditure related to cannabis policing.

It is important to note that some cannabis related arrests could have been made while investigating other offences and therefore the total should not be attributed to cannabis alone. Estimates also need to account for what is referred to as the seniority effect, which is more serious crimes require more senior police officers which will therefore increase the unit cost (Bryan et al., 2011: 62-67).

However, adjustments can be made to account for these effects by either excluding a portion of offences and by weighting the denominator according to the expected intensity of offences (Shanahan, 2011).

Another method of estimating policing costs is taking an approximation of the average number of hours of police time that is required for a police action to be completed and then multiply that figure by the average cost of an hour of police time, also known as micro costing (Shanahan, 2011: 55). Using this method one would have to identify all the steps necessary (i.e. what resources are used and which personnel have been employed) to handle a given offence and then apply the appropriate prices and salaries to the procedure. These steps could include for example, the time to search, time to fill out paper work as well as cross checking the identity of the criminal.

The second phase in the enforcement process deals with the criminal justice procedure costs. In order to estimate this cost, a breakdown of cannabis convictions for supply and possession across the types of courts will be required. The cost of court proceedings can be very high: Bryan et al. (2011) estimated annual costs of court proceedings were approximately £97m in the UK in 2010 however, it should be noted that costs associated with court proceedings resulting in "not guilty" verdicts was not accounted for. Data relating to the entire court procedure are extremely important to get a true estimate of this cost.

The third cost that falls under enforcement costs, is the implementation of sentences imposed by the justice system. These are the costs of maintaining a prisoner that is in jail. In order to estimate this cost, data on the specific drug type and sentence length is required. An analysis of possession and trafficking offences are also needed which should be looked at in conjunction with the amount of time spent in prison for each category (Shanahan, 2011: 89 and Bryan et al., 2011: 69).

Together with policing cost and traditional court responses are the courts' referrals to treatment, known in certain countries as the Magistrates Early Referral into Treatment program (MERIT) (Shanahan, 2011: 101-102). The program is designed for offenders who qualify for bail, show signs of an evident drug problem and who shows potential for rehabilitation and treatment.

Once the court identifies the offender as eligible for MERIT, the offender is assessed for drug use history, other criminal records, health status and a general risk assessment regarding other social factors. The court will then review the assessment and depending on the outcome the offender may receive individual or group counselling.

The offender may also be required to attend rehabilitation or detoxification programs with support from a caseworker managing the offenders' progress (Shanahan, 2011).

If the offender does not comply with the bail requirements, fails to attend treatment programs or commits any further offences the magistrate is notified and appropriate charges will be applied. Shanahan (2011) estimated the average cost per an accepted MERIT offender to be $4960 in New South Wales (Australia 2006/07 AUD) however; this excluded the cost of rehabilitation and detoxification programs.

According to Reuter et al. (2010: 7), there has been a substantial increase in the number of treatment cases for abuse or dependence with more than 50 percent of drug treatment admissions coming through MERIT in the US. One reason for the rise in treatment may reflect increasing enforcement of cannabis laws in the sense that offenders willingly plead guilty in order to attend treatment rather than to deal with the legal issues like arrest. It is expected that the number of treatment cases and hence cost associated with MERIT will fall under a legalised regulated framework but will still be positive given that youth possession and consumption will still be illegal (Reuter et al., 2010). Shanahan (2011) estimated the total average cost of MERIT under an illegal framework at $3.52 million as compared to $2.46 million (AUD) post legalisation in New South Wales (Australia 2006/07 AUD).

In addition to the actual policing of laws and the general court proceedings costs, there are legal cost associated with prosecuting and defending a case. An estimate of $2.0 million was derived for prosecution and $1.2 million for Legal Aid (Shanahan, 2011). This method assumed that the distribution of prosecution and Legal Aid followed a similar distribution to total police expenditures on enforcing cannabis laws and used a percentage of this expenditure to derive the estimates.

Further there are also costs borne by the family members of a juvenile offender given the specific outcomes of a case. This includes the value of the family members' time attending the police station when the child is arrested, cautioned or required to attend court or juvenile conferencing. Shanahan (2011) estimated this cost to be $57,712 in New South Wales (Australia 2006/07 AUD) by assuming an average of four hours of parents' time for court and juvenile conferencing and applied an average hourly wage.

4.4.2 Stigma associated with a criminal record

A central concept with regards to cannabis policy is stigma associated with a criminal record as a result of cannabis usage. This refers to the perceived loss in utility as a result of having a criminal record because of possession and use of cannabis (Shanahan, 2011: 160-165).

The term stigma is generally described as something that is attached to a person because of an attribute that the person possesses or a status ("stigma") which makes that person unaccepted or less desirable in society.

Some argued that stigma which is associated with a criminal record is likely to decrease the use of cannabis. The reason for this is that some believe the personal cost of a criminal record is a justifiable consequence of using or possessing cannabis and it acts as a deterrent for the use of the substance (Shanahan, 2011).

Others debate that unlike the stigma attached to mental illness, drug use itself has a value attached to the negative stigma associated with it and that that drugs with a higher stigma such as heroin have a lower prevalence than those which have a lower stigma such as cannabis. In addition, it is claimed the chances of criminal prosecution for using cannabis are low therefore the fear of stigma may be the only real deterrent of consuming cannabis (Shanahan, 2011).

Stigma as a deterrent has two interconnected components, one regarding an individual being stigmatised because of being a drug-user, and the other arising from having a criminal record. The stigma associated with minor offences may be viewed as a negative consequence which can have extensive implications on the offender in the longer term which are not proportional to the original offence (Shanahan, 2011 and Bryan et al., 2011: 90-93).

In studies of stigma associated with being a drug-user, it was argued that stigmatisation occurs when one person is viewed as being less acceptable to another because of some attribute (stigma). Some believe that stigma only becomes serious when it begins to obscure a person's identity, which occurs quite often with drug use. It was found that individuals who believe that they are being stigmatised or discriminated in some way, have a poorer health status. Other studies have found that stigma has an adverse impact on the problem drug-users, and that those in treatment for drug-use who feel discriminated against and stigmatised are more likely to drop out of treatment (Shanahan, 2011).

In the case of stigma associated with a criminal record, research has found that individuals who have a criminal record for cannabis use may be considered as a drug-user and a criminal in society, thereby having a compounding effect (Shanahan, 2011).

Studies which focused on this effect found a range of negative consequences, including social stigma - for example embarrassment and disapproval from friends and family members - and economic stigma, such as loss of professional registration, negative impact on employment and future wages, denial of business licenses, and potential restrictions on travelling abroad (Shanahan, 2011 and Bryan et al., 2011).

A UK study has found that about 26 percent of employers are less likely to employ someone with any form of criminal record and about 56 percent of employers surveyed said that a drug offence will have negative influence on the applicant's chances of employment (Bryan et al., 2011).

Shanahan (2011: 164) used Contingent Valuation (CV), as a method to value the costs associated with the stigma. CV uses surveys to elicit respondents' WTP for a good, and so is suited to capturing unpriced non-market values. In this study, respondents were asked what they would be willing to pay in order to avoid stigma from a criminal record from consuming cannabis. A total of $7.42 million was estimated in New South Wales (Australia 2006/07 AUD).

4.4.3 The gateway effect: supply-side argument

Social networks including friends and family are vital in the manner in which cannabis users obtain their supplies (Bryan et al., 2011: 90). Studies have found that majority of users (over 90 percent) either obtained cannabis from a friend (or had it bought for them by a friend) or from a dealer who they knew socially. So a point is made that cannabis use is largely a result of a social activity rather than that of deliberate commercial activity which is the primary objective of drug dealers. Therefore, it is argued that the majority of users (who are not otherwise involved in criminal activities) run the risk of being charged with an illegal activity as an unintended consequence of something they regard as part of their social life (Bryan et al., 2011). Shepard and Blackley (2007: 415) estimates also suggests that an increase in cannabis related arrests was followed by an increase in subsequent harder drug arrests.

This socially driven activity of users generates contact (either directly or indirectly) with a profit driven supply base, and as a result pressure or temptation is created (by dealers) for users to indulge in more harmful drugs. Therefore,it is argued that the licensing and regulation of cannabis will result in eliminating the entry point of the supply of hard drugs in the longer term which will in turn save people from imprisonment, crime and harder drug dependence (Bates, 2004:26; Shepard and Blackley, 2007:406; Bretteville-Jensen, 2006b:526 and Bryan et al., 2011:101).

4.4.4 Output lost through imprisonment

Another cost to account for is the loss of earnings of the prisoner that is in jail, should that person have been employed. To the extent that the offender was fully aware of the risks involved in consuming or supplying cannabis and the offender has taken this risk into account by deciding to associate himself/herself with the drug, the bigger part of this cost is internal cost. Only the lost tax revenue portion should be included in a conservative evaluation which restricts itself to external social costs and benefits (Bryan et al., 2011:73-74).

Should the person still be employed, the value of the loss of output would be the gross earnings received. One simple method of evaluation would involve multiplying the time spent in prison by the average level of earnings. However, this method will ignore the fact of a relatively low chance of employment if arrested for a drug offence and the below-average earnings level if employed at the time (Shanahan, 2011). In addition, it is expected that individuals who are imprisoned for drug-related crimes most likely have weak labour market attachment compared to the average for people who are arrested on suspicion of drug-related crimes (Bryan et al, 2011). Shanahan (2011) used a sample of 399 offenders and a minimum hourly wage of $13.47 and estimated the total loss in wages for the year 2007 at $8.74m in New South Wales (Australia 2006/07 AUD).

Table 1 on the following page highlights the main costs of prohibition that have been estimated. It highlights the most significant, quantifiable values that would need to be accounted for in a CBA.

4.5 Summary

This chapter provided a basis for comparing the two policy options and identified a wide range of costs that is imposed by prohibition. Also in order to correctly account for the effects on social welfare a distinction had to be made between internal and external costs of drug use. Internal costs are those borne by the drug user and some examples include the enjoyment derived from consumption as well as any adverse effects on wellbeing which streams from their drug use. External consequences are those that impact others such drug-related crime, distress caused to family members and health care costs.

It was found that all internal costs should be excluded from the cost-benefit calculation since the revealed preference assumption assumes that the drug user makes a rational decision with respect to their drug use.

However, excluding the entire potion of internal costs does create a level of uncertainly given the assumptions of perfect information, rational behaviour and developed decision-making abilities which does not apply to the entire population and therefore excluding all internal harms could create biased estimates.

The most significant, quantifiable costs under prohibition were enforcement, output lost through imprisonment, stigma associated with a criminal record and the supply-side gateway effect, which can be looked at as the benefits of legalisation. Chapter Five will identify the cost and benefits that needs to be accounted for in a legalised market.

Table 1: Summary of Costs of a Prohibition Policy Option

COSTS	AUTHOR	AVERAGE ESTIMATE	REGION
Enforcement (total criminal justice costs)	Bates (2004)	$24 million	Alaska
	Miron (2005)	$ 7.7 billion	USA
	Shepard and Blackley (2007)	$8 billion	USA
	Reuter et al. (2010)	$75 million	USA
	Miron (2010)	$48.7 billion	USA
	Shanahan (2011)	$49,267,123	New South Wales, Australia
	Bryan et al. (2011)	€291 million	England and Wales
Output lost through imprisonment	Shanahan (2011)	$8.74 million	New South Wales, Australia
	Bryan et al. (2011)	€12.9 million	England and Wales
Stigma associated with a criminal record	Shanahan (2011)	$7.42 million	New South Wales, Australia
	Bryan et al. (2011)	€23 million	England and Wales
Supply-side gateway	Bryan et al. (2011)	€53 million	England and Wales

*Note: These figures are not directly comparable as different authors accounted for different aspects, during various time periods and regions when estimating these costs.

Source: Authors Own Illustration

CHAPTER FIVE

COSTS AND BENEFITS IN A LEGALISED REGULATED MARKET

5.1 Introduction

The previous chapter addressed the question of whose preferences need to be accounted for in a CBA and identified the welfare effects of a prohibition policy. The aim of Chapter Five is to identify the probable welfare effects of a regulated legalised policy. The chapter also aims to consider the distribution of these costs and benefits and to categorise these values according to the parties affected by the policy change. This chapter together with Chapter Four will be valuable in informing the policy debate set out in Chapter One and will be an extremely important step towards completing a full-blown CBA of the two chosen policy options.

5.2 Demand Response

Before the discussion on the costs and benefits of a legalised policy it important to gain an understanding of the demand response of consumption. This is because many of the cost and benefits under legalisation depend on credible demand figures in order to estimate the magnitude of either a cost or benefit. It is difficult to forecast demand, even in the case of standardised goods in legal markets with access to quality data. To forecast demand under a new regulatory framework and the entry of new suppliers would be even more challenging (Bryan et al., 2011). Conventional methods to forecast demand involve using information on the expected future price and income movements as well as estimates of the demand response to prices.

5.2.1 Demand Elasticities

An important concept to note here is that of demand elasticities which explain the percentage change in demand to a percentage change in the price of a good ceteris paribus (Pacula and Lundberg, 2014: 2-4). For instance if the elasticity of cannabis demand is say -0.8, it means that a 10 percent fall in the price of cannabis will result in an 8 percent increase in cannabis consumption holding all else constant.

The price elasticity of demand for most goods will generally be negative, which indicates that in increase in prices will result in a decrease in consumption, in line with the law of demand. In the case of the price elasticity of demand being less than 1 in absolute terms (between 0 and 0.99), it is considered to be less responsive to price changes (because consumption changes less than the price changes, in percentages) or "inelastic" in economic terms. On the other hand, a value greater than one in absolute terms is known as "elastic" since the consumption changes by proportionately more in response to a price change.

There is an important difference between participation elasticity and intensity elasticity with regards to cannabis consumption (Pacula and Lundberg, 2014:2-4 and Bretteville-Jensen, 2006b:498). Participation elasticity refers to how responsive the new cannabis users will be to variations in price whereas intensity elasticity measures the responsiveness of consumption levels of existing cannabis users. Therefore, we can look at the total elasticity as the sum of the participation and intensity elasticities.

In order to understand how the total consumption changes, we need an understanding of how the behaviour of regular users and heavy users changes given the fact that the price elasticity of demand varies over the different users (Pacula and Lundberg, 2014:2; Kilmer, 2010:6 and Bretteville-Jensen, 2006b).

According to Bretteville-Jensen (2006b:560), under legalisation then there will be a significant increase in use among current drug users as well as in the number of new users. Some of the reasons for this may be easier access to cannabis, reduced stigma associated with use and the removal of criminal penalties and a reduction in the perceived harm which will each have independent effects on total demand (Pacula and Lundberg, 2014: 6). It should be noted that the demand response will vary depending on the type of policy change (decriminalisation versus legalisation) as well as on the type of user (casual, light, regular or heavy). With reference to Figure 1, the increase in the number of users would shift the demand curve outwards.

Further, it is expected that under legalisation the price of cannabis will fall and can be illustrated by a movement down the demand cure (Pacula and Lundberg, 2014; Kilmer, 2010: 3 and Bretteville-Jensen, 2006b).

FIGURE 1: DEMAND CURVES FOR CANNABIS
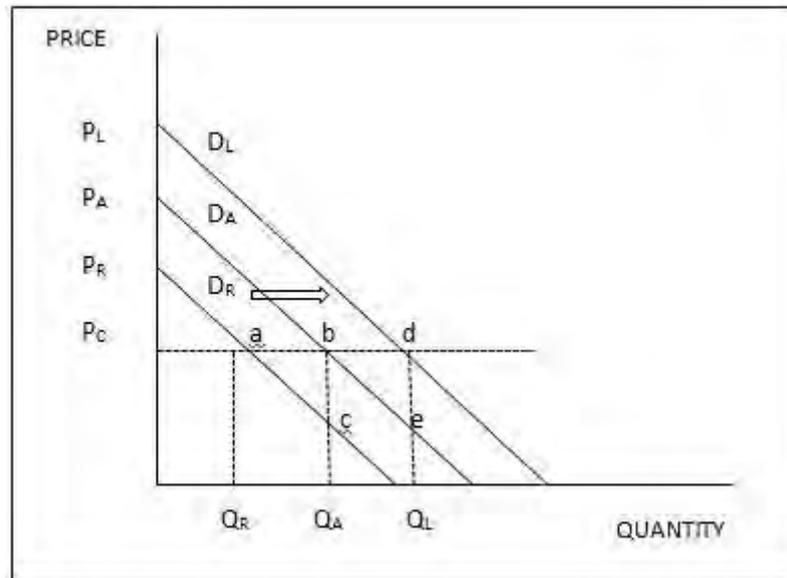
Source: Shanahan (2011), authors own illustration

Holding all else constant, Pacula and Lundberg (2014) suggested that policies which decrease the price of cannabis by 10 percent will result in a 3-5 percent increase in the number of new cannabis users younger than 18 years of age. With regards to regular users a 2.5 percent increase is expected as well as an increase in the amount of time cannabis will be used during adulthood. Bretteville-Jensen (2006b:510) also indicates a high level of responsiveness among heavy drug users following a decrease in price.

Understanding how much the consumption of cannabis will change in response to price changes is important but other aspects of a change in policy such as decreasing the perceived harm of cannabis use and the legal risk are also imperative in explaining the actual changes in consumption (Pacula and Lundberg, 2014 and Kilmer, 2010).

5.3 Benefits in a Legalised Market

5.3.1 Consumption Benefits

In economic theory relating to consumption, a consumer will choose a vector of goods or services given their income, preferences and the given prices of goods and services (Shanahan, 2011: 58). Cannabis users provide a number of reasons as to why they consume the drug.

Some of the reasons include, to get intoxicated, to socialise, to help them relax, to lessen boredom and to aid with deep sleep. Therefore to the consumer, cannabis provides some positive utility in that they are willing to pay for its use. However in the case of drug consumption, this behaviour may be viewed as myopic in that consumers may not take into account the effects that could later accrue from its consumption (which may be especially true for teenagers) (Bryan et al., 2011; Bretteville-Jensen, 2006b).

If we look at a case of regulation which relaxes the external consumption constraints, it will lead to an increase in the consumption of cannabis. As a result of increased consumption, there will be an associated increase in cannabis-related harms (such as mental and physical illness) to the consumer. However, should the consumer be informed of the risks and have the capacity to use the information to make more rational decisions, then the enjoyment derived from consumption should *more than offset* the increase in potential harm since the consumer is in a better position to make a well-informed decision and so the *net* effect should be accounted for (Bryan et al., 2011 and Shanahan, 2011:204-205).

In general, CBA studies regarding illicit drugs and alcohol have failed to recognise any positive utility from the consumption of drugs, alcohol and tobacco. However, if one fails to account for any net positive utility gained then the results of a CBA would be incorrect. It is therefore important to note that if this offsetting (net) effect is ignored from cannabis consumption, then it will lead to an underestimation of the social benefits which will result from a legalised policy option (Shanahan, 2011).

However, the challenge to the estimation is how to derive a true value of consumption while taking into account that a portion of consumption is a result of dependence and some results from myopic behaviours. One method is to calculate the consumer surplus for recreational users and then assert an estimate of the loss due to dependence users (Shanahan, 2011). Another method is to use data on the demand for cannabis and calculate the consumer surplus with and without dependence.

With reference to the figure above, the consumer surplus for dependent and non-dependent users can be calculated. D_R represents the demand curve for non-dependent users and D_A representing the additional demand for dependent users.

The consumer surplus for the non-dependent population will be P_R-a-P_C with consumption levels at Q_R. Then when consumption moves to Q_A from Q_R, the additional expenditure is PC multiplied by the difference between QA and QR and the consumer value is Q_R-ac-Q_A. The consumer surplus for those who are dependent will be P_R-a-P_C-abc.

In the case of a legalised market the demand cure is expect to shift outwards to DL (given that the risk is lower and more socially acceptable etc.) and if the price remains at P_C the consumer surplus would be P_L-d-P_C minus an amount greater than abc (given more users in a legal market) to account for the users that are dependent.

However, a key factor to this estimate is the nature of demand responses and prices in order to account for in the additional consumption value in a legalised market (Shanahan, 2011).

5.3.2 Production Costs

Besides the instance of home grown, small-scale production methods of cannabis, one can expect the wholesale price of cannabis to fall under a legalised framework (Caulkins, 2010: 21-23). One explanation is that producers will no longer be required to pay a risk premium for undertaking an illegal activity and consequently the cost of production (for example labour cost) would fall. Another reason the cost of producing cannabis will likely fall is due to economies of scale from larger production volumes, increased competition in the market for growing equipment and innovation as a result of a more open exchange of information. Another thing is that labour productivity is likely to increase due to specialisation of full time in cannabis production by workers and workers with particular skills in the cannabis environment could enter the industry more efficiently (Caulkins, 2010: 425 and Bryan et al., 2011: 54-56).

The production costs make up only one component of the pre-tax price of cannabis. Other factors that need to be considered under a policy evaluation are distribution costs, processing and production cost (lighting, production materials, labour), compliance costs, producer's profit margin as well as the retailers' margins (Caulkins, 2010 and Reuter et al., 2010). The compliance costs are of particular importance since there will be a need for some direct controls on the nature of the product (possibly covering nicotine, tar, and THC content). In addition, these controls bring about the need to undergo monitoring and to exercise a high degree of control on the quality of the product like with alcohol and are the main factors that might soften the overall price decline.

The reduction in production costs relative to the prohibition policy is a 'gain to society' and this gain is what will form part of the CBA.

According to Caulkins (2010), the cost of producing tobacco can be used as a reasonable proxy when estimating the cost to produce cannabis. This is because both cannabis and tobacco would undergo similar processes in terms of harvesting, drying, treating and being rolled into cigarettes before being sold.

5.4 Costs in a Legalised Market

5.4.1 Drug-related crime

One of the largest components of the external costs of illegal drug use is that of drug-related crime. Studies have found that in Wales and England approximately 88 percent of the social and economic costs of drug use was attributed to drug-related crimes together with the cost of policing (Bryan et al., 2011: 78-81). There are a number of ways the consumption of illegal drugs can influence crime. Shanahan (2011:81)identified the "economic compulsive" mechanism which is simply a term that describes the need for additional income to feed drug-related purchases. There can also be direct "psychopharmacological" causes of drug-related crime which may be the weakening of self-control or impaired decision-making abilities resulting in psychopharmacological causes of crime.

However it is also argued by a number of researches that drug-related crime will in fact decrease under a legalised model (Bates, 2004; Shepard and Blackley, 2007 and Bretteville-Jensen, 2006b). The arguments in this respect are that prohibition prevents black market participants from solving their grievances through nonviolent mechanisms which would be available in a legalised model and that there is more scope for corruption as black market participants are usually willing to pay officials to look the other way (Bates, 2004). Shepard and Blackley (2007) also found other crimes will be reduced given that law enforcement efforts will be redeployed to other more serious crimes. Further, it is argued that under legalisation the price of cannabis would fall therefore users would not need to finance higher-priced purchases, leading to a reduction in income generating crimes (Bates, 2004: 23-25). However, Bretteville-Jensen (2006a:562-563) also indicates that the fewer drug-related crimes may be offset by the number of new users; therefore it is important to still account for this effect on society.

As discussed, the general approach taken when dealing with theft is to account for the value of stolen goods which implies a loss to society. However, this will over-estimate the total loss to society since it ignores the benefit generated by the stolen property which is still in existence after the theft occurred. In effect, the stolen property is viewed as a transfer from the legal owner to the new owner (the thief) which is not a total loss to society. Even though it may be viewed as being incorrect to account for an act (the benefit to the thief) that is socially unacceptable in the measure of social welfare, it would be inaccurate to exclude it altogether, particularly under conventional measures of welfare (Bryan et al., 2011).

5.4.2 Market Regulation Costs

In order for cannabis to be supplied, there needs to exist some sort of regulation like licensing which is similar to that which is already in place for alcohol and tobacco.

Regulation can be broken down into four areas to allow for interpretation. Firstly retail regulation will include monitoring and controlling the use and sale to under-age individuals, advertising, mandatory health warnings, drug-driving testing as well as imposing restrictions as to where cannabis can be consumed. These costs will be borne by the controlling agency namely the government and also includes controlling the remaining illicit activities such as the importation and exportation of cannabis (Bryan et al., 2011:83-84 and Shanahan, 2011:120-130).

The second area regards production which will focus on the monitoring of production sites, the methods of production and the enforcement on bans of unlicensed production. Also the extent to which compliance cost for the grower increases will need to be accounted for.

Consumers also face costs in terms of non-compliance fines that may be imposed. Offences can include driving or operating machinery under the influence, disregarding restrictions as to where cannabis can be consumed as well as if found in the possession of cannabis and is not of the legal age (Shanahan, 2011)

Lastly, there are costs associated with information and education programs which will be needed to provide information about the new laws and the potential negative consequences of consuming cannabis. Consumer information may include the health effects such as physical and mental illness, the dangers of driving under the influence and the effects of consuming cannabis with other substances like alcohol and tobacco. Other costs can include encouraging responsible and moderate use as well as providing information on treatment options (Bryan et al., 2011; Shanahan, 2011).

According to Bryan et al. (2011) initiating the system of a regulated licensed supply will free up resources that are currently being used to intercept the importation of cannabis since the licensing will reduce the incentive for importation of illicit cannabis. And it is suggested that these resources could be redeployed to local agencies for the monitoring and enforcement of the new cannabis market.

It would be challenging to put a credible value or to cost the entire regulation activity as it evident that regulation encompasses many forms. In practice it involves a large number of local, provincial and national agencies and the difficulty comes in distinguishing between the other functions of these agencies (Bryan et al., 2011).

Data that can be used to estimate regulation costs include aggregate expenditures on tobacco and alcohol control (Bryan et al., 2011 and Shanahan, 2011).

5.4.3 The Gateway effect: demand-side argument

One of the most widely discussed theories on the gateway effect is that cannabis legalisation leads to a risk of transition to more serious drug abuse such as cocaine or heroin. The reason this could be is because cannabis which now falls under the legal dominie and loses its forbiddance affect that it had under an illegal model. If this causal gateway exists then a policy change which may increase the consumption patterns of cannabis may also increase the use of hard drugs in turn. This effect is usually seen as a demand side phenomenon and is conditional on increased consumption of cannabis which may then rise the future long term social costs associated legalisation (Bryan et al., 2011: 97-104).

As mentioned the gateway hypothesis generally refers to the demand behaviours, but there may also be causal gateways on the supply side which would instead generate benefits (as it is argued that the licensing and regulation of cannabis will result in eliminating the entry point of the supply of hard drugs in the longer term which will in turn save people from imprisonment, crime and harder drug dependence) which was viewed as a cost of prohibition.

According to Bryan et al. (2011), the overall supply and demand effect may favour a legalised market over a prohibited one. It is expected that the benefits of the supply side gateway removed will offset the costs brought about from the demand gateway, provided that there is not a very large increase in consumption under legalisation.

5.4.4 Effects on human capital and earnings attainment

It is believed that consumption of cannabis acutely impairs the cognitive performance of an individual however there are still debates whether there are long term impairments of the brain especially when use begins in teenage years (Shanahan, 2011: 200-203). Several hypotheses have been put forward which includes cannabis usage is a result of poor educational attainment, cannabis contributes to the cause of poor school performance and possibly early school leaving, and that cannabis use and poor educational attainment are resultant of common factors.

Research has found that THC negatively impacts the functioning of the brain which consequently affects the memory and cognitive functioning, at least in the short term (Bryan et al., 2011: 93-96 and Shanahan, 2011: 200-203).

Even though there is insufficient evidence to confirm whether prolonged use has a sustained effect on cognitive function, even short term impairment may result in difficulties in learning and in navigating through the education system. Shanahan (2011) reviewed a series of studies which found that cannabis consumption, particularly heavy cannabis use among high school adolescents, was related to poorer educational attainment. The possible link between early consumption of cannabis and the failure to achieve any recognised qualification is the biggest concern of a legalised model.

In the case that it is found that cannabis adversely affects human capital accumulation, it follows to say that there will be a loss in earnings to human capital in the future, until there is some form of on-the-job training or experience gained which may offset the initial loss in earnings. In addition, it may also be that prolonged use of cannabis could potentially decrease the productivity of an individual at work which is supplementary to the effect of educational attainment (Bryan et al., 2011).

In order to evaluate these losses, a combination of the following evidence needs to be analysed, that is, the dealing with the impact of cannabis use on educational attainment, dealing with the long term returns of educational attainment and investigating the impact of the current cannabis use on productivity at work. The latter two effects involve the anticipated level of earnings when employed as well as the prevalence of unemployment which will affect the earnings stream (Shanahan, 2011 andBryan et al., 2011).

5.4.5 Health Care Costs

Mental illness

Various potential harms have been argued to accrue from the consumption of cannabis, with schizophrenia and psychosis among the most widely debated (Shanahan, 2011). There have been three main cases postulated about the relation between psychosis, schizophrenia and cannabis. These include substantial cannabis consumption causes psychosis, consumption of cannabis can aggravate schizophrenia, and cannabis may quicken the development of schizophrenia (Ngui and Shanahan, 2010: 31-33;Bryan et al., 2011: 85-87 and Shanahan, 2011: 190-192).

Individuals with serious prolonged psychiatric illness pose a great social cost to family and friends who have to deal with the demanding diagnostic process of mental illness. It is particularly difficult to diagnose drug-users and becomes even more difficult to separate the symptoms of intoxication and drug dependency with that of mental illnesses on its own (Shanahan, 2011).

This is one of the most important areas of concern regarding cannabis policy and also one of the most difficult research areas. This will be discussed further under the difficulties associated with Long-term and indirect costs and benefits.

There is evidence for the relationship between cannabis use and mental illness or impairment. Randomised experimental methods were used to study the effects of oral THC on cognitive test outcomes. This was done in order to analyse the short-term connection with impairment of brain function however, it could not be determined if there was any connection between these short-term impacts on the brain and long-term mental illnesses such as schizophrenia (Ngui and Shanahan, 2010: 31-33).

Also, analysis of the relation between cannabis prevalence and the incidence of schizophrenia (using trend analysis), has found little evidence to support the direction of causality. Further, studies in Australia also suggest that there is no causal relationship between consumption and schizophrenia however; psychiatrists in this country have shown an increasing fear regarding cannabis-related psychotic illness (Shanahan, 2011).

Although the results appear inconclusive, the amount of research in the field suggests that here is some relation between cannabis usage and schizophrenia and psychotic conditions (Reuter et al., 2010 and Shanahan, 2011).

It is clear that the cost associated with the treatment of psychosis is an external social cost which should be included in a CBA. Ngui and Shanahan (2010) estimated the cost of psychotic illnesses at \$6.2 million in New South Wales in 2007 which accounted for the largest portion of total health care costs. However, the loss of income and output thereof is an internal cost and should be excluded from the CBA (Shanahan, 2011).

Treatment for cannabis dependency costs

Even though cannabis is alleged as a nonthreatening drug with a lower dependency risk than other drugs, its dependence is the most common form of drug dependence after alcohol, and demand for treatment has been increasing internationally (Reuter et al., 2010 and Shanahan, 2011: 187-190). The dependence of cannabis is characterised by distress which results from a group of problems which reflect impaired control over an individual's usage aside from the other harms that arise from its use. It is believed that people who attempt to stop consuming cannabis may suffer from symptoms of withdrawal, insomnia, depression, anxiety, irritability and decreased appetite.

The dependence of cannabis may involve a wide range of external costs (like health treatment costs and reduced productivity) and intangible costs (such as agony caused to the user's family and friends). In the cases of the cannabis users underestimating the risk of the dependency (a case of imperfect information), there will be an internal cost to the drug-user which should be taken into account in the calculation of the net social cost. However the difficultly in separating such affects has led to researchers excluding this from their analysis (Bryan et al., 2011). According to Ngui and Shanahan (2010) dependency cost accounted for 17.1 percent of total treatment costs which amounted to $2.9 million (AUD) in 2007.

Physical disease

Normally, cannabis is combined with tobacco due to unreliability to burn on its own. Cannabis products which are commercially produced are expected to have better combustion properties and it is assumed that the primary means of consumption is through smoking. It is also assumed that even in the presence of cannabis controls, when cannabis is smoked, it is at least as damaging to the respiratory and cardiovascular systems as is tobacco. Therefore, a legalised market for cannabis exhibits the potential for mental as well as physical health issues (Bryan et al., 2011: 88-89).

It is important to understand the relationship between cannabis and tobacco consumption as it is important in determining the costs of a physical disease (Ngui and Shanahan, 2010). It should be noted though that in the case of an individual smoking tobacco as well as cannabis, it may be very difficult to distinguish the damage cause by each substance to the overall health of that individual.

Research has concluded that the two substances complement one another which imply that in the case of a legalised market, it can be expected that use of tobacco will increase as well (Shanahan, 2011). It is also important to distinguish between prevalence and incidence as it is likely that for someone who already smokes tobacco, an increase in cannabis use may become a substitute for cigarettes while for someone in the initiation stages cannabis may induce additional demand for tobacco (Ngui and Shanahan, 2010 and Reuter et al., 2010). Another point to consider is that under a legalised market product development may change the relationship between the demand for cannabis and tobacco altogether and since the true relationship between cannabis and tobacco is still uncertain and only crude estimates of the potential health effects may avail (Bryan et al., 2011).

Low birth weight of new-borns

Animal studies suggested that high doses of cannabis in rats, mice and rabbits caused abnormalities in birth. However, instead of using THC, these birth defects followed from very crude marijuana extract, suggesting that other cannabinoids (not THC) could have led to these malformations (Ngui and Shanahan, 2010: 34-35 and Shanahan, 2011: 94).

However, other research has found that using cannabis during pregnancy is associated with low birth weights of new born babies which results in additional hospital costs. In New South Wales, Australia it had been estimated the costs associated with low birth weights tallied $1.6 million in 2007(Shanahan, 2011).

Data that may be useful in estimating these health costs include unit costs of providing treatment linked to illnesses, the duration of the spells in treatment by substance of abuse and a breakdown of the drug treatment budgets of substance abuse. Understanding the process involved in each treatment type and the resources expended to provide such treatment is crucial to this estimate (Ngui and Shanahan, 2010). Ngui and Shanahan (2010) determined the number of casualties for specific illnesses and then multiplied it by their respective average costs. However, it should be noted that it is difficult to assign values to these intangible costs which is why many researchers have excluded this cost from their analysis (Bryan et al., 2011).

Drug-related accidents

It has been established that cannabis together with other drugs causes some level of impairment to the performance of a driver of a motor vehicle. However, the identification of the causes of accidents is limited and the low priority accorded by police investigations to drugs as a contributing factor is a major concern (Ngui and Shanahan, 2010: 36-39 and Shanahan, 2011: 195-198). It is also extremely difficult to determine if drugs are present in the drivers system which may have caused the accident and it is even more challenging when drugs and alcohol are both present.

Some postulate that cannabis affects the cognitive functioning in a way which results in driving more slowly and taking fewer risks compared to people intoxicated with alcohol (Reuter et al., 2010: 40-41 and Shanahan, 2011). Other research has found however that the high levels of THC increases the likelihood of culpable driving, mostly when cannabis is consumed with alcohol. The Californian Fatality Analysis Reporting System (FARS) has identified that in 5.5 percent of vehicle accidents in 2008, one or both drivers tested positive for cannabis.

It was also found in Britain that out of 2094 road deaths, 3.1percent of them involved drugs and likewise in France, where it was found that about 2.5percent of road deaths was caused by drugs (Reuter et al., 2010 and Bryan et al., 2011). Also according to Ngui and Shanahan (2010), road traffic accident casualties accounted for 13.7 percent of total treatment costs associated with cannabis.

The number of accidents caused by drug-driving needs to be determined and then multiplied by average cost of treatments and the value of lives lost also needs to be accounted for. The value of other accidents also needs to be taken into account such as the fires and property damage related to smoking of cannabis. Shanahan (2011) used the annual health care costs related to tobacco smoking as a proxy.

With regard to the value of lives lost, Reuter et al., 2010 suggest figures between $4 million to $9 million per death. However this estimate becomes complicated when there are multiple causes and deaths involved in accidents. In environmental and food safety economics the value of a statistical life (VOSL) is used when assessing environmental and regulatory policies (Shanahan, 2011). The Environmental Protection Agency in the US uses a mean willingness to pay of $7000 to avoid a 0.001 risk of death, with a resulting VOSL of $7 million.

Table 2: Summary of Benefits in a Legalised Market

BENEFITS	AUTHOR	AVERAGE ESTIMATE	REGION
Consumption benefits	Shanahan (2011)	$137.06 million	New South Wales, Australia
Production costs	Kilmer et al. (2010) (indoor production)	$250-$400 per ounce	California
	Caulkins (2010) (indoor production)	$300 per pound	USA
	Caulkins (2010) (outdoor production)	$30 per pound	USA
	Shanahan (2011) (total production costs)	$4.5 million	New South Wales, Australia
Drug-related crime	Bryan et al. (2011) (net effect indicates a decrease i.e. a net benefit)	€15 million	England and Wales

Source: Authors Own Illustration

Table 3: Summary of Costs in a Legalised Market

COSTS	AUTHOR	AVERAGE ESTIMATE	REGION
Demand-side gateway	Bryan et al. (2011)	€25 million	England and Wales
Reduced educational attainment	Shanahan (2011) (total wages)	$125.7 million	New South Wales, Australia
	Bryan et al. (2011) (tax portion of wages)	€12 million	England and Wales
Government regulation cost	Shanahan (2011)	$3.9 million	New South Wales, Australia
Cost of establishing regulations	Shanahan (2011)	$1.04 million	New South Wales, Australia
Information and education programmes	Bryan et al. (2011)	€16 million	England and Wales
	Shanahan (2011)	$12.5 million	New South Wales, Australia
Growers' compliance cost	Shanahan (2011)	$41 750	New South Wales, Australia
Treatment for Dependency cost	Ngui and Shanahan (2010)	$2.9 million	New South Wales, Australia
	Shanahan (2011)	$10.8 million	New South Wales, Australia
	Bryan et al. (2011)	€44.7 million	England and Wales
Mental illness costs	Ngui and Shanahan (2010)	$6.2 million	New South Wales, Australia
	Shanahan (2011)	$7.1 million	New South Wales, Australia
	Bryan et al. (2011)	€21 million	England and Wales
Physical illness	Bryan et al. (2011)	€21 million	England and Wales
Drug-related accidents	Ngui and Shanahan (2010)	$2.3 million	New South Wales, Australia
	Shanahan (2011) (treatment cost plus value of lives lost)	$8.5 million	New South Wales, Australia
	Bryan et al. (2011) (all accidents caused by cannabis)	€192.1 million	England and Wales
Low birth weight of new born babies	Ngui and Shanahan (2010)	$1.6 million	New South Wales, Australia
	Shanahan (2011)	$2.9 million	New South Wales, Australia

Source: Authors Own Illustration

5.5 Distribution of Costs and Benefits

As mentioned in Chapter Three, the broad perspective taken into account in the CBA analysis includes the cannabis user, the grower, retailer, government and the wider society.

In terms of the fiscal implications of a legalised policy option, costs will include enforcing new regulations like the monitoring of production sites, the methods of production and the enforcement on bans of unlicensed production. It will also include providing awareness and support programs, drug driving testing as well as the treatment costs associated with psychosis, low birth weight of new born babies and drug-related accidents. For the prohibition policy it will include policing, general court proceeding costs, prosecution and Legal Aid and the courts' early referral into treatment costs.

Total personal and societal costs and benefits will include stigma associated with a criminal record, cost of a defence attorney, the loss in wages whiles in prison and for the legalised market it will include consumption benefits and educational attainment lost. And to the wider society costs will include, the parents lost work time for prohibition and loss in tax through loss of wages, the loss of productivity through decreased education attainment and drug-related accidents which involve others for a legalised market.

The grower will face the compliance related costs imposed by government and all the revenues from the sale of cannabis will serve as their benefits.

5.6 Categorisation of Cost and Benefits

The costs and benefits can be separated into direct and indirect effects to allow for interpretation. Direct costs and benefits are that which relate to immediate operations of the cannabis market and includes for example, the cost of policing and the cost of administering a system of regulation. The indirect costs and benefits relate to the long term effects which stems from the behaviours of people. These can include the health consequences (which may be felt long after the actions that caused them), the demand gateway as well as the effect on decreased human capital attainment.

The categorising of costs and benefits in this dissertation follows that of Shanahan (2011) with some modifications to fit the scope of this dissertation. Each of the potential costs and benefits were classified into one of the four categories below.

Shanahan (2011) categorises potential costs and consequences as follows:

1. Direct intervention cost for both policies
2. Costs to other agencies and personal costs
3. Costs and benefits to the drug user from both policies
4. Other value (productivity, accidents to third parties)

The first category includes the direct cost for both policies. For the prohibition policy this includes the direct policing costs, the general court proceedings costs, prosecution and Legal Aid and the courts' early referral into treatment costs (MERIT).

For the legalised and regulated policy option this includes the market regulation costs such as the cost to the government to enforce regulations. These activities include the controlling of the remaining illegal activities (import and exportation of cannabis), policing of quality standards, monitoring and controlling the use and sale to under-age individuals and drug-driving testing.

The second category consists of the costs to other agencies and personal costs. These include the cost to the health care system such as the treatment cost for mental and physical illnesses, dependence, drug-related accidents and low birth weight of new born babies. The cost of defence attorneys, parents' lost work time while attending court for juveniles and the cost of information and awareness programs are included in this category.

The third category involves the cost and benefits to the drug user from both policies. For the prohibited policy option it will include the value of stigma associated with a criminal record and for the legalised option it will include the loss of human capital accumulation and earnings and the consumption benefit derived.

The last category deals with the productivity loss and accidents to third parties. This will involve the tax lost to society as a result of reduced educational attainment and hence earnings, as well as the injuries to others from accidents as a result of cannabis use.

Shanahan (2011) also included a fifth category labelled adverse or spill over effects. This included impacts such as drug tourism and the effect of cannabis consumption on the use of other substances.

Drug tourism refers to tourists being drawn to places where cannabis consumption is legalised. This has been evident in the Netherlands where a de facto legalised policy has prevailed for a number of years. According to Bryan et al. (2011) drug tourism can be a nuisance, which is why the Dutch government has considered implementing controls on tourists' access to cannabis. However, drug tourism can also have positive spill over effects such income from other countries and employment opportunities. The overall effect of drug tourism is not seen to be large, however it is considered to be a net social cost (Bryan et al., 2011).

With regards to the effects on consumption of other substances, it is said that legalisation which causes a drop in the price of cannabis (and increased demand) will lead to changes in the demand for other substances (for example, other drugs and alcohol). If there is positive cross-price elasticity between cannabis and the other substance in question, then the consumption of the other substance will fall when cannabis demand increases, indicating that the other substance is a substitute for cannabis. And if there is a negative cross price elasticity between the two then, the other substances will complement cannabis and legalisation will therefore increase the demand for both cannabis and the other substances. According to Bryan et al. (2011) the cross price elasticities are negative between cannabis, tobacco, alcohol and other drugs suggesting that any policy-induced increase in cannabis consumption will increase the demand for these other substances. The increased in demand for these other substances will have independent welfare effects which is why Shanahan (2011) includes this in her fifth category.

5.7 The Difficulty Associated with Long-Term and Indirect Costs and Benefits

It is particularly difficult to evaluate the indirect consequences of a policy change. There are a wide range of long term effects which include education and employment courses, mental and physical health, the risk of the demand gateway and drug-related crimes which all have adverse effects on society.

The difficulty lies in the ability to distinguish between internal and external costs.If it is the case that an individual makes a fully informed decision (under simple assumptions), the potential internal cost are be said to offset the pleasure derived from the consumption of cannabis and the internal cost will therefore be excluded from the CBA calculation. But if researchers who have access to large bodies of data are uncertain with regards to the magnitude of the potential future internal costs, it will be inaccurate to assume that the user will fully understand these costs (Bryan et al., 2011).

The other problem arises when trying to determine the causal link between cannabis use and various long term effects that are assumed to follow from it. Confounding is one of the particular issues here, which is simply a form of endogeneity. For example, in the link between cannabis use and schizophrenia, there is a statistical relationship since the average prevalence and intensity of cannabis usage is considerably higher among individuals who suffer from the disease compared to the non-sufferers. This association could be argued to arise because cannabis use causes schizophrenia in some individuals, or because there are *underlying factors* which contribute to both cannabis use and schizophrenia. So if it is these endogenous factors that are responsible for the relation between cannabis and schizophrenia, then it can be argued that there is no true causal relationship present and therefore, legalisation will have no effect on the occurrence of schizophrenia (Bryan et al. 2011).

The dual problem faced by researchers is that the behavioural and biological processes are not understood well enough to clearly identify the confounding factors and therefore, they cannot be fully observed. Also, it is unethical and infeasible to conduct controlled trials whereby humans are observed for the long term effects of cannabis.

5.8 Summary

This chapter identified the probable welfare effects of a regulated legalised policy. The chapter also aims to consider the distribution of these costs and benefits and to categorise these values according to the parties affected by the policy change.

With regards to identifying the cost and benefits and who they accrue to, the broad perspective taken into account in the CBA analysis includes the cannabis user, the grower, retailer, government and the wider society. Government cost included, enforcing new regulations include providing awareness and support programs, drug driving testing as well as the treatment costs. For the prohibition policy it will include policing, general court proceeding costs, prosecution and Legal Aid and the courts early referral into treatment costs. Personal costs and benefits included include stigma associated with a criminal record, cost of a defence attorney, the loss in wages whiles in prison, consumption benefits and educational attainment lost. The grower faces compliance cost to the extent to which it increases under legalisation and wider society costs included, the parents lost work time, loss in tax through loss of wages, the loss of productivity through decreased education attainment and drug-related accidents which involve others.

The categorisation of potential costs and consequences where split into four categories which includes, direct intervention cost for both policies, costs to other agencies and personal costs, costs and benefits to the drug user from both policies and last category is other value which includes productivity changes and accidents to third parties. Chapter Six will conclude the dissertation and provide recommendations based on the findings.

CHAPTER SIX

CONCLUSION AND DISCUSSION

This dissertation began by explaining how cannabis was first outlawed. The first international drug control treaty came into effect in 1912; however, only in 1961, with the revision of the International Drug convention, was cannabis added to the multilateral regime. It was also highlighted that even before cannabis had been controlled on an international level, certain countries like the US and South Africa used prohibition of cannabis as a means of social control.

Given that the US had acquired a "newfound superpower" status within the United Nations, it was said that they exploited their position and become the dominant nation pushing for cannabis to be outlawed. Therefore, arguments arose that prohibition of cannabis on an international level, was not based on scientific and economic reasoning but rather based on politically charged arguments.

However, the international consensus has been changing considerably, with a growing number of westernised countries moving towards legalisation of the plant. Examples of reform are exemplified by countries such as Uruguay, Spain, Portugal and ironically the US. These changes in laws have been driven by vigorous debates around which policy option (i.e. prohibited verse legalised) should be adopted with voluminous arguments in support of each.

A case for prohibition can be made by viewing the social cost that drug use places on society. These costs include drug-related accidental harms and crime, human capital deterioration and health care costs accruing mainly from dependence, mental and physical illnesses. Therefore, a case for prohibition can be made on the grounds that restricting drug use would increase social welfare.

However, in 1960 Ronald Coase developed a theory which forced economists to view externalities from a different perspective. In the case of cannabis policies, the theory can be applied to viewing the costs imposed from the prohibition of cannabis and as theory implies, an economically efficient solution should be achieved regardless of which party imposes the externality. Therefore, regardless of whether drug use (legalisation) or non-drug use (prohibition) creates the externalities, an economically efficient solution should be achieved.

Supporters of a legalised model put forward arguments that coercive polices have largely failed; that this approach creates a huge black market from which criminals benefit and not legitimate business or society at large; that it places huge cost on the criminal justice system, and creates discrimination and stigmatisation which lowers the probability of drug users gaining employment as well as obtaining treatment.

Therefore, given that there are differing views on the societal impact that a policy change may have, a systematic assessment which accounts for the potential impacts of the different policy options would be necessary in informing this debate. One tool that policymakers have at their disposal is that of CBA.

Previous research in the field of cannabis policies has mainly focused on one or two specific aspects of a policy change. Also minimal attempts have been made to determine who the costs and benefits accrue to, as well as which individuals and preferences should be taken into account.

The aim of this dissertation was therefore, to identify and analyse the different policy options available regarding cannabis and to identify and highlight a wide range of costs and benefits associated with two policy options, that was, an illegal model versus a regulated-legalised model.

The objectives were:

a. To understand cannabis use as an economic problem, by identifying reasons for and possible external costs of its use;

b. To identify the different policy options regarding cannabis (and the underlying rationale guiding these approaches) by reviewing international policy;

c. To identify the probable costs and benefits of prohibition and legalisation as policy alternatives; and

d. To investigate the distribution of such costs and benefits and consider whose preferences should be included in a CBA.

The rationale for the consumption of cannabis was identified in Chapter One, where it was found that cannabis had been used for a multitude of purposes since the early existence of mankind. One of the most cited uses was for medical purposes as various studies showed that there has been a long history of cannabis being used in countries such as India, South America, Malaysia and South Africa. Some of the main illnesses it is said to be useful for includes cancer, AIDS-related wasting, glaucoma and asthma.

Another major use was for recreational aspects, where it was found that THC was the main compound in the plant that was responsible for the "high" that people experience. Industrially, cannabis fibre is also useful in various industries such as clothing and textile, cosmetics and with recent developments even in the energy sector. Cannabis is also used for religious purposes as it was found that the Rastarfarians, Hindus and Khoisan people consumed it.

The dissertation then focused on cannabis purely from a recreational drug perspective and set out the various policy options available in this regard. These policies range from strictly prohibited policies, whereby all activities relating to cannabis are illegal, towards a regulated legalised policy, whereby activities relating to cannabis are legal and regulated in terms of production, availability and/or use.

Two policy options were then selected for comparison, which were the prohibition-based policy and the regulated legalised policy, mainly because of the economic benefits proposed by the Miron (2005) report together with the conclusions reached in the 2013 Cannabis Proposition Paper and the 2015 Cannabis Round Table Discussions in South Africa.

The main aim of prohibition is to eliminate drug use given the societal impact that drug use imposes. The restriction of drug use would mean that these societal harms are limited and therefore the main strength of prohibition would be based on the grounds that it increases social welfare. However, evidence suggests that cannabis usage has been increasing worldwide which indicates that prohibition is to a large extent, ineffective.

Together with the ineffectiveness are the inefficiencies that are also tied to enforcing prohibition. These inefficiencies include the massive criminal justice resources that are being used to fight what many argue is a health concern rather than a criminal justice issue. It is further argued that the costs involved are not proportionate to the benefits derived from enforcing such regulation, thereby making the existence of such regulations inefficient.

Prohibition also comes with externalities such as the stigma that is associated with having a criminal record. It had been highlighted that stigma associated with minor cannabis offences have extensive implications on the offender in the long term which were not proportionate to the original offence. In addition, it was found that drug users who feel discriminated against and stigmatised, are more likely to drop out of treatment programmes. This therefore highlights some of the major consequences of stigmatisation which is a direct result of prohibition.

Another major drawback of prohibition is that of the supply gateway which implies that pressure or temptation is created by drug dealers for users to indulge in more harmful drugs. This means that a system which prohibits cannabis use creates the possibility of cannabis users being exposed to harder drugs and therefore run the risk of being convicted for more serious crimes and suffering from harder drug dependence in the future.

With regards to a legalised regulated option, the main strengths point to the potential tax revenues that can be derived from the sale of cannabis. The states of Washington and Colorado have earned combined tax revenues amounting to over US$100 million in one year of legalised sales. The spill over effects of the increase in tax revenues have been allocated to fund youth and adult drug education, substance abuse prevention and treatment programmes and academic research in the field of cannabis policy.

Another major strength of legalisation is the savings in criminal justice resources. Evidence in Washington and Colorado has showed more than 80 percent reduction in court filings; possession offences and arrests relating to cultivation and distribution (with cultivation and distribution charges decreasing the most). This also supports the fact that legalisation is reducing the size of the black market as well as redirecting criminal justice resources towards more serious crimes.

Furthermore, legalisation is argued to aid in the overall growth of a country by facilitating job creation in the cannabis industry. In Colorado for example, there has been employment creation in the cannabis industry coupled with economic output of US$30 million which in turn contributes towards the tax base in the state. These findings are indicative of the potential gains of the legalisation of cannabis under a regulated framework.

However, there are also weaknesses associated with legalisation such as increases in the number of cannabis users (especially among the youth). Reasons for increased use include easier access to cannabis, reduction in perceived harm, removal of criminal penalties and reduced stigma associated with use. Even though it was expected that legalisation increases usage, evidence in Washington suggests otherwise. For example, since the legalisation of cannabis, there was not been an increase in the usage rates of the youth and youth usage has remained fairly stable. One possible reason for this may be due to the investments made towards youth education and prevention programs and emphasis placed on treatment rather than on criminal penalties.

Another major drawback of legalization is the increased health care costs on government and such costs include treatment for cannabis dependency and metal and physical illnesses. Drug-related crimes and drug-related accidents were also highlighted as major drawbacks although evidence again suggests otherwise. Both Washington and Colorado have found that since legalization, there have been decreases in crime rates and in traffic fatalities. Even though the causation of legalisation, decreased crime rates and decreased traffic fatalities have not been established, it can be argued that legalisation of cannabis in these states have not resulted in increased crime or increased drug-related accidents.

The rationale for using CBA as a theoretical framework for evaluating public policies and specifically why it would be appropriate when dealing with cannabis policies was set out in Chapter Three. When comparing other methods of evaluation such as financial analysis, cost utility analysis and cost effectiveness analysis, CBA was chosen as themore appropriate method of evaluation as it accounts for a broader set of events or outcomes across multiple sectors. The broader outcomes include cannabis consumption, psychosis, cannabis use disorder, mortality and morbidity, poor educational attainment and stigma, and multiple sectors such as health, education and criminal justice.

With regards to whose preferences should be included in a CBA, the revealed preference assumption assumes that the drug user makes a rational decision with respect to their drug use and therefore all internal costs should be excluded from the cost-benefit calculation. However, it should be noted that this statement is underpinned by strong assumptions of perfect information, rational behaviour and developed decision-making abilities, which creates a level of uncertainty with respect to the exclusion of all internal harms. With regards to the internal benefits derived from cannabis consumption, it is argued that only the portion of utility that is more than offset by the harms caused by cannabis should be accounted for. However, the challenge to the estimation is how to derive a true value of consumption while taking into account that a portion of consumption is a result of dependence and some results from myopic behaviours, which then no longer aligns with the revealed preference argument.

With regards to identifying the cost and benefits and whom they accrue to, the broad perspective taken into account in the CBA analysis includes the cannabis user, the grower, retailer, government and the wider society.

In terms of the fiscal implications of a legalised policy option, the costs will include enforcing new regulations like the monitoring production sites, the methods of production and the enforcement on bans of unlicensed production. It will also include providing awareness and support programs, drug driving testing as well as the treatment costs associated with psychosis, low birth weight of new born babies and drug-related accidents.

For the prohibition policy it will include policing, general court proceeding costs, prosecution and Legal Aid and the courts' early referral into treatment costs.

Total personal and societal costs and benefits will include stigma associated with a criminal record, cost of a defence attorney, the loss in wages whiles in prison, consumption benefits and educational attainment lost. And to the wider society, costs will include the parents' lost work time, loss in tax through loss of wages, the loss of productivity through decreased education attainment and drug-related accidents which involve others.

In a legalisation scenario, growers and retailers will face additional costs associated with compliance with regulatory standards imposed by government, for example licences and safety standards, but are also likely to benefit from additional revenues resulting from increased sales of cannabis.

The categorisation of potential costs and consequences were split into four categories: direct intervention cost for both policies; costs to other agencies and personal costs; costs and benefits to the drug user from both policies; and other values, which include productivity changes and accidents to third parties.

With regards to understanding the rationale behind certain polices in various parts of the world, the Coasean idea was identified as a relevant theory that could explain these changes. The theory implies that in the case of external costs which cannot be settled through private negotiations, the overall goal is to find an appropriate regulatory framework which allocates rights in a way that leads to the most efficient (lowest cost) outcome.

In countries such as Russia and Mexico, the costs of enforcing a policy of strict prohibition were found to be non-proportionate to actual cannabis offences. In other words the prohibition policy was inefficient, because the cost in terms of scarce criminal justice resources expended on enforcement exceeded the likely social costs of cannabis use lawmakers were attempting to prevent. This then led to the decriminalisation of small quantities of cannabis, which basically transfers some of the rights to small quantity users. This change underpins a key inference that drives the Coasean theory, that is, simply attempting to regulate the externalities (of drug use) out of existence may not lead to an economically efficient outcome; rather, laws and regulations should be put in place in such a way that an efficient solution can be achieved for society.

It was also identified that other countries had found existing prohibition laws to be ineffective in achieving the prohibition policy objective and therefore opted for alternate strategies such as demand reduction approaches. In countries such as Australia and Canada, the focus has been shifted to providing education and treatment (rehabilitation) programs instead of harsh criminal penalties. This again is one of the main arguments that supporters of legalisation point to, that is, cannabis consumption should be viewed as a health concern, rather than a criminal justice issue as a health-centred approach focused around education and prevention may be more effective and efficient in dealing with drug usage.

In other countries like Uruguay and the US, the potential tax revenues from the sale of cannabis were one of the main driving forces behind policy changes. Given that the black market for cannabis is so big, the idea that legitimate businesses and society at large should benefit instead of narrow criminal interests is another major argument supporters of legalisation make. This in turn will also decrease drug-related crimes and lower the probability of corruption among enforcement officials.

Although this approach to regulation does create risks involving the health of citizens, it had been identified that removing all risks when devising regulations are impractical, if not almost impossible. It is also argued in this regard that individuals in society should have freedom of allowance to make informed decisions within reason, about the risks of cannabis consumption.

And even though there may be a trade-off between tax revenues, saved resources and increased health care costs, an informed approach which endeavours to balance out this trade-off could be the key to efficient regulation.

One way this act could be 'balanced' can also be related back to Coasean theory. For example, the idea of increased health care costs negatively affecting society only imposes externalities if health care is provided free from government resources (tax). However, the Coasean theory implies that the market can potentially solve this externality if property rights can be clearly defined. So for instance, if there were regulations in place such that drug users were required to pay for their drug-related health care cost directly then the stronger the incentive would be to reduce drug consumption to a socially efficient level.

This can also be related to the externality of human capital accumulation, as it is argued that given youth consumption rates are high, legalisation would lead to an even greater amount of teenagers using cannabis and given evidence suggest that cannabis negatively affects learning abilities it would therefore dampened human capital accumulation. However, if regulations are in place which limits underage use then this externality could be reduced if these regulations are effectively enforced.

Therefore, the extent of the externalities imposed by legalisation can be viewed as a direct function of the regulations that will be in place and how efficiently these laws are enforced.

An examination of international cannabis laws provides an opportunity for countries to learn from and reconsider national rules and regulations. It had been discovered that prohibition can have its own set of externalities, such as increased law enforcement cost, stigma and discrimination and the creation of black markets which all directly or indirectly impose costs on to society.

However, countries' economic environments differ and it is therefore important that countries do not import policy unmodified from other nations without taking the context of the country into consideration. For example, the US may be highly effective in enforcing regulations, and therefore may derive the maximum benefit from tax revenues from cannabis sales, or may incur the least possible costs as a result of restricting underage consumption or restricting importation of illegal cannabis. However, in other countries, these control measures may not be as effective and therefore the cost and benefits may not be directly comparable to that of the US.

It is therefore important for countries to look at how effectively other harmful substances are controlled in order to gain an understanding of the probable effectiveness of cannabis regulations. It had been identified that the effectiveness with which regulations are enforced will play a vital role when it comes to the overall effect of legalisation.

If it is enforcement costs that are the major concern, then a decriminalised policy may well bring about efficiency gains without some of the negative consequences of legalisation. However, in cases where regulations can be effectively enforced then the full benefit of legalisation may be realised.

For most of the world, the debate surrounding cannabis is far from over. Reliable data are required regarding cannabis usage, as the demand responses are vital to estimating the magnitude of costs and benefits of legalisation.

Implementing a legalised model could produce consequences that may become irreversible as it would not be easy to go back to prohibition. Therefore it would be wise for countries to proceed cautiously and continue to monitor the effects of legalisation in the countries that have implemented these frameworks.

REFERENCES

1. Adler, M.A. (2007). *Encyclopedia of Law & Society: American and Global Perspectives.* Cost-Benefit Analysis. Thousand Oaks.

2. Adler, M. and Posner, E.A. (2009). *New foundations of cost–benefit analysis.* Regulation & Governance (2009) 3, 72–83.

3. Ames, F. (1958). A Clinical and Metabolic Study of Acute Intoxication with Cannabis Sativa and Its Role in the Model Psychosis, Marijuana: Medical Papers, Reprinted from Journal of Mental Science, vol. 104, October 1958, pp. 972-999.

4. Australia. Department of Finance and Administration (DFA). (2006). *Introduction to cost-benefit analysis and alternative evaluation methodologies.* Department of Finance and Administration [Canberra]: http://www.finance.gov.au/finframework/docs/Intro_to_CB_analysis.pdf (Accessed: 8 March 2016).

5. Bates, S.W. (2004).The Economic Implications of Marijuana Legalization in Alaska. Principal Investigator Boreal Economic Analysis & Research Fairbanks. Alaska.

6. Baxter, J.H. and Baker, H.M. (2012). *The Use of Cannabis for Medical Purposes*. J Global Drug Policy, 7.

7. Belfield, C. (2012) How Does Cost-Benefit Analysis Help Determine Public Value? Department of Economics, Queens College, City University of New York. Draft paper prepared for Creating Public Value Conference, University of Minnesota.

8. Better Regulation Task Force. (2003). *Principles of Good Regulation*. Available at: http://webarchive.nationalarchives.gov.uk/20100407162704/http:/archive.cabinetoffice.gov.uk/brc/upload/assets/www.brc.gov.uk/principlesleaflet.pdf (Accessed: 5 March 2015).

9. Bewley-Taylor, D., Blickman, T. and Jelsma, M. (2014). *The rise and decline of cannabis prohibition.* The history of cannabis in the UN drug control system and options for reform. Amsterdam/Swansea: Global Drug Policy Observatory/Transnational Institute.

10. Bickford, T. (2014). *Campaign to Regulate Marijuana like Alcohol.* Available at: http://regulatemarijuanainalaska.org/. Accessed: 2 May 2015.

11. Bretteville-Jensen, A.L. (2006a). *Drug demand–initiation, continuation and quitting.* De Economist, 154(4), pp.491-516.

12. Bretteville-Jensen, A.L. (2006b). *To legalize or not to legalize? Economic approaches to the decriminalization of drugs.* Substance use & misuse, 41(4), pp.555-565.

13. Bryan, M., Del Bono, E. and Pudney, S. (2011). *Licensing and regulation of the cannabis market in England and Wales: Towards a cost-benefit analysis.* Institute for Social and Economic Research.

14. Castaldi, M. and Llambias, F. (2013) *Uruguay becomes first country to legalize marijuana trade.* Available at: http://www.reuters.com/article/us-uruguay-marijuana-vote-idUSBRE9BA01520131211 (Accessed: 10 March 2015).

15. Caulkins, J.P. (2010). *Estimated cost of production for legalized cannabis.* RAND Corporation, WR-764, Santa Monica, CA: RAND.

16. Central Drug Authority & Human Sciences Research Council (CDA and HSRC), (2015). *Cannabis Round Table Discussion.* Kopanong Hotel and Conference Centre.

17. Constitutional Court of South Africa, (2002). (Prince V President of the Law Society of the Cape of Good Hope (CCT 36/00) (2002) ZACC 1).

18. Crombie, N, (2014).*Marijuana legalization Q&A: What's next for Oregon?* Oregonian/OregonLive. Available at: http://www.oregonlive.com/politics/index.ssf/2014/11/marijuana_legalization_oregon.html. (Accessed: 11 April 2015).

19. Department of Agriculture, Forestry and Fisheries (DAFF), (2011). *A PROFILE OF THE SOUTH AFRICAN HEMP MARKET VALUE CHAIN*. Available at: http://www.nda.agric.za/doaDev/sideMenu/Marketing/Annual%20Publications/Commodity%20Profiles/INDUSTRIAL%20PRODUCTS/Hemp%20Market%20Value%20Chain%20Profile%202013.pdf (Accessed: 9 March 2015).

20. Drug Policy Alliance. (2015a). *Status Report: Marijuana Legalization in Colorado after One Year of Retail Sales and Two Years of Decriminalization.* New York.

21. Drug Policy Alliance. (2015b). New York. *Status Report: Marijuana Legalization in Washington after 1 Year of Retail Sales and 2.5 Years of Legal Possession.* New York.

22. Drugs and Drug Trafficking Act. No 140 of 1992, 5(b).[Assented to 2 July, 1992]**,** [Date of Commencement: 30 April, 1993]. Act has been updated to Government Gazette 33601 dated 8 October, 2010.

23. du Plessis, A, Visser, I and Smit, A. (2013). *South African National Cannabis Working Group.* Cannabis Position Paper 2013.

24. Green, J. (2012). *Toughest marijuana laws around the world*. Available at: http://www.theweedblog.com/toughest-marijuana-laws-around-the-world/ (Accessed: 2 May 2015).

25. Joy, JE, Watson, SJ and Benson, JA. (1999). *Marijuana and Medicine: Assessing the Science Base.*Institute of Medicine. Division of Neuroscience and Behavioral Health, National Academy of Sciences.

26. Kilmer, B. (2010). *Insights on the effects of marijuana legalization on prices and consumption.*

27. Kruger, G, Du Toit, C and Fourie, D. (2014). *National Position Paper on Cannabis Sativa.* SANCA National Treatment Portfolio.

28. Miron (2010). *The Budgetary Implications of Drug Prohibition.* Department of Economics, Harvard University.

29. Miron, JA. (2005). *The Budgetary Implications of Marijuana Prohibition.*Department of Economics, Harvard University.

30. National Drug Master Plan (NDMP), (2011). *National Drug Master Plan 2012-2016.* First Draft 2nd Revision, Minister of Social Development.

31. New approach, (ND). *Washington, About the Initiative 502*. Available: http://www.newapproachwa.org/. Accessed: 2 May 2015.

32. Ngui, R; and Shanahan, M. (2010). *Cannabis Use Disorder Treatment and Associated Health Care Costs in New South Wales, 2007*. National Drug and Alcohol Research Centre.

33. NORML, (2015a). Washington Laws & Penalties. (Online) Available: http://norml.org/laws/item/washington-penalties-2. Accessed: 2 May 2015.

34. NORML, (2015b). Colorado Laws & Penalties. (Online) Available:http://norml.org/laws/item/colorado-penalties. (Accessed: 2 May 2015).

35. NORML, (2015c).Alaska Laws & Penalties. (Online) Available: http://norml.org/laws/item/alaska-penalties. (Accessed: 2 May 2015).

36. NORML, (2015d).Oregon Laws & Penalties. (Online) Available: http://norml.org/laws/item/oregon-penalties-2/. (Accessed: 2 May 2015).

37. NORML, (2015e).District of Columbia Laws & Penalties. (Online) Available:http://norml.org/laws/item/district-of-columbia-penalties. (Accessed: 2 May 2015).

38. Organisation for Economic Co-operation and Development (OECD), (2008). *Introductory Handbook for Undertaking Regulatory Impact Analysis (RIA).* Version 1.

39. Pacula R.L and Lundberg R. (2014). *Why changes in price matter when thinking about marijuana policy: a review of the literature on the elasticity of demand.*Public Health Reviews.

40. Paterson, C. (2009). *Prohibition & Resistance: A socio-political exploration of the changing dynamics of the Southern African cannabis trade, c. 1850-the present. (*Doctoral dissertation, MA thesis, Rhodes University, Grahamstown).

41. Peltzer, K. (2007). Cannabis use trends in South Africa. Human Sciences Research Council and University ofLimpopo, Pretoria, Volume 13 No. 4.

42. Peltzer, K. and Ramlagan, S. (2007). *Cannabis use trends in South Africa.* South African journal of psychiatry, 13(4), p.6.

43. Perkel, C. (2005). *Cannabis-the debate continues: a South African perspective*: original article. African Journal of Psychiatry, 8(1), pp.25-30.

44. Piper, A. (2005). *The Mysterious Origins of the Word 'Marihuana.* Ino-Platonic Papers, Number 153.

45. Reuter, P., Kilmer, B., Caulkins, J.P., Pacula, R.L. and MacCoun, R.J. (2010). *Altered state? Assessing how marijuana legalization in California could influence marijuana consumption and public budgets.* Santa Monica, CA: RAND.

46. Roussell, A. (2012). *Forensic Identification of Marijuana: Suspicion, Moral Danger, and the Creation of Non-Psychoactive THC.* The. Alb. LJ Sci. & Tech., 22, p.103.

47. Shanahan, M. (2011). *Assessing the economic consequences of two cannabis policy options.* Drug Policy Modelling Program. National Drug and Alcohol Research Centre.

48. Shanahan, M. and Ritter, A. (2012). *A CBA of cannabis legalisation: Lessons learned and future directions.* Drug Policy Modelling Program, University of New South Wales, Australia.

49. Shane, S. (2014). *Why Colorado and Washington were wise to legalize pot.* Available at: http://www.entrepreneur.com/article/230942 (Accessed: 19 June 2015).

50. Shepard, E.M. and Blackley, P.R. (2007). *The impact of marijuana law enforcement in an economic model of crime.* Journal of Drug Issues, 37(2), pp.403-424.

51. Sienden, A., Kysar, DA. and Driesen, DM. (2006). *Cost-Benefit Analysis: New Foundations on Shifting Sand.* Temple University Beasley School of Law.

52. Smith, MT. (2011). *The Financial and Economic Feasibility of Biodigester Use and Biogas Production For Rural Households.* The University of Kwa-Zulu Natal.

53. South African Central Drug Authority (SACDA), (2004). *Position Paper on Cannabis.*

54. United Nations Office on Drugs and Crime (UNODC), (2011). *Cannabis: A Short Review.* Discussion Paper.

55. Wilkins, C and Scrimgeour, F, (2000). *Economics and the Legalisation of Drugs.* Agenda, Volume 7, Number 4, 333-344.

56. World Health Organisation. (2006). *Guidelines for conducting cost-benefit analysis of household energy and health interventions.* In Guidelines for conducting cost-benefit analysis of household energy and health interventions. OMS.

Turnitin Originality Report

Masters Dissertation 2016 by Tachin Ramnath

From Thesis (Economics PhD)

- Processed on 14-Mar-2016 6:34 PM CAT
- ID: 611891206
- Word Count: 35453

Similarity Index

8%

Similarity by Source

Internet Sources:

8%

Publications:

2%

Student Papers:

N/A

sources:

1

3% match (Internet from 02-Mar-2016)

http://www.beckleyfoundation.org/wp-content/uploads/2013/09/BF-CANNABIS-CBA-REPORT.pdf

2

1% match (Internet from 06-Oct-2010)

http://whqlibdoc.who.int/publications/2006/9789241594813_eng.pdf

3

1% match (Internet from 08-Mar-2012)

http://protect.theinfo.org/wikileaks/file/za-cda-cannabis-position-2009.pdf

4

1% match (publications)

Amy Sinden. "Cost-benefit analysis: New foundations on shifting sand", Regulation & Governance, 03/2009

5

< 1% match (Internet from 12-May-2015)

http://www.nda.agric.za/doaDev/sideMenu/Marketing/Annual%20Publications/Commodity%20Profiles/INDUSTRIAL%20PRODUCTS/HEMP%20MARKET%20VALUE%20CHAIN%20PROFILE%202012.pdf

UNIVERSITY OF ™
KWAZULU-NATAL

INYUVESI
YAKWAZULU-NATALI

08 December 2015

Mr Tachin Ramnath (209525163)
School of Accounting, Economics & Finance
Westville Campus

Dear Mr Ramnath,

Protocol reference number: HSS/1769/015M
Project title: An economic evaluation of alternate cannabis policy options - towards a Cost-Benefit Analysis

Full Approval – No Risk / Exempt Application

In response to your application received on 18 November 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully
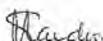
....
Dr Shamila Naidoo
On behalf of Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Ms Jessica Schroenn Goebel
Cc Academic Leader Research: Dr Harold Ngalawa
Cc School Administrator: Ms Jerusha Naidoo / Ms Nondumiso Mfungeni

---