

The South African hemp story: saviour crop or business as usual?

By

Camila Joan Coogan

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University

Supervisor: Luke Metelerkamp
Co-supervisor: Stefanie Swanepoel

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Declaration

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Abstract

This study, presented in the form of two journal articles, seeks to understand the barriers to initiating a viable, inclusive and sustainable hemp industry in South Africa. Production of the crop has been prohibited in the country since the early 1900s, although state-supported research trials into its agronomic and commercial feasibility in South Africa have been ongoing since the 1990s. The increased global interest in hemp is fuelled by the need to find sustainable replacements for high-carbon materials such as fibres, paper, plastics, and so on. In addition, hemp offers nutritional and medicinal benefits. While many countries, such as Canada, began removing restrictions on hemp production and researching the beneficial uses of the crop at the same time as South Africa began trials, this country is still to realise any benefits from both public and private-sector investment in research. This study aims to unearth the barriers – both obvious and more hidden – in an effort to contribute to overcoming them and realising a viable hemp industry in South Africa. Using a qualitative research approach, within a grounded theory framework, the study employed a literature review of both academic and grey literature (research reports, news articles, etc.) and conducted semi-structured interviews with 16 key stakeholders. During this process, small findings emerged, which allowed a theory to begin to develop as to the obstacles facing the industry. There is little academic literature to draw on about establishing a hemp industry in the developing world; the study therefore draws from research on infant industries, innovation and the role of subsidies to frame the discussion. The first journal article (*An analysis of the historical determinants shaping the future of the South African hemp industry*) explores the visible barriers of legislation, which in turn revealed the second barrier. This is the desire for hemp production to contribute towards solving South Africa's socioeconomic challenges as a 'saviour crop'. The third visible barrier is the lack of clarity about whether hemp production would be commercially feasible in South Africa, and, if so, what kind of production model would be best. The primary finding in the first journal article is that perhaps the lack of a clearly articulated vision from government for the industry in terms of its desired socioeconomic contribution and commercial feasibility is the biggest stumbling block. The second journal article (*An exploration of the competing narratives within South Africa's hemp industry*) highlights the 'invisible' barriers, including the differing expectations and vision for the industry, the existing silo mentality within stakeholders, dispersed and misdirected funding streams, absence of a public champion, and industry fatigue. Both articles use illustrative examples from other countries to highlight elements that could be of use in South Africa, emphasising the importance of an institutionalised home for hemp in the country, state support, communication between stakeholders, and an applicable licensing model. It is hoped that the study provides an accurate reflection of the industry and opens up discussions about alternative ways forward over, around or through the identified barriers.

Keywords: hemp industry South Africa, infant hemp industry, agricultural skills transfer, saviour crop, cannabidiol (CBD), industry gatekeepers, silo mentality, agricultural champions, natural fibre

Opsomming

Die doel van hierdie studie, wat in die vorm van twee vaktydskrifartikels aangebied word, is om te probeer verstaan wat die vestiging van 'n lewensvatbare, inklusiewe en volhoubare hennepbedryf in Suid-Afrika verhinder. Hoewel die verbouing van dié gewas sedert die vroeë 1990's verbied word, word staatsondersteunde navorsingsproewe oor die agronomiese en kommersiële haalbaarheid daarvan in Suid-Afrika sedertdien op 'n deurlopende grondslag uitgevoer. Die toenemende internasionale belangstelling in hennep word aangevuur deur die behoefte aan volhoubare plaasvervangers vir koolstofryke materiale soos vesel, papier, plastiek, ensovoorts. Daarbenewens hou hennep bepaalde voedings- en medisinale voordele in. Hoewel baie lande, waaronder Kanada, die verbod op hennepverbouing begin ophef en die voordelige gebruike van die gewas begin ondersoek het, juis toe Suid-Afrika se proewe 'n aanvang geneem het, het openbare en privaatsektorbelegging in navorsing in Suid-Afrika nog geen vrugte afgewerp nie. Hierdie studie probeer die ooglopende sowel as meer verborge hindernisse bepaal ten einde dit te bowe te help kom en 'n lewensvatbare hennepbedryf in Suid-Afrika te help vestig. Aan die hand van 'n kwalitatiewe navorsingsbenadering en 'n grondige teoretiese raamwerk is 'n literatuuroorsig van akademiese sowel as grys literatuur (navorsingsverslae, nuusberigte, ensovoorts) onderneem, en is semigestruktureerde onderhoude met 16 sleutelbelanghebbendes gevoer. Algaande het klein bevindinge na vore gekom op grond waarvan 'n teorie oor die struikelblokke vir die bedryf ontwikkel kon word. Daar is weinig akademiese literatuur om te raadpleeg oor die vestiging van 'n hennepbedryf in die ontwikkelende wêreld. Daarom put die studie uit navorsing oor jong bedrywe, innovasie en die rol van subsidies om die bespreking te rig. Die eerste vaktydskrifartikel ("An analysis of the historical determinants shaping the future of the South African hemp industry") verken die sigbare hindernis van wetgewing, wat op sy beurt die tweede hindernis na vore gebring het, naamlik die wens dat hennepverbouing as 'n soort 'reddergewas' tot 'n oplossing vir die sosio-ekonomiese uitdagings van Suid-Afrika sal bydra. Die derde sigbare hindernis is die gebrek aan duidelikheid oor of hennepverbouing kommersieel haalbaar sal wees in Suid-Afrika en, indien wel, watter soort produksiemodel die beste sal wees. Die hoofbevinding in die eerste artikel is dat die gebrek aan 'n duidelik verwoorde regeringsvisie wat betref die gewenste sosio-ekonomiese bydrae en kommersiële lewensvatbaarheid van die bedryf die grootste struikelblok is. Die tweede vaktydskrifartikel ("An exploration of the competing narratives within South Africa's hemp industry") beklemtoon die 'onsigbare' hindernisse, waaronder die verskillende verwagtinge van én visie vir die bedryf, die bestaande 'silo-mentaliteit' onder belanghebbendes, karige en wanaangewende finansieringstrome, die gebrek aan 'n openbare kampvegter, en bedryfsafmatting.

Albei artikels gebruik voorbeelde uit ander lande om elemente uit te lig wat in Suid-Afrika van nut kan wees, met die klem op die belang van 'n geïnstusionaliseerde tuiste vir hennep in die land, staatsondersteuning, kommunikasie tussen belanghebbendes, en 'n gepaste lisensiëringsmodel. Die hoop is dat die studie 'n akkurate weerspieëling van die bedryf bied en tot gesprekke sal lei oor alternatiewe toekomstige handelwyses om óór, óm of déúr die betrokke hindernisse te kom.

Trefwoorde: hennepbedryf, Suid-Afrika, jong hennepbedryf, oordrag van landbouvaardighede, reddergewas, kannabidiol ("CBD"), bedryfshekwagters, silo-mentaliteit, landboukampvegters, natuurlike vesel

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List of acronyms and abbreviations

ARC	Agricultural Research Council
BBC	British Broadcasting Corporation
CBD	Cannabidiol
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
ECHPPI	Eastern Cape Hemp Pilot Project Initiative
NHF	National Hemp Foundation
NPC	National Planning Commission
THC	Tetrahydrocannabinol
ZAR	South African Rand

Chapter 1: Introduction

1.1 Introduction

This study, titled *The South African hemp story: saviour crop or business as usual*, aims to explore the barriers to establishing a viable hemp industry in South Africa. It does this in the form of two journal articles. The first article (*An analysis of the historical factors shaping the future of the South African hemp industry*) is presented in Chapter 2 and explores the obvious barriers – legislation prohibiting hemp production, the desire for the industry to fulfil socioeconomic objectives, and questions around the commercial feasibility of the crop in South Africa. The second article (*An exploration of the competing narratives within South Africa's hemp industry*) is presented in Chapter 3 and unearths more intangible barriers that emerge from in-depth, semi-structured interviews with key stakeholders in the industry. The study contributes towards much-needed analysis of the industry in South Africa and its key stakeholders, as well as presenting possible ways forward. I intend to submit my first article to the *Journal of Sustainable Development in Africa*. It supports work dealing with theoretical and operational developmental efforts in Africa from a transdisciplinary angle. The journal publishes peer-reviewed articles between 16–25 double-spaced pages with an abstract of 100–300 words. I will submit my second article to the *Journal of Good Governance and Sustainable Development in Africa*. It is peer-reviewed and published quarterly by the Research Centre for management and social studies that aims at accelerating socio-economic development in vast areas of the world. Both use an APA referencing method.

1.2 Study rationale and research aim

I have experienced first-hand the benefits of using hemp as an alternative eco-friendly building material: I live in the first hemp house built in South Africa, and I have personally assisted in mixing and applying hemp-crete to a house being built as a World Design Capital project. I am an employee at Hemporium, an import-based South African hemp retail company that manufactures and sells a diverse range of hemp products from fabric to cosmetics and nutrition. In addition to this, I have been closely following the progress of the Western Cape commercial incubation hemp trial, and have been involved as a volunteer in the 2013 harvest of the crop. Therefore, I have seen and experienced the tangible value hemp has to offer in its various forms and across a diverse range of products. I entered this research with the intention of investigating the story of hemp in South Africa to identify the determinants of the current and future status of hemp in the country.

1.3 Research objectives

The overall objective is to identify the factors influencing the status and progress of the South African hemp industry.

A secondary objective is to discover ways of overcoming these obstacles. For this reason, the first article focuses on the obvious barriers, and the second article on more hidden barriers that only emerged during the research process.

Both need to be addressed before hemp can realise the vision of a viable, sustainable, inclusive industry held dear by many stakeholders.

1.4 Conceptual framing

Claims about hemp being a 'saviour crop' have often been exaggerated (Rhydwen, 2006), such as that it can grow without fertilisers, pesticides, using minimal water and in poor soil (Business Day, 1995; Danylchuk, 1995; Nel, 1998; Vermeulen, 2008; Piotrowski & Carus, 2011). Hemp remains, however, one of the most versatile plants known to man with an estimated 25 000 uses (Robinson, 1996; Vermeulen, 2008; Piotrowski & Carus, 2011; Fine, 2014; Johnson, 2015). The diagram below illustrates the multitude of uses for the different parts of the plant along the value chain.

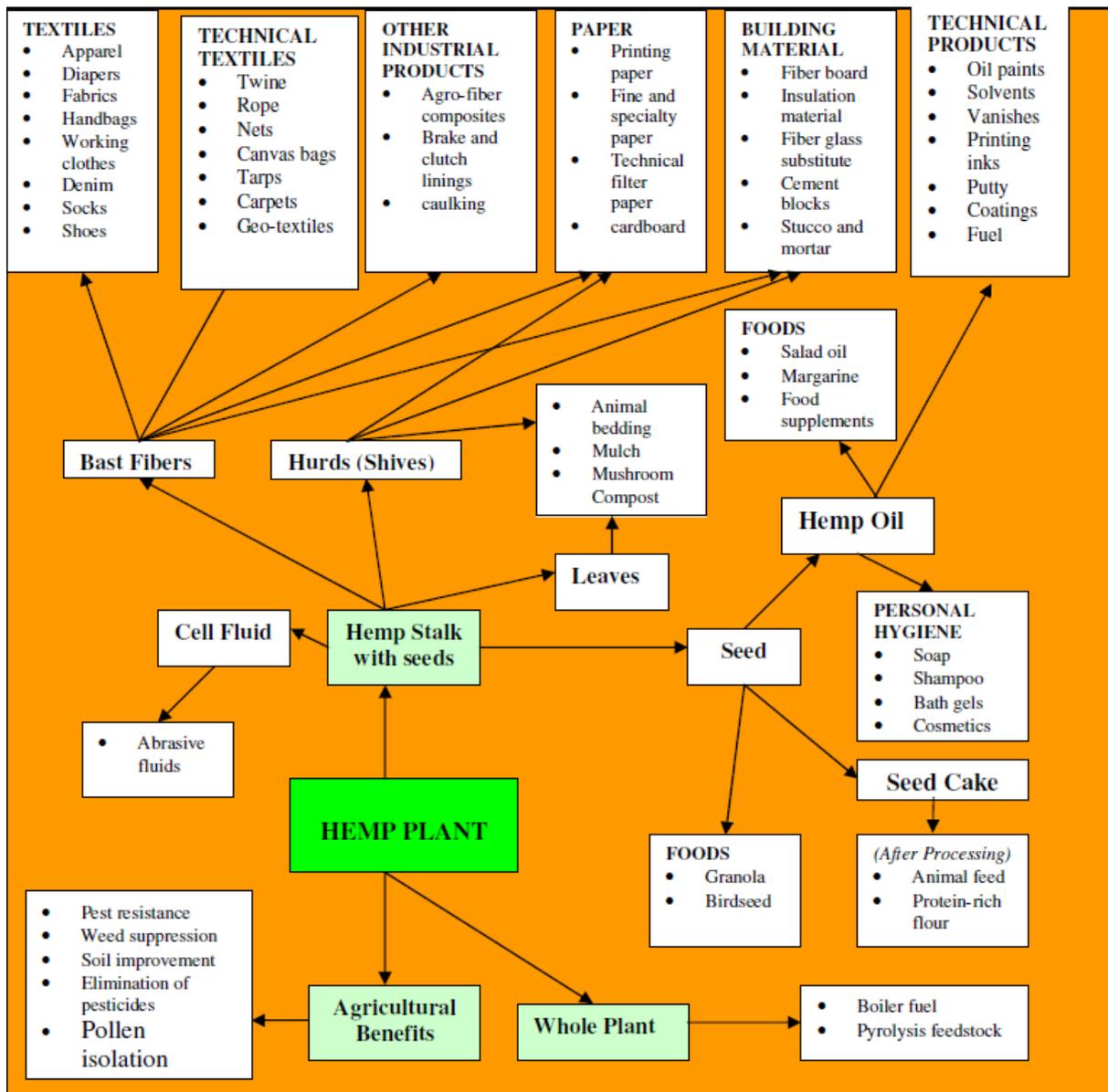


Figure 1: Hemp Value Chain

Source: DAFF (2011)

There is substantial research showing that hemp can be a more eco-friendly alternative to many of the ecologically destructive materials used in the textile, construction, farming and biomass, among other, industries, (Rhydwen, 2006; Vermeulen, 2008; Piotrowski & Carus, 2011; Finnan & Styles, 2013; Perozzo, 2015). Therefore, this thesis is based on the argument that hemp should be developed as an industry in South Africa, diversifying our agricultural industry and potentially creating jobs within various sectors (Blouw, 2005; Rhydwen, 2006). On this premise, this thesis unravels the possible hindrances to the development of the South African hemp industry.

1.5 Study outline

This thesis argues two main points: firstly that the story of hemp in South Africa is shaped by historical factors, some unique to South Africa; and secondly, that the barriers influencing the current status of hemp go beyond legislation and are often hidden or obscure.

The first article argues that South Africa's particular historical factors shape the potential future of the hemp industry and the opportunities it provides to bring about environmental, social and economic benefits. These factors are legislation, economic conditions, and a history of social inequity. The factors and the relationships between them present particular barriers for those wanting to explore the many benefits of this so-called saviour crop. A comparative literature review and cursory interviews into South Africa's kenaf industry also provided insight from another infant natural fibre industry. The level of analysis is primarily at a national and organisational level.

The second article identifies and elaborates on the several, sometimes competing, narratives around the future of the South African hemp industry. There are many different stakeholders, including government representatives, the private sector, small-scale and commercial farmers and researchers. These stakeholders have many overlapping interests, but expect quite divergent outcomes.

The lines dividing stakeholders are murky, and it was only through spending time interviewing key stakeholders that the more obscure blockages to the hemp industry in South Africa emerged.

1.6 Overarching literature

The National Development Plan (NPC, 2012) and 2015 World Wide Fund for Nature (2015) agricultural report were used as primary documents as well as literature on infant industries and the hemp industry in other places, mostly Canada. Comparative literature on South Africa's kenaf industry was also included to bring insight from another infant natural fibre industry. The bulk of the literature is drawn from grey sources – annual reports, trial results, news articles and so on. There is a dearth of peer-reviewed academic literature on starting a hemp industry in the developing world.

1.7 Methodology

The sampling procedure was influenced by initially wanting to investigate the job creation opportunities of legalising hemp in South Africa. After doing an initial literature search and speaking off the record to people who were involved, it became clear, however, that there wasn't enough data to compile a research project that would offer a true reflection.

Therefore, even though the process of gathering literature had begun, the access I gained to many of the key role players who had been or are still involved in the hemp industry became the driving force in the study. As more individuals were interviewed, the real obstacles began to emerge and this shaped the literature chosen. This often led to more interviews with additional role players, and further enquiries with initial interviewees, which then highlighted more theories, and instigated a return to the literature to investigate, and the process continued as such. This resulted in an iterative and recursive process based on the concept of grounded theory.

The reason for selecting the grounded theory approach is that it allows concepts and theories to emerge through the data-collecting process (Kolb, 2012). I already had a basic knowledge of the hemp industry when I started the research and could make initial hypotheses that developed into theories as the interviews were conducted and studied. The grounded theory approach was useful as the theoretical work on hemp, especially in South Africa, is underdeveloped and the literature that exists is not necessarily available to the public. Choosing interviews as the main source of data collection (see Table 1) was the most efficient way of accessing the nuances of South Africa's hemp 'story' that could be playing a greater influencing role on the current and future prospects for the industry.

Table 1: List of interviews with key stakeholders

Sector	Organisation	Interviewee	Role	Interaction
Private sector	Hemptions	Amelia Karg	Owner of Hemptions, a hemp nutrition and cosmetics manufacturer, distributor and wholesaler	<ul style="list-style-type: none"> • 1x formal interview (2/8/2015) • communication through email afterwards
Private sector	Hemporium	Tony Budden	<p>Owner of Hemporium, a South African hemp products company specialising in fabrics and clothing</p> <p>Involved in lobbying government to legalise hemp cultivation in South Africa</p> <p>Partnered with Rapula Farm for commercial research trials</p>	<ul style="list-style-type: none"> • 1x formal interview (1/8/2015) • multiple loose discussions
Private sector	House of Hemp	Thandeka Kunene	<p>Owner of House of Hemp as well as the National Hemp Foundation (NHF) coordinator</p> <p>Also key private sector member that communicates with government on behalf of the private sector</p>	<ul style="list-style-type: none"> • 1 x formal interview (12/06/2015) • communication by phone, email and SMS afterwards
Private sector	South African Organic Sector Organisation	Thierry Revert	<p>Former member of the Southern African Hemp Company</p> <p>Promotes the legalisation of hemp production with a focus on organic farming practices</p>	<ul style="list-style-type: none"> • 1x formal interview (30/06/2015) • communication by email afterwards
Private sector	N/A	Paul Cohen	Former member of the Southern African Hemp Company	<ul style="list-style-type: none"> • 1 x semi-formal interview (19/7/2015) • communicated by email afterwards
Private sector/ researcher	N/A	James Wynn	Former member of the Southern African Hemp Company	<ul style="list-style-type: none"> • Email correspondence (3/9/2015)

Researcher	N/A	Craig Paterson	Wrote a thesis titled: <i>Prohibition & Resistance: A Socio-Political Exploration of the Changing Dynamics of the Southern African Cannabis Trade, c. 1850-the present</i> suggesting Cannabis prohibition started in South Africa	<ul style="list-style-type: none"> Correspondence through email (4/9/2015)
Private sector	The 'Dagga Couple'	Myrtle Clarke & Jules Stobbs	Middle-aged South African citizens arrested for possession of Cannabis in their home. They have taken up the challenge to decriminalise Cannabis in South Africa	<ul style="list-style-type: none"> Loose, informal conversation (4/9/2015) Further email correspondence to confirm knowledge obtained in meeting
Government	Department of Agriculture, Forestry and Fisheries (Formerly)	Monde Sotana	Project manager of the Eastern Cape trials	<ul style="list-style-type: none"> 1x formal interview (10/7/2015) ongoing email, phone correspondence afterwards
Government/ research	Council for Scientifics and Industrial Research (CSIR)	Sunshine Blouw	CSIR research leader of non-woven and composite research group Involved in the Eastern Cape trials	<ul style="list-style-type: none"> 1x formal interview (3/8/2015) contacted via email once afterwards
Government/ research	Agricultural Research Council (ARC)	Graham Thompson	Research manager at the ARC.	<ul style="list-style-type: none"> 1x formal interview (8/8/2015) communication by email afterwards
Agriculture	Emerging farmers	Tamie Madliwa	Emerging farmer that participated in the Eastern Cape trials Secretary of the Indalo Fibres and Oils Cooperative	<ul style="list-style-type: none"> 1x formal interview (12/8/2015) communicated via phone once afterwards
Agriculture	Commercial farmer – Rapula Farm	Mike Gregor	Conducted Rapula Farm hemp commercial incubation trials	<ul style="list-style-type: none"> 1x formal interview (15/8/2015) communicated via email afterwards
Natural fibre industry	Herdman's processing plant in Atlantis	Johan Beukes	Former manager, knew a lot about the kenaf project in Winterton	<ul style="list-style-type: none"> informal discussion and email correspondence (14/8/2015)

Source: Author (2015)

Interviews were recorded and transcribed to ensure accuracy of data. All ethical processes were followed, including gaining formal consent from the Ethics Committee, informing interviewees of their rights, and securing their written permission for the interviews. They were free to exclude information they had given from the formal records.

One of the downfalls of the grounded theory approach is that the findings can often be too conceptual and not tangible enough. Additionally, due to the recursive and iterative nature of this approach, the continual process of identifying a possible lead from the data then investigating through literature often leads to further interviews and can at times prevent the research from reaching a satisfactory level of depth and detail (El Hussein, 2014). Being aware of the downfalls of the research methods chosen assisted with minimising their negative influence on the research.

On a more personal level, my own bias and involvement in the industry could pose as a limitation. As a researcher already associated with a leading activist and role player in the South African hemp industry, interviewees may have avoided disclosing certain (and perhaps pertinent) information. Efforts were made to avoid being immediately associated with the opinions of the hemp activist Tony Budden due to a close relationship with him, while still practicing transparency. An attempt to counteract this was done by reflecting on scenarios alone and with objective individuals not part of the story. Lastly, the fact that key government departments, namely, the Department of Health, Department of Agriculture, Forestry and Fishing (DAFF) and the South African Police Service did not respond to requests for interviews or were not permitted to share information, left the research without first-hand insight and opinions from these influential public actors. This was addressed by investigating literature and speaking to other role players who had contact with them. Another limitation to this data-collecting technique is the possible misinterpretation of participants' answers and the importance they placed on certain statements and therefore relaying their position in an inaccurate way.

1.8 Conclusion

By utilising the grounded theory approach using the research methods of semi-structured interviews and a literature review, the findings that emerged are threaded throughout both journals aiming to tell the South African hemp story to date while analysing what blockages need to be attended to in order to create a viable, inclusive and sustainable hemp industry in South Africa. While each journal article can stand on its own, to avoid repetition, acronyms have been introduced once on first mention in the document and then used throughout, as have multi-authored publications. The table of interviewees has been introduced in Chapter 1, but is referred to in other sections.

Chapter 2: An analysis of the historical factors shaping the future of the South African hemp industry

2.1 Introduction

South Africa's particular historical factors shape the trajectory of the country's future path, including that of its varied primary and secondary industries. The country's infant hemp industry is, in turn, affected by these factors, which derive from historical and entrenched social and economic inequalities. The factors and the relationships between them present particular barriers to those wanting to explore the myriad social, environmental and economic benefits promised by hemp production, a so-called 'saviour' crop. A saviour crop is one that purportedly delivers a country from its social, economic and ecological ills (Dictionary.com, 2015). Hemp is used as a primary or secondary component for more than 25 000 consumer products, including clothing, building materials, medicines, paints, fuel, plastics and lubricants (Robinson, 1996; Vermeulen, 2008; Fine, 2014; Johnson, 2015). As far back as 1938, it was hailed as "The Billion Dollar Crop" by Popular Mechanics Magazine (1938). It is believed to be a sustainable alternative (in environmental and economic terms) to fossil fuel-based products and, through its seeds, provides high levels of nutrients, as well as protein (Vahanvaty, 2009).

Most Western countries banned the cultivation of hemp in the early 1900s (United Nations, 1961). South Africa was a forerunner in this movement with local prohibitions placed on *Cannabis* (encompassing both hemp and marijuana varieties) production in the late 1800s by various British governors and imposing a national ban in 1922 when all four provinces were amalgamated into the Union of South Africa (Paterson, 2009). The Union called for an international ban in 1923 (Paterson, 2009). The rationale among Western countries for prohibiting hemp production range from its similarity and resultant association with marijuana, a member of the *Cannabis* species that has narcotic properties, to a desire to maintain market share for other materials, such as timber for wood pulp (Esmail, 2010). Countries such as the United Kingdom, Canada and Australia, however, began challenging and changing this legislation in the early 1990s in order to explore the varied benefits of the crop (Karus & Vogt, 2004; Cole & Zurbo, 2008; National Industrial Hemp Strategy, 2008).

South Africa remains embroiled in heated controversy as to whether hemp production should be legalised, despite the fact that hemp production provides a platform for establishing an agronomic industry, thus potentially opening up much-needed new job and livelihood opportunities (Blouw, 2005; Cole & Zurbo, 2008; Owen, 2012).

It could also generate space for innovative research and development – particularly regarding medicinal applications; and, potentially, offer a way in which the country's small-scale farmers could enter a commercial market space (Horton, 2009; Xinhua News Agency, 2009).

Identified sectors in South Africa that would benefit from hemp production include the manufacturing of agri-fibres for car parts (Hemporium, 2015), as done by Mercedes-Benz and other leading international vehicle manufacturers (Holbery & Houston, 2006; Suddell, 2007); processing of natural building materials (insulation, bricks and cement for housing) (Perozzo, 2015); providing nutritional supplements (Vahanvaty, 2009); and eco-friendly paper production (Hemporium, 2015). Expanding these sectors would create jobs and contribute to ameliorating housing challenges, malnourishment and unemployment levels in the country (National Planning Commission [NPC], 2012).

This article explores the legislative framework, which presents as a primary barrier, and ascertains through a review of academic and grey literature and by conducting extensive semi-structured interviews with key stakeholders, other barriers particular to the South African context. These include the need to address issues of social inequality and the economic aspects of production, processing and manufacturing. The study is an attempt to understand the barriers and explore ways of overcoming them to contribute towards opening up a viable space for a potentially high-value hemp industry in South Africa.

2.2 Methodological approach

The nature of the research determined the methodological approach. There is not yet an extensive body of peer-reviewed literature on initiating a hemp industry in the developing world and the study was therefore exploratory in nature, following threads in both the literature and the data generated through in-depth interviews to generate 'small' findings. In effect, a qualitative, grounded theory research methodology was employed to enable these small findings to coalesce into emergent theories (Kolb, 2012; El Hussein, 2014).

Two primary methods were used. The literature review drew primarily on grey literature, given the dearth of academic, peer-reviewed work done on this subject, and included newspaper articles, company reports, memos, unpublished field studies and so on. This was complemented by theoretical studies on aspects such as innovation (Council of Higher Education, 2009; Herrington, Kew & Kew, 2009; Steenekamp, van der Merwe & Athayda, 2011; Dutta & Lanvin, 2013; Ernst & Young Global Limited 20, 2013); infant industries (List, 1856; (McKee, 1934; Shafaeddin, 2000); and subsidies (Chang, 2002; United Nations, 2002; United Nations, 2004).

In-depth and semi-structured interviews were conducted with 16 industry stakeholders (see Table 1) ranging from private-sector actors to public-sector researchers who had been involved to some extent in hemp trials or discussions at the government level about the crop. At some points during the research process, findings from the interviews seemed to contradict the theory provided by the literature review, and so a recursive and iterative process was followed to 'untangle' the different narratives, meanings and contexts and uncover the barriers particular to the South African context.

Narratives that are missing from the study are those of government, specifically the Department of Health, DAFF, and South African Police Service who declined to participate as well as the illegal growers of marijuana who have experience with Cannabis cultivation. To overcome the government limitation, care has been taken to communicate with stakeholders with previous and current links to government to attempt to understand via proxy the government narrative, as well as through an analysis of policy documents.

2.3 Background

2.3.1 A brief history of hemp

There is evidence of hemp production taking place from the Neolithic era onwards across the northern latitudes of Europe and East Asia (Godwin, 1967; Moon, 2008; Serecon Management Consulting Inc., 2012; Johnson, 2015). Records of hemp cultivation date back to around 8 000BC in Central Asia (Lash, 2003; Moon, Song, Jeong & Bang, 2006; North American Hemp Co., 2010). Hemp was used to make clothing, ropes, paper and sails, with the word 'canvas' having its root in the word *Cannabis*.

Demand for hemp declined in the 1800s as steam and diesel engines replaced sailing ships, and ship cables and hulls were made from iron and steel (North American Hemp Co., 2010). Around the 1950s it became cheaper to import manila hemp, jute and cotton as substitutes and when synthetic fibres were invented, the market for hemp shrank considerably (United States Department of Agriculture: Economic Research Service, 2000; North American Hemp Co., 2010). In the early 1930s many Western countries, perhaps inadvertently, criminalised hemp production by prohibiting production and trade in *Cannabis*, of which hemp is a sub-species (Bergoffen & Clark, 1996).

2.3.2 Distinguishing between hemp and marijuana

Both marijuana and hemp originate from the same species, *Cannabis sativa*; they are however genetically different, displaying different properties (Datwyler & Weiblen, 2006; MPR News, 2015). These differences are outlined in Table 2.

Table 2: Comparative characteristics of hemp and marijuana

Characteristics	Hemp	Marijuana
Plant species	<i>Cannabis sativa</i>	<i>Cannabis sativa</i>
Primary use	Agricultural crop: seed, fibre, hurd, seedcake and oil	Medicinal and recreational crop; horticultural crop
Tetrahydrocannabinol (THC) level	0.3–1% THC	5–30% THC
THC/cannabidiol (CBD) ratio	Higher CBD level	Higher THC level
Appearance	50/50 male/female plants – longer thinner plants with higher biomass harvests	'Bushy' appearance; male plants pulled out to prevent pollination and lowering of THC levels
Growing requirements	Thicker density in order to encourage stalks to grow higher Grown outdoors	Plants needs individual attention and stable growing conditions influenced by light, temperature, humidity, carbon dioxide and oxygen

Source: Information drawn from Vermeulen (2008) and Johnson (2015)

Some sources classify hemp as *Cannabis sativa* L. while others consider the *Cannabis sativa* L. species to include both marijuana and hemp (Stearn, 1974; Yablan, 2007). The *Cannabis* plant produces a diverse group of compounds called cannabinoids; over 60 different ones have been identified (Leaf Science, 2014; The Scientist, 2015). The tetrahydrocannabinol (THC) levels influence whether the plant is allowed to be grown for industrial purposes. It is generally accepted that plants with less than 0.3% THC do not have narcotic properties and therefore can be grown commercially in countries that allow hemp cultivation (Health Canada, 2012; UK Home Office, 2014).

2.3.3 An era of prohibition

2.3.3.1 In South Africa

Cannabis sativa (encompassing both hemp and marijuana) has been used for medicinal purposes in South Africa for centuries (Robinson, 1996; Brough, Sotana & Mhlontlo, 2005; Paterson, 2009). Given the lack of written documentation in pre-colonial times (prior to the mid-1600s), it is unclear how and what elements of the plant were used (Paterson, 2009). There is therefore no clear distinction made between hemp and marijuana in literature on the legislative history of *Cannabis sativa* in the country (Republic of South Africa, 1965).

South Africa's various regions have been the spoils of alternating colonising powers – the Dutch and the British – since the mid-1600s. Respective governors of the Cape and the Orange Free State banned the cultivation of *Cannabis* (including hemp varieties) in 1891 and 1903.

The rationale was that consumption led to increased criminal activities and labour indolence (Bourhill, 1912; Paterson, 2009). In Natal, a request was made for prohibition in 1884, but due to a lack of consensus, it was never passed (Paterson, 2009). The next push for prohibition took place in mining areas in the Transvaal, but this was rejected by mine managers who allowed the open sale of *Cannabis* at mine stores supplied by white-owned *Cannabis*-producing farms that emerged to meet the demand (Paterson, 2009).

In 1910 all four colonies (Cape, Natal, Transvaal and Orange River) were unified under British rule to form the Union of South Africa (Paterson, 2009). The British monarch was the effective governor-general and the Union was governed as a constitutional monarchy. *Cannabis* was officially prohibited in all four provinces in June 1922 under the Customs and Excise Duties Amendment Act (Mills, 2007; Paterson, 2009). It appears that the rationale for the ban stemmed from a view held by colonial authorities that consumption of *Cannabis* led to the moral deterioration of Africans (Bourhill, 1912; Paterson, 2009), and that this posed a security risk to white settlers.

In 1923, the Union proposed to the League of Nations Advisory Committee on Traffic in Opium and Dangerous Drugs that the whole or portions of the plants *Cannabis Indica* and *Cannabis Sativa* be treated as habit-forming drugs and banned (Paterson, 2009). South Africa was the first country to request this ban and it was passed by the League of Nations into international law in 1925 (Paterson, 2009). The convention, however, only dealt with international trading in *Cannabis* and so did not prohibit domestic production or trading (United Nations Office on Drugs and Crime, 2008).

Interestingly the basis for the Constitutional Court challenge by South Africa's 'Dagga Couple', Myrtle Clarke and Jules Stobbs, for their conviction for possession of marijuana, is that the law has its origins in the racist and colonial laws of the early 20th century (Paterson, 2009), which were then further entrenched by international statutes manipulated by United States propaganda (The Dagga Couple, 2015).

2.3.3.2 In the rest of the world

While the United States did not ratify the 1925 convention (United Nations Office on Drugs and Crime, 2008), this ruling may have influenced its later decision to prohibit *Cannabis* through the passing of the Marijuana Tax Act of 1937 (Esmail, 2010; Johnson, 2015).

Many countries followed suit, passing blanket laws encompassing hemp production. There are exceptions. France continued to produce hemp throughout the 20th century. Today it is the most viable supplier and exporter of low-THC certified hemp seed in the world (Owen, 2012).

Some communist countries, such as Russia and China, also continued to cultivate hemp. China is the world's largest exporter of hemp textiles (Owen, 2012). Russia, with a dwindling market share, holds the biggest hemp germplasm collection in the world at the N.I. Vavilov Scientific Research Institute of Plant Industry in Saint Petersburg (Hemp University, 2015) with around 500 varieties currently in the collection, down from 1400 in the mid-20th century (Grigoryev, 2015).

2.3.4 Changing attitudes and perceptions

In recent years about 30 countries have challenged and changed the legislative framework (Owen, 2012) to permit the cultivation and processing of hemp (Johnson, 2015). The few examples sourced from iHav (2012), Hemp Industries Association (2014), Food Standards Australia New Zealand (2015) and Hemp University (2015) given below serve to indicate the growing interest in and demand for the crop.

- The state of Victoria in Australia was the first permitted to issue licences to grow hemp in 1998. New South Wales, Northern Territory, Queensland, Tasmania, South Australia and Western Australia have all adopted a licensure system to cultivate hemp. However, Australia is the only industrial country that prohibits consumption of hemp foods.
- Canada initiated a licensure system allowing commercial production in 1998 and is now the main supplier of hemp seeds and oil to the United States.
- Romania is a large European commercial producer with 40 000 recorded acres planted to hemp in 1993. Slovenia produces hemp for currency paper. Poland produces hemp for fabric, cordage and hemp board and uses it to cleanse contaminated soils of heavy metals.
- Denmark is conducting research on organic hemp production. Germany initiated research in 1992 and in 1995 lifted the ban allowing for legal cultivation and research to continue. The Netherlands has been researching processes for making hemp paper.
- India uses naturalised *Cannabis* used for cordage, textiles and seed oil.
- Chile grows primarily for hemp seed production.
- New Zealand, Austria, the United Kingdom, Japan, Italy and Turkey also grow hemp.

While hemp production remains illegal on a national level in the United States, in the 1990s several states began to conduct market research on the crop and to change local state laws to allow some form of cultivation and processing, with the argument that it could boost the agricultural sector and improve the livelihoods of rural communities (Johnson, 2015; NSCL, 2015; Stansbury, 2015). There is a move towards full legalisation of the crop.

The Farm Bill (2013) was passed in the United States Congress in 2014 redefining the distinction between industrial hemp and marijuana (Johnson, 2015; NSCL, 2015). In January 2015, the Industrial Hemp Farming Act (2015) was introduced to the House and Senate and, if passed, will remove all federal restrictions on cultivating industrial hemp, including removing its classification as a schedule-1 controlled substance (Johnson, 2015).

The following flowchart illustrates the diverse uses of the plant, which provide the motivation for so many countries wanting to legalise and formalise hemp production.

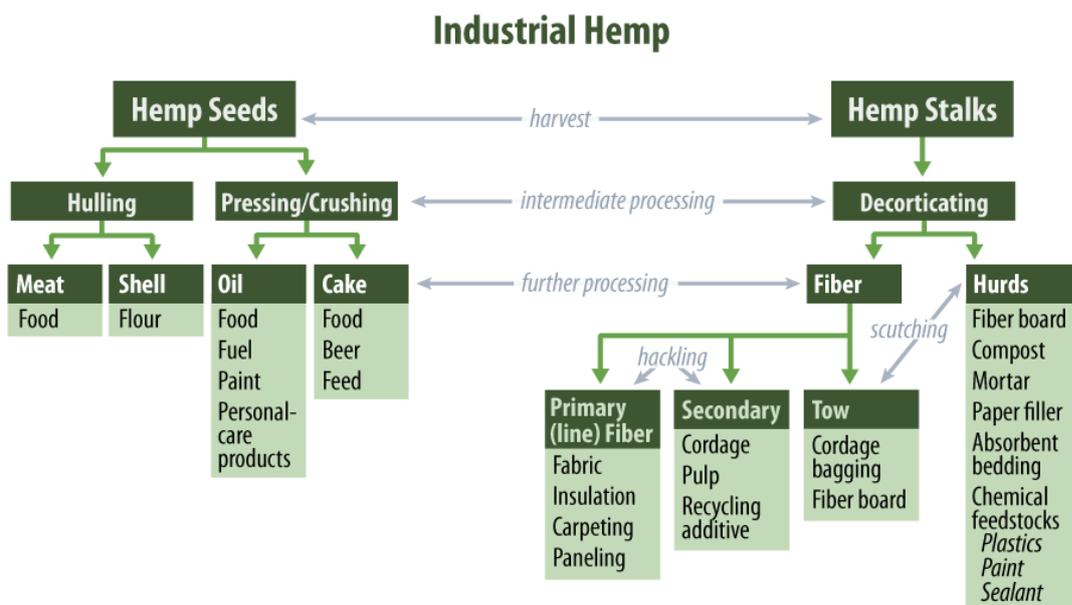


Figure 2: Uses of industrial hemp
Source: Johnson (2015)

2.3.5 The value of the market

Due to the dynamic nature of the international hemp market, caused by new entrants and new processing techniques resulting in new applications for the crop, there is little standardised and comprehensive data available on the size and value of the market, and who is benefitting the most. The estimations given below are drawn from a variety of sources to provide an indication of the market's relatively high value and potential growth.

The United States is the world's largest importer of hemp, estimated at 60% of the global production (Global Hemp Group, 2014). It sources raw and processed fibre primarily from China and seed and oilcake primarily from Canada (Hemp Industries Association, 2014; Johnson, 2015).

A 2013 United States Congressional Research Service report estimates the value of the United States retail market to be US\$500 million and, based on the 60% figure given above, the global market to be worth about US\$800 million (Global Hemp Group, 2014).

The market has shifted from primary demand for hemp fibre to demand for hemp nutritional and bodycare products (Johnson, 2015). The shift in focus to the plant's nutritional and medicinal qualities corresponds to a growing demand for alternative treatments for chronic diseases and ailments; for example, the treatment of seizures in children (Fernández-Ruiz, Devinsky, Cilio, Cross, French, Hill, & Katz, et al. 2012; Sides, 2015). Medical trials on the properties of Cannabidiol or CBD oil are now being extended from animals to humans (Fernández-Ruiz et al., 2012; Sides, 2015). Hemp seed oil is produced from the seeds of the plant and contains less than 25 parts per million CBD, while CBD hemp oil is extracted in a concentrated form from hemp flowers and can contain up to 150 000 parts per million CBD; it can also be derived from the stalks and the seeds, but at a much lower concentration (Hemp Industries Association, 2014). The retail market for CBD oil is still unclear as there are not yet many products on the market, but it is the fastest growing segment of the hemp industry (Budden, 2015).

2.4 Contextual overview of the status of local hemp production

There is an existing market for hemp in South Africa, which is currently served by imported hemp products, mainly textiles, and imported raw materials made into beauty, medicinal and culinary products (DAFF, 2011; Hemporium, 2015). There is also potential demand for hemp-based composite materials for use in buildings (DAFF, 2011). South African businesses also import hemp as a raw product and export it as a manufactured one (DAFF, 2011).

Given the prohibition on hemp, there is a low level of production within the country, which is conducted through government-sanctioned research projects. Three import-based hemp retail companies, House of Hemp (fabrics and nutrition), Hemporium (fabrics, clothing, accessories, cosmetics and nutrition) and Hemptons (cosmetics and nutrition) dominate the market.

2.4.1 Status of imports and exports

All three local retail companies confirm that the demand for their products has increased (Budden, 2015; Karg, 2015; Thompson, 2015).

I get more hits on my research site than my Hempton's product site; people are curious about hemp and want to learn more about it (Karg, Hemptons, 2015).

The market value of imports and exports for South Africa between 2010 and 2014 are displayed in Table 3 below:

Table 3: Imports and exports of hemp (raw/retted and raw/processed, but not spun) 2010–2014

Import (value ZAR)	2010	2011	2012	2013	2014
True hemp, raw/processed, not spun	18 156	29 677	27 1222	16 038	16 1820
True hemp fibre, raw or retted	7 756	-	260 986	-	296
Export (value ZAR)	2010	2011	2012	2013	2014
True hemp, raw/processed, not spun	63 851	56 828	76 282	54 156	11 5992
True hemp fibre, raw or retted	468	3 387	23 261	2 446	5 020

Source: Quantec Research (2015)

*- figure not available

DAFF's *Hemp Market Value Chain Profile* (2010, 2011, 2012, 2013) reports base their estimation of local demand for hemp on this data; however, the reports may be misleading because they only show the raw/retted hemp fibre commonly known as plumber's hemp, which is imported and exported, thus excluding processed and spun hemp (in the form of fabric) and hemp oil and seeds. They also do not supply a clear definition of the type of hemp monitored and accounted for.

According to Mr Sotana (2010), hemp fibre, yarn and fabrics to the value of R20 million were imported in 2005; however, attempts to confirm this with the Textile Federation of South Africa were met with no response. Inconsistencies in capturing data on local hemp trade and demand make it difficult to gauge the extent and value of the market.

2.4.2 Research trials and accompanying projects

The research trials and results to date are presented in Table 4, including mention of the actors that were involved and funding details.

Table 4: South African hemp research trials and results to date

Research trials	Stakeholders	Purpose	Funding	Outcomes
Initial feasibility trials (1994/ 96)	Initiated by the Southern African Hemp Company and conducted by the Agricultural Research Council (ARC) Department of Health issued permits	To test the agronomic feasibility of hemp in South Africa	Southern African Hemp Company	European cultivars unsuitable for large-scale production in all parts of the country. Suitable for the Eastern Cape and Western Cape (if irrigated)
PG Bison and Masonite Africa partner with ARC and Southern African Hemp Company (1997–1998)	Private sector: Southern African Hemp Company, PG Bison & Masonite South Africa Public sector: ARC, Department of Health	Private-sector players interested in exploring potential of hemp to replace high-carbon materials such as wood pulp	PG Bison & Masonite South Africa	Evolved into Southern Africa Bast Crop Consortium
Southern Africa Bast Crop Consortium (1998–2005)	Private sector: Southern African Hemp Company, PG Bison, Masonite Africa Ltd., Mondi and Safcol Public sector: ARC, Council for Scientific and Industrial Research (CSIR), Department of Agriculture, Department of Health	To develop localised hemp cultivars with European Union-certified low-THC hemp cultivars, crossbred with local or equatorial varieties of <i>Cannabis</i> at the ARC	ARC and House of Hemp	Expanded agronomic trials and breeding at the ARC's Tobacco and Cotton Research Institute at Rustenburg, and at agricultural experiment stations in the Eastern Cape Two localised hemp fibre cultivars (SA1 and SA2) developed
Eastern Cape Hemp Pilot Project Initiative (ECHPPI) (1999–2005)	Public sector :Eastern Cape Department of Agriculture and Land Affairs, ARC, CSIR, Fort Cox College and University of Fort Hare, Department of Health Private sector: House of Hemp and Southern African Hemp Company	Phase 1: to prove the agronomic feasibility of growing hemp as a bast fibre in the Eastern Cape; to publish a growers' guide	R15 million from Department of Agriculture R1 million from Department of Science and Technology through the CSIR for equipment	Establishment of the National Hemp Foundation (NHF) in 2001 Trials extended to more farms (originally 15), agronomic feasibility proved; need for more research into raising the yields to an economically feasible level; extension of the value-chain through a subsidy programme
Commercial feasibility trials (Phase two of ECHPPI and expanded beyond Eastern Cape)	Private sector: House of Hemp (NHF coordinator who coordinated trials), Hemporium, three original small-scale farmers from Eastern Cape (Qamata, Libode and Mthiza),	Phase 2: Prove the commercial feasibility of hemp & confirm THC stability in Southern Hemisphere.	Rapula Farm - self-funded Department of Social Development willing to subsidise Eastern Cape farms for	Report due by ARC and House of Hemp on the findings of the commercial feasibility trials (2010–2015)

	<p>Rapula Farming and Bruinjties Rivier (Western Cape), Bulwer, KwaZulu-Natal</p> <p>Public sector: ARC, CSIR, Department of Trade and Industry, Department of Health</p>		<p>2011 planting, but seeds arrived too late, they didn't renew subsidy in 2012</p> <p>House of Hemp – assisted farmers in the Eastern Cape and KwaZulu-Natal with funding.</p>	
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Source: Information drawn from (Tobacco and Cotton Research Institute, n.d.; Nel, 1998; Blouw & Sotana, 2005; Brough et al., 2005; Sotana, 2010; Sotana, 2013; Wynn, 2015)

Beyond the trials that primarily focused on the initial agronomic phase there were other efforts to extend the value chain involving various stakeholders. Mr Sotana, project manager for Phase 1 of the Eastern Cape Hemp Pilot Project Initiative (ECHPPI), and Hemptons helped several of the emerging farmers who had taken part in the trials form a cooperative in 2004 (Sotana, 2010). Farmers were trained on all aspects of hemp oil extraction and 10 oil-pressing machines at a cost of R1.2 million were imported from Germany for the newly formed cooperative Indalo Oils and Fibre (Madliwa, 2015; Sotana, 2015). Two of these are still in use by the Dohne Institute in Stutterheim, the rest are packed away. An accompanying subsidy programme aiming to extend value along the chain set up a women's group called African Eye. The idea was the fibre would be produced and processed, and then sent to businesses such as African Eye to create marketable products. This group was trained for six weeks by the Council for Scientific and Industrial Research (CSIR) to make cushion covers, which would be sold onto Woolworths (Blouw, 2015).

As the project entered Phase 2 in 2007, things took a different turn. Phase 2 would concentrate on assessing the commercial feasibility of hemp; it also entailed a withdrawal of government involvement in the broader agenda pushing for hemp production in the country. The possible reasons for this are explored in the following section.

2.4.3 The National Hemp Foundation

The National Hemp Foundation (NHF) composed of public- and private-sector actors was initiated in 2001 to coordinate the emerging industry. Lukile Ngada, Director of the Department of Agriculture, was the first chairman of NHF. In 2003, he resigned as chairman and requested that all government involvement in hemp initiatives be discontinued.

This may be linked to Max Mamase's, Eastern Cape Minister of Agriculture in 1997 and initiator of ECHPPI, involvement in a corruption scandal (Millie, n.d.), his subsequent resignation and trial, which resulted in a lack of a government public champion for the crop, and possibly explains Ngada's efforts to disassociate government from hemp initiatives in the Eastern Cape (Millie, n.d.; Sotana, 2015). Mr Sotana wanted the hemp initiative to continue and formally handed over coordination of the project in 2007 to the NHF and appointed Dr Thandeka Kunene as head of the foundation.

This thing doesn't belong to government, if government is shutting it down then you guys drive it ... I went to the NHF meeting in 2006 in Port Elizabeth and handed over my responsibilities to Thandeka and told her to continue as long as she abides by regulations (Sotana, ex-DAFF, 2015).

Dr Kunene, a private-sector actor and founder of the House of Hemp, has close ties with government having been involved in several poverty alleviation programmes in the past; she was also an African National Congress youth league member (Kunene, 2015; Sotana, 2015). Dr Kunene has been the national coordinator of the NHF since 2007 and all commercial incubation research trials since 2010 (Kunene, 2015; Sotana, 2013; Thompson, 2015). She has been a key promoter of natural fibre use in the country to fight poverty and environmental degradation and helped to form the Global Natural Fibre Forum (Global Hemp Group, 2015). House of Hemp is the only company to have been granted a six-year exclusive permit in 2010 to produce and process hemp in the country (House of Hemp, 2015).

The NHF started reviewing the legislation related to hemp production in 2007 and found that more trials were needed to test the stability of THC levels in the southern hemisphere, as well as the commercial viability of a hemp industry in South Africa. It handed the responsibility for compiling a six-month desktop commercial feasibility study over to DAFF in 2012; to date this study has not been released (Blouw, 2015; Madliwa, 2015; Sotana, 2015; Thompson, 2015).

2.4.4 Assessing the commercial feasibility of hemp production

In 2010, the NHF initiated commercial incubation trials involving several small-scale farmers in the Eastern Cape (involved in the ECHPPI Phase 1 trials) and KwaZulu-Natal (House of Hemp, 2015; Sotana, 2013). South Africa's first commercial research crops were planted on these farms in October 2010. The results, however, at the Eastern Cape sites were disappointing due to a lack of resources, expertise and maintenance of equipment (Sotana, 2013).

In 2011 Hemporium approached the Department of Health for a permit to produce hemp on Rapula Farm, a commercial farm owned by a partner in Hemporium, near Wellington in the Western Cape (Budden, 2015). It was directed to apply through Dr Kunene and to assist a Rastafarian community in Robertson to apply for a permit too. Despite Dr Kunene's primary focus on poverty alleviation and ensuring that hemp production would contribute towards uplifting small-scale farmers, she accepted Hemporium's request for a research permit on a commercial farm because:

I chose Rapula over the other commercial farms that applied as they said "we will help" (Kunene, House of Hemp, 2015).

Unfortunately the emerging farmers sites weren't doing well enough as they didn't have enough resources (Kunene, House of Hemp, 2015).

Hemporium and Rapula Farm applied for a permit, but when Department of Health officers conducted a site inspection at the Robertson site they had concerns over the Rastafarians' use of marijuana and lack of adequate fencing to comply with the licensing requirements, which resulted in the permit being denied (Budden, 2015). Subsequently Rapula Farm and Brintjies Rivier were the two successful Western Cape applicants, but received the seeds too late and were only able to plant their first research crops in October 2012 (Budden, 2015; Gregor & Budden, 2013; Sotana, 2013).

Rapula Farm participated in the commercial incubation research trials from 2011 to 2015 at its own cost. The owners compiled annual reports of their processes and results, which noted that Futura, a French variety, had been the most successful over the years with improving yields (Gregor, 2015). There were issues around irrigation and the high cost thereof, and that Rapula Farm did not have the freedom to choose their own seeds or when to plant (Gregor, 2015).

Farm owners indicated that Mediterranean varieties were most likely to be suitable for the Western Cape and also that a larger area would need to be cultivated to ascertain the commercial feasibility of the crop (Gregor, 2015). Rapula and Hemporium wanted to investigate CBD production and hopefully recoup some of their investment, and began communication with House of Hemp to initiate this process. They felt, however, that the level of information requested from them bordered on impinging on their intellectual property. After a series of miscommunications they circumvented House of Hemp to approach the Department of Health directly, but were told they needed to follow formal channels (Budden, 2015; Gregor, 2015). The application process through House of Hemp has been initiated again at time of writing.

In essence, the trials have proven that it is agronomically feasible to grow hemp in the Eastern and Western Cape provinces and that there is potential for the value chain to be extended to include small-scale producers. There are, however, three obvious barriers to establishing a viable industry in the country. The review of the literature and semi-structured interviews with key stakeholders allowed these barriers to emerge.

2.5 The barriers to legal hemp production in South Africa

2.5.1 Current regulatory environment

The fact that it is illegal to produce hemp in South Africa is the most evident barrier to instigating a hemp industry in South Africa. A number of interviewees commented on this obstacle, saying:

The legislation stifles business and keeps hemp as a luxury product [because of the high costs of imported hemp] (Karg, Hemptons, 2015).

Legislation is the biggest barrier; hemp should be classified as a non-regulated industrial crop as licensure barriers are too high. Education is more effective than prohibition. Creativity will come with freedom (Madliwa, Emerging farmer, 2015).

Legislation is the biggest barrier that hasn't been driven within government (Thompson, ARC, 2015).

The battle to change legislation regarding this crop has been a high-profile one driven by public and private stakeholders, albeit with different motivations. The primary obstacle is that hemp is still classified as the same plant as marijuana, which is classified as a narcotic. Compounding this legality is that hemp cultivation is governed by several acts. The primary one is the Medicines and Related Substances Act (1965), which regulates *Cannabis* (the plant or any portion thereof) as a schedule-7 drug that is dangerous and habit-forming with no recognised medicinal value (Republic of South Africa, 1965). There is some allowance made for processed hemp fibre and seed production, but cultivation is forbidden. It allows raw hemp materials and products to be imported if the THC levels are below 10 parts per million (Republic of South Africa, 1965), but if imported for commercial reasons, the stalk needs to be harvested and processed and the seeds sterilised (Sotana, 2015).

The second relevant act is the Drugs and Drug Trafficking Act (1992), which mandates the South African Police Service to support the legislation set out in the Medicine and Related Substances Control Act (1965) (Republic of South Africa, 1992). This does imply that if the latter was amended, the former would no longer apply to hemp cultivation.

2.5.1.1 The battle to change legislation

The battle lines around changing legislation have been drawn on different issues. There are those that argue that it hinders the establishment of a viable and economically valuable agricultural and industrial sector in South Africa, while others are pushing for legislation change on humanitarian grounds, as hemp and CBD oil are believed to reduce pain from cancer, among other diseases. Both private and state funding have been directed at changing legislation.

Public-sector actors

Those involved in the trials, often at their own expense, have a vested interest in seeing a legal hemp-producing sector come to life. The CSIR has been involved since the early 1990s funding research on hemp as a natural fibre for non-woven and bio-composite materials (Blouw, 2015).

The Southern African Hemp Company commissioned the first trials in 1994/95 at Rustenburg under the auspices of the Agricultural Research Council's (ARC's) Tobacco and Cotton Research Institute (Wynn, 2015), which started contributing to funding of the trials in 1998 (Thompson, 2015; Wynn, 2015). The national Department of Agriculture invested heavily (R15 million) in ECHPPI between 1999 and 2005 (Brough et al., 2005; Sotana, 2013).

Private-sector actors

The Southern African Hemp Company that had initiated the first hemp trials encouraged private-sector players to get involved. In December of 1996, PG Bison and Masonite Africa Ltd. joined the initiative and fully funded the hemp research programme (Wynn, 1998). These private-sector players left the initiative in 1998 due to frustrations about not being able to influence the research agenda given the CSIR's mono-focus on hemp fibre.

At the end of Phase 1 in 2005, the government reduced its support and private-sector player House of Hemp began to contribute (Kunene, 2015). House of Hemp also funded and continues to fund the small-scale farmers involved in research trials (Kunene, 2015; Thompson, 2015).

Hemporium helped manage research trials at Rapula Farm and has contributed towards a legal challenge around *Cannabis* prohibition, as well as funding several educational projects, including the building of a hemp house to serve as a soup kitchen in Khayelitsha (Budden, 2015).

Those with a personal stake

Member of Parliament for South Africa's Inkatha Freedom Party Mario Oriani-Ambrosini stated in Parliament that he was using illegal medical *Cannabis* to ease the pain caused by lung cancer (Davies, 2014). Ambrosini tabled the Medical Innovation Bill that provided for research and development into the use of cannabinoids for medical purposes and *Cannabis* for beneficial commercial and industrial purposes (Davies, 2014; eNCA, 2014). Oriani-Ambrosini died on 16 August 2014; the bill was up for discussion on 27 May 2015 and subsequently industrial and commercial uses of *Cannabis* have been excluded to leave the still unfinalised bill focused purely on medical applications (BTL, 2015).

Representatives from Fields of Green for All, which focuses on overcoming the obstacles surrounding legalisation of the use of *Cannabis* in South Africa, has drafted a memorandum to the President of South Africa following a meeting with him on 17 January 2015. The memorandum notes that agro-industrial development of hemp could be a "powerful economic driver for the rural peoples" throughout South Africa and that global demand for the crop ensures a high-value export market opening up the way for a "genuine Economic Renaissance". It notes this as particularly so because certain methods of production don't rely on high levels of technology and are labour intensive (Fields of Green for All, 2015). In addition, the memorandum points out the cross-benefits as there are both industrial and medicinal benefits derived from the plant (Fields of Green for All, 2015).

There is already an untapped knowledge of growing *Cannabis* in South Africa on a relatively large scale illegally. Policemen routinely fly over and spray glyphosate onto areas such as the Transkei where marijuana crops are inconspicuously grown among other vegetation (The Green Times, 2016). Often times the people growing the crops are doing so to survive and the spraying often ends up killing their income source as well as infecting their other crops, livestock and water. Perhaps if this knowledge could openly be tapped into it could assist with fast forwarding viable hemp production in South Africa.

2.5.1.2 Other considerations

There may be a risk of losing valuable foreign aid because at the federal level the United States government does not distinguish between hemp and marijuana and countries could be penalised for allowing hemp cultivation (Winn, 2013). The United States is South Africa's single largest trading partner and legalising hemp production could compromise trade agreements between the two countries (Bah & Amusa, 2013).

South Africa, however, could also lose out on the opportunity to generate significant revenues from researching and developing medicinal products from *Cannabis*.

Recent research indicates that CBD has significant potential to treat nausea and vomiting; suppress seizures, combat psychosis, inflammatory disorders, tumours and cancer cells, neurodegenerative disorders, anxiety and depression (Fernández-Ruiz et al., 2012; Sides, 2015, *The Scientist*, 2015). The space to capitalise on these discoveries may be closing as large pharmaceutical companies, such as GW Pharmaceuticals, have already started taking out patents on its products derived from natural *Cannabis* (GW Pharmaceuticals, 2014).

2.5.1.3 Moving forward

It becomes apparent that the real obstacle in South Africa is not solely the regulatory framework. Clarifying the classification of hemp and marijuana as two different varieties of the same plant would automatically decriminalise hemp, making it legal to produce the crop in South Africa.

Two findings emerged during this study's focus on the legislative barrier. First, there is a lack of knowledge about the differences between hemp and marijuana at the highest levels. Larger-scale efforts to decriminalise *Cannabis* including the Medical Innovation Bill and the work done by Fields of Green for All, for example, keeps hemp aligned to its narcotic 'cousin', which does not help expand understanding of the differences between the plants, their uses and benefits.

In this context private-sector funding of efforts to amend legislation is perhaps misguided as funds would be better spent on general and specific education on the value of hemp production, illustrations of its varied uses and investments into training on its cultivation, processing and manufacturing among a diverse group of stakeholders ranging from members of Parliament to the general public and farmers.

Second, there is perhaps a reluctance to remove the legislative barrier without ensuring that the industry delivers on its ability to redress social inequities. Dr Blouw of the CSIR indicated that the issue of which stakeholder group should/could/would benefit from the legalisation of hemp is still a contentious one (Blouw, 2015). This tension between the possibilities of a business-as-usual and a saviour crop approach is presented as the second major obstacle that emerged during the research process.

2.5.2 Hemp as a ‘saviour’ crop

Since the inception of trials in South Africa, hemp production has been viewed as an avenue to include small-scale farmers and producers in the agronomic value chain.

Any investment by government in establishing and supporting the hemp industry is aligned with the National Development Plan’s objective of closing the social inequality gap by focusing on the economic advancement of the poorest South Africans (NPC, 2012; Soko & Balchin, 2014).

Government views agriculture as a key industry in which to create jobs and support inclusive economic participation (Grobbelaar & Heinemann, n.d; NPC, 2012; World Wildlife Fund for Nature, 2015). Hemp production and processing not only offers agricultural value-chain opportunities, but the crop itself can be used as a cost-effective construction material (Popular Mechanics Magazine, 1938; Johnson, 2015; Perozzo, 2015), which could help ameliorate the country’s housing backlog of more than 2 million houses (Swilling, forthcoming) and improve the living conditions of those living in the country’s rapidly expanding informal settlements (Moroke, 2009; NPC, 2012). If grown for its seed, hemp can be a crucial source of protein and essential fatty acids aiding in bolstering food security (Vahanvaty, 2009) for the roughly 13 million people that are food insecure, including the millions of children that are undernourished (Swanepoel, 2014). In essence, many of the local hemp stakeholders view hemp as a ‘saviour’ crop for either social or environmental reasons or a combination of both.

I also foster a few start up hemp businesses, they will essentially be my competition, but I hope they can contribute to growing the industry (Karg, Hemptons, 2015).

This is Africa’s time, as a white African you have to bow to Africa. Whites in Africa live in fear as you live opposite the ‘have nots’ and the purpose of my life is to give back to as many ‘have nots’ as possible as a black South African (Kunene, House of Hemp, 2015).

Hemp is recognized globally as a premier eco-resource and our current environmental practices are not sustainable. Alternatives are necessary that speak to our social needs too (Budden, Hemporium, 2015).

If the problem really is the question of whether hemp will become the preserve of well-resourced commercial farmers with ready access to markets as opposed to playing its role as a saviour crop and presenting opportunities to include and stimulate small-scale farming, processing and manufacturing, then attention needs to be paid to envisioning a contextually appropriate licensing model that would ensure the latter.

2.5.2.1 Suitable licensing models

The semi-structured interviews generated a diverse range of responses to the question as to how hemp should be regulated in South Africa. In terms of licensing, the Canadian model was brought up as a possible option for South Africa (Blouw, 2015; Sotana, 2015; Thompson, 2015), but the most popular response was that a hybrid model that ensures inclusion of both small-scale and commercial farmers should be promoted and that small-scale and emergent farmers should be encouraged into cooperative models that enabled sharing of equipment and knowledge, along with more effective use of capital investment (Budden, 2015; Kunene, 2015). One interviewee cautioned that a strong management team would be needed should a hybrid model be implemented (Gregor, 2015). Others offered the opinion that hemp should be completely deregulated and classified as an industrial crop (Karg, 2015; Madliwa, 2015).

A localised licensing regime would need to incorporate and protect the needs and markets of both small-scale and commercial actors, lead to skills and knowledge transfer, and contribute to decreasing social inequity. The Canadian and Chinese licensing systems are explored below to isolate elements beneficial to the South African context.

Canadian example

The Canadian government authorised commercial hemp production under licence in 1998 overseen by the Minister of Health (Vantreese 1998; Canada, 2015) and under the mandate of the Office of Controlled Substances of Health, which issues licences (Health Canada, n.d.). Canada uses a regulated commercial production framework favouring large-scale commercial farming.

The licensing system is structured in such a way to make it high risk and unappealing for those wanting to grow marijuana instead (Owen, 2012). All hemp must contain less than 0.3% THC and farmers must allow inspections of their crops. The system is successful in that the strict measures of control ensure that seed cultivars remain of good quality with high levels of essential fatty acids, oil and protein (Canadian Hemp Trade Alliance, 2015).

It also allows the industry's progress to be recorded in detail and enables effective participatory action research that stimulates knowledge generation and transfer (Owen, 2012; Bryman & Bell, 2014), which could be of benefit in the South African context.

Hemp is still a minor crop for Canada cultivated on less than 1% of farming land (Crawford, n.d.). Yields are, however, improving each year due to improved processing technology, investments in research and development and financial support from the state (Serecon Management Consulting Inc., 2012; University of Kentucky, 2013). Canada is one of the main suppliers of hemp to the American market (University of Kentucky, 2013). The number of applications has varied over the years, with a high of 569 approved applications in 2006 due to the hype created unintentionally in the United States when its Drug Enforcement Administration's 2004 attempt to prevent the importing and consumption of hemp goods was overruled in court (University of Kentucky, 2013). This resulted in increased demand for hemp products in the United States. Overproduction and the prioritising of more profitable crops, however, led to the number of applications falling to a low of 77 in 2008 (University of Kentucky, 2013). Since 2008, though, the number of applications has steadily increased (Johnson, 2015).

Chinese example

China, which has never prohibited hemp production, uses a deregulated, small-scale production through cooperatives model. Private households and state farms are contracted to cultivate hemp in areas with easy access to production and processing facilities to maximise efficiency and profitability (Wang & Shi, n.d.; Li, Yao & Yeung, 2003). These regions are Shandong and Jiangsu and more recently Yunnan province, which has started promoting hemp production to its farmers (Wang & Shi, n.d.; Xinhua News Agency, 2009). In a radical shift from its communist past, the Chinese government now allows farmers to make their own marketing and production decisions and it no longer determines the prices within the natural fibres sector (Wang & Shi, n.d.; Li et al., 2003). A state agency visits the farms to test the quality of the hemp, collect the crop and make payment (Li et al., 2003). The government now acts only as the regulator when necessary (Li et al., 2003). The Chinese system rests on a strong knowledge base stretching back thousands of years, particularly for hemp fibre. Farmers are supported by the China Agriculture Research System, which has a focus on hemp breeding (Salentijn, Zhang, Amaducci, Yang & Trindade, 2015). The Bureau of Fibre Inspection of China ensures that quality is kept to the national standard (Li et al., 2003).

Despite the level of support, industrial hemp remains a minor crop in China comprising only 0.3% of area sown to fibre crops in the 1990s (Wang & Shi, n.d.; Li et al., 2003).

This is expected, however, to increase as the government is encouraging farmers to grow hemp in order to increase their incomes – estimated at a 100% annual increase in 2009 – and it is also viewed as an ideal crop to develop in rural communities (Horton, 2009; Xinhua News Agency, 2009). On a processing level, however, hemp is considered a labour-intensive crop that needs a stable, humid processing environment (Mohr, 2015). Many manufacturers have partially or fully automated their factories to increase productivity (Mohr, 2015).

What do these models offer South Africa?

There are elements of both examples that would benefit a South African model for licensing and producing hemp. The Canadian strictures that act as a disincentive to marijuana producers (if these were modified to not effectively exclude small-scale producers on cost and compliance mandates (BBC News, 2014; Kunene, 2015; Madliwa, 2015)), combined with state support and the participatory action approach that leverages knowledge generation and transfer are appropriate to the South African context.

The Chinese model with its emphasis on small-scale, cooperative production ensures that the value chain (and resultant livelihood opportunities and incomes) are kept in the country and within a certain grouping of producer. The labour-intensive mode of hemp processing has, however, led to inefficiencies when compared to modern technologies and those involved in the processing industry, guaranteed of a salary and benefits, are not incentivised to perform (Li et al., 2003). South Africa needs labour-intensive industries (Industrial Policy Action Plan, 2015), but the Chinese example cautions against overinvestment in labour-intensity at the cost of efficiency and therefore perhaps diminishing South Africa's ability to compete on the global market.

2.5.2.2 Putting the cart before the horse...

Focusing on an appropriate licensing model, however, disregards the on-the-ground realities of South Africa's rural areas. The discrepancy between the South African context and that of developed countries, such as Canada, or even developing countries, such as China, is vast. The hemp industry in both of those countries enjoys high levels of infrastructural and institutional support in terms of research and market information.

Despite this, the industry in both countries has faced challenges (National Hemp Strategy, 2008). South Africa comes from a much lower base and to ensure that benefits accrue to the marginalised and disempowered, strategic investments in both human and financial capital would need to be put in place.

Dedicated research and development needed

Three research trial initiatives have been conducted into the agronomic and commercial feasibility of hemp production in South Africa over the past 17 years with farms in the Eastern Cape, Western Cape and KwaZulu-Natal. The trials have confirmed that hemp production is viable in the eastern and western Cape regions. Brough et al. (2005) compiled a growers' book in 2005 under the auspices of the ARC to share knowledge on the production of the crop. This book has not been updated to include the findings of other research trials, which would help determine future areas of research and move the industry closer to legalised commercialisation. There appears to be a lack of knowledge sharing between different stakeholders and a faltering momentum as the diversity of viewpoints diverges as to their motivations for involvement in the industry.

South Africa's research councils are only partially state funded. They source external funding to cover costs for various research topics (Blouw, 2015; Thompson, 2015). The implication is that external funders can shape the research agenda or, if no funding is sourced, that the focus of the study is shifted to something more viable (in terms of accessing funds) (Blouw, 2015). South Africa also has an inadequately educated workforce (Blouw, 2015) and it ranks 132nd out of 144 countries on the quality of primary education (Ernst & Young Global Limited 20, 2013). This links directly into the low levels of innovation within the country and the apparent inability to develop new industry value chains, which are export-led, and create jobs (Dutta & Lanvin, 2013). While the country needs to focus on developing scientific, technical, engineering and mathematics skills within young people (Duut & Lanvin, 2013), quality secondary and all tertiary education remains inaccessible to most South Africans due to the cost (Steenekamp et al., 2011).

Some research participants noted that international expertise was available and that South Africa should harness the knowledge of those that have already had success in the industry.

We are really in the dark here and it would pay for someone to do a trip to the nearest successful producers, such as Australia or Canada, or even better to get an expert out here at harvest time... (Gregor, Rapula Farm, 2015).

Participants of the Rapula Farm trials did eventually consult a hemp expert from Canada at their own expense after receiving insufficient support from the ARC and the CSIR (Gregor & Budden, 2013).

Instigating a hemp industry in South Africa that would support job creation, a more inclusive economy, skills transfer and improved opportunities for the rural poor, in particular women, rests on strong institutional leadership (Van Rooyen, Swanepoel, van Zyl, Rwelamira, Stroebel & Doyer, 2001) that ensures that knowledge outputs are disseminated with all key stakeholders, including affected communities; that they are not duplicated; and that they are put to good purpose (Van Rooyen et al., 2001).

A firm focus on skills transfer and managing expectations

Skills transfer in the South African sense has to mean a holistic transfer of knowledge; i.e. it is not good enough to transfer a practical skill regarding primary production without also educating around entrepreneurialism, basic economic principles, accessing markets, quality control, and so on. It requires that clear objectives are set and explained to participants to avoid unmet expectations and the resultant backlash.

Two examples of skills transfer initiatives in the local context are discussed briefly to illustrate this point. ECHPPI, launched in 1999, had as one of its main foci job creation within emerging farming communities. The project involved 260 people (farmers and their families) (Sotana, 2010). Farmers were told that hemp was a low-input crop, although this is not necessarily the case if the crop is to yield commercial yields (Brough et al., 2005, Gregor, 2015; Sotana, 2015). Farmers hoped that being part of the pilot study would open up future work opportunities (Madliwa, 2015). Their disillusionment with the study because the objectives and limitations of the pilot study were not adequately presented, is captured in the quotes below:

I kept my hopes high for a long time but after a while I needed to make sure I was still farming other vegetables at the cooperative to put food on the table. I still believe hemp would do good for this country (Madliwa, Emerging farmer, 2015).

The current barriers into the SA hemp industry are too high (Kunene, House of Hemp, 2015).

I'm not involved anymore as I need to make money and the growing requirements with fencing is an expensive and unnecessary extra cost. If someone wants to get into the field and steal, they will cut the fence (Madliwa, Emerging farmer, 2015).

Once the six-week training period for the African Eye women's group was finished, the group was given a lump sum of money. The expectations of what was to be done with that money were never discussed.

We expected that the group to take the sum and reinvest it into the business to continue it as [we] had identified a market and brought it to the group. Instead the group received the money, divided it among themselves and walked away assuming the project was over (Blouw, CSIR, 2015).

The perspectives offered from the group indicate that expectations were not managed and that the experience for them had not been empowering in a long-term sense.

The women never got the payment for their last order and were not informed of what happened or what was expected of them, we didn't want to follow up on the payment as they had covered all the costs of the women's training and materials and we didn't feel we had the right to enquire (Madliwa, Emerging farmer, 2015).

The lack of communication between stakeholders is connected to the lack of a dedicated research and development institutionalised approach to hemp production.

Using private-sector capacity wisely

The underlying desire to ensure that a hemp industry benefits small-scale producers and the delay in lifting prohibitions against production until the way to do this becomes clear could have adverse implications in terms of splitting the market. There is already a sense of frustration from private-sector players who feel that they are excluded as stakeholders.

The present limitations and power dynamics are so restricting, at least let us create some kind of an industry, otherwise the way it seems to be unravelling no one is winning including those it is intended to benefit (Budden, Hemporium, 2015).

The industry in SA is over-protected and I believe there is space for many people (Karg, Hemptons, 2015).

It wasn't like they really wanted us [white farmers] to succeed at the trial ... It wasn't an enabling environment and the value of a commercial trial was undermined (Gregor, Rapula Farm, 2015).

The viewpoints expressed illuminate a philosophical difference in attitude towards the market. Dr Kunene sums up this divergence to the previous quotes by stating:

*Look at me! I'm an example of a black person who came from the same place as you!
The purpose of my life is to give back to the 'have nots' and show them you don't have
to be white and rich to succeed* (, House of Hemp, 2015).

2.5.2.3 Moving forward

The lack of a clear vision for the industry encompassing a leading role for research and development institutions, a cohesive learning and skills transfer programme, comprehensive market research and commercial feasibility studies presents as a major obstacle. While there is merit in exploring the benefits of a hybridised licensing system for hemp in South Africa, there is little point in establishing such a system if other systemic factors – such as dedicated investment and research plans – are not in place.

Essentially what is needed is a collaboratively formed framework that would incorporate the 'saviour crop' approach through systematic transfer of knowledge and expertise, while allowing those with capital and experience to begin to explore external markets (Budden, 2015; Kunene, 2015). Government has a leading role to play in this sense as coordinator of the aforementioned elements, besides amending its gatekeeper role in terms of the Medicine and Related Substance Control Act (Budden, 2015; Madliwa, 2015; Sotana, 2015). In the South African context, government has to go further than fulfilling its role to create a favourable business climate that provides fair opportunities for all stakeholders (United Nations, 2015). It needs to take a long-term view to promoting entrepreneurialism in South Africa (NPC, 2012); engage more in private-sector collaborative partnerships to drive the industry (Blouw, 2015) and work to overcome the current lack of coordination across departments and managerial weakness, which the National Development Plan notes as the driver of inefficiencies, as opposed to budgetary constraints (NPC, 2012).

It is still not clear, however, whether hemp is a commercially feasible crop for South Africa. It may be that it should only occupy its current niche market. Even if production is commercially feasible, the question remains as to whether it can also fulfil its role as saviour crop and shift the country towards a more sustainable paradigm. The issue of commercial feasibility is raised as the third primary barrier.

2.5.3 Is hemp production commercially viable?

The hype surrounding hemp obscures the economic realities of bringing the industry to commercial feasibility. The long-awaited feasibility study conducted by DAFF in 2012, which has not yet been released, could provide some much-needed guidance in this regard. A recent announcement from the Hemp Industries Association that hemp production was generating large profits does not clarify actual profit margins, but rather points to increased demand (Stansbury, 2015). Gregor of Rapula Farm, the only commercial farm that participated in the trials, notes that he doesn't believe hemp is economically viable as a single-use crop unless produced for medicinal purposes (Gregor, 2015).

There have, however, been attempts to work out the economic feasibility of hemp across its varied applications. These are illustrated in the table below, which indicates that producing hemp for fibre is the least viable and that CBD is potentially a high-value application. Note that the returns indicated here do not account for farming expenses or purchase of hemp for processing purposes. The table also illustrates estimated returns on the farming level and the first processing level.

Table 5: Average yield under good conditions per hectare (2013)

Farm Level			First Stage of Processing (Cooperative level)		
Part of the Plant	Economic Return (ZAR)	Quantity	Part of the Plant	Economic Return (ZAR)	Quantity
Stalk	R3.50/kg R35 000	10 tons	Stalk	Fibre – R9/kg Hurd- R6/kg R66 000 (for both)	2 tons
Seed	R30/kg R30 000	1 ton	Seed	Oil – R100/l R25 000 Seedcake – R50/kg R37 500 OR Dehulled seeds – R115/kg R86 250	250l oil
CBD extract	R10 000/kg R150 000	15kg	CBD extract	R150 000/kg R600 000	2kg

Source: Budden (2015)

The yields from the 2013 commercial feasibility trials harvest are not necessarily reflective of yields under good conditions because this was the first time that some of the farmers were growing hemp, there was an absence of expert advice and support, and some of the farms had insufficient resources. Libode harvested 4 tons of hemp biomass a hectare, Qamata 1 ton a hectare and Rapula Farm 20 tons a hectare in 2013 (Sotana, 2013).

Table 6 below illustrates the costs that were involved in the commercial incubation trials at Rapula Farm, proving that the current licensing process is expensive and, unless subsidised, would exclude a large portion of the population from entering hemp agricultural production. The costs of fencing and capital investment in equipment would be large initial costs and the running costs under the current permit system are expensive (Budden, 2015; Madliwa, 2015). Note that the cost of electricity to pump the water from the dam may not reflect the potential cost of irrigation for the average farmer without access to a dam.

Table 6: Approximate costs for Rapula Farming under research permit for two hectares

THC testing costs	R12 000
Certified imported seed	R1 638.11
Seed transport	R6 640
Licensing requirements (licence, fencing and electric fencing)	R755 + R24 000 + R565.68 respectively
Fertiliser and lime	R2 300
Irrigation (electricity to pump from dam, no actual water cost)	R6 075
Irrigation system (cost depreciated over five years)	R6 400
Labour	R24 502
Total	R84 875.79

Source: Gregor & Budden (2014)

These trials do not provide a true reflection of potential commercial feasibility as the permitted size for the research trials was small at two hectares, which does not justify investment in the necessary machinery. Gregor (2015) noted that farmers would need the right seed (preferably local cultivars as imported seed is expensive), the appropriate machinery and growing experience, as well as access to market, to create a commercially viable environment.

Given that these were research trials, Rapula Farm could not sell produce directly onto the market, but had a choice of whether to work through House of Hemp to process the hemp and then buy it back from the company, or to discard the harvest (Budden, 2015).

The cost of transporting the raw hemp materials from Cape Town to Johannesburg and back, along with the fixed price they would need to pay for the processed harvest, was more expensive than importing material from overseas (Budden, 2015).

2.5.3.1 An infant industry

There is much literature and debate around the infant industry argument, which proposes that industry initiatives need protection to allow them to mature and reach economies of scale (List, 1856; McKee, 1934). While related more to the manufacturing industry than agricultural production (Shafaeddin, 2000), this literature does offer an economic rationale for some sort of trade protectionism (List, 1856). Ha-Joon Chang, a development economist, notes that “almost all of today’s rich countries used tariff protection and subsidies to develop their industries” (Chang, 2002). The United Nations notes that subsidies can be a suitable tool used to address imbalances within the agricultural sector (United Nations, 2002). The issue of tariff protection and subsidies is a complex one in today’s world because of World Trade Organisation restrictions. There is also the chance that the infant industry will never mature; however, the United Nations notes in a report that “it would be a mistake” to “deny developing countries the opportunity of actively nurturing the development of an industrial sector” (United Nations, 2004).

There is an apparent desire to ensure that the hemp industry will benefit black small-scale and emergent producers in the country, indicated by the restricted nature and location of the trials and trial participants. In a sense, the South African hemp industry is an infant one in the national sense, with a further infant industry embedded within that, coalesced around small-scale and emergent farmers.

This vision of hemp contributing to reducing poverty and social inequality levels along with the resultant decisions about funding choices needs to be articulated clearly from the highest levels (Shafaeddin, 2000).

2.5.3.2 A mono-focus on hemp for fibre

Most of the research trials and projects have focused on producing hemp fibre varieties. Since the Kyoto Protocol there has been a surge in interest in natural fibres as sustainable alternatives to high carbon-emission products (United Nations, 1987; Blouw, 2015). It is unclear how much has actually been invested in developing the natural fibre industry in South Africa (kenaf, flax and hemp).

It is, however, a substantial sum if one assesses the diverse funding streams into the Herdmans flax processing plant project (Beukes, 2015), the kenaf project in Winterton (Van der Merwe, 2007), and the South African hemp initiatives that have also been allocated funding from a variety of government departments (Brough et al., 2005). This includes R15 million to focus on bio-composites, non-composites and non-woven flax and hemp production (Sotana, 2013), as well as private sector funding. Funding has been ongoing, dispersed and not recorded.

There are several constraints to this mono-focus. Studies and pilot projects in other countries indicate that hemp is not viable as a sole-purpose crop; i.e., it needs to be cultivated for fibre, seed and oil (Clarke & Pate, 1997; Kolarikova, Ivanova, Hutla & Havrland, 2015).

Hemp as a single application is not viable in my view (Blouw, CSIR, 2015).

In addition, there are high quality standards for hemp fibre – both in production and processing stages, which requires a relatively mature industry or substantial investment in training (Ecotextiles, 2014). There are certain economies of scale required to validate the establishment and maintenance of a processing plant (Kraenzel, Petry, Nelson, Anderson, Mathern, & Todd, 1998; Sustainable Fibre Solutions, n.d.); start-up costs are substantial (Gregor, 2015; Perozzo, 2015), as are ongoing costs, such as field tests, licensing and storage logistics (Owen, 2012). In addition, while some argue that hemp is a low-input and thus cheaper crop to cultivate (Sotana, 2010), irrigation is sometimes required, which is costly (Gregor, 2015).

This seems to indicate that hemp, grown for fibre, is more suited to commercial-scale production. This defeats the objective of using hemp fibre production to open up job and livelihood opportunities. A lack of experience regarding producing and processing hemp for fibre disadvantages South Africa further as it is competing with countries like China with extensive knowledge and experience, as well as a leading global market share.

You have to learn how to grow the crop before you can work out how much you'll make and how much it'll cost; these things take so much time...We're still learning about canola, which was sold as the next 'saviour' crop to farmers in the Western Cape. However, it is an expensive and marginal crop that we have been growing for 20 years and only now are we starting to understand it (Gregor, Rapula Farm, 2015).

There is a place for hemp, as a rotation crop, I would replace oats with hemp however hemp is more expensive to cultivate so the returns would have to be higher... there is no saviour crop, except corporate crops like sugar cane or timber, but agronomic crops are usually family-run businesses, which feed into a niche; hemp would form part of that ... Biggest mistake of idealistic people who have researched hemp as a crop haven't taken it to a farming level and this creates disconnect between the claims and the reality (Gregor, Rapula Farm, 2015).

2.5.5.3 Moving with the times

The hemp fibre market is a mature one on the global level and South Africa is not poised (as discussed in the previous two sections) to capture growth in this market. A potential gap for the country to exploit is the exponential interest in *Cannabis*' medicinal benefits. The added advantage of producing hemp for its CBD and seed is the plant itself can then be used to make construction materials or as an input for biofuel (Prade, Svensson & Mattsson, 2012). The hurd (inner core of hemp stalk) or fibre can be used as low-carbon construction materials. Hempcrete comprises the broken-down hurd mixed with a lime binder set to dry in a mould (Perozzo, 2015). It must be noted, though, that this is a lengthy process and as long as materials need to be imported, an expensive one (Budden, 2015). Besides the lucrative nature of using the medicinal attributes of the plant (Gregor, 2015), producing hemp for CBD and seed requires a lower level of skills than those required for fibre production (Kraenzel et al., 1998).

I don't believe hemp is feasible unless cultivated for CBD for medicinal purposes, meaning the stalks and seeds become by-products and affordable (Gregor, Rapula Farm, 2015).

Hemp needs to be planted for seed and CBD to be a saviour crop (Kunene, House of Hemp, 2015).

2.5.5.4 How other countries have overcome the cost barrier

Canada focused on cultivating hemp for its seed. Industry collaboration, government support and adaptive strategies (Owen, 2012) have been the main tools used to overcome cost barriers. Canada does not provide any form of direct monetary support for hemp production or processing (Vantreese, forthcoming). The European Union subsidised hemp farmers to the equivalent of £500 per hectare (Butler, 2011; Johnson, 2015) helping hemp and flax producers keep costs down and generate profits while they were still learning how to cultivate the crop.

Subsidies were subsequently reduced and then removed due to farmer abuse (Butler, 2011) and the charge that they further disadvantaged developing countries affecting their industrial development (Cantore, Kennan & Page, 2011). Subsidy funds would perhaps have been better spent on support services and infrastructure for the industry (Butler, 2011).

2.5.5.5 Moving forward

It is obviously imperative that the commercial feasibility studies are completed and that knowledge distributed to all stakeholders. The methodology for the study and associated scale of the trials bears scrutiny to ensure that the results generated are capable of being scaled up and applied in the South African context.

While subsidies could be used to supplement the initial costs of equipment for the small-scale sector, this seems a redundancy when looking at the lack of a supporting institutional framework regarding research and development, the necessary mechanisms for knowledge generation and transfer, and the miscommunication around expectations indicated in value-added activities associated with existing initiatives. The lack of an 'adequate' workforce (few producers with the necessary technical skills) presents as a major obstacle to starting any new industry (Steenekamp et al., 2011). Industry protection is viewed as essential for nations with such a competence gap (List, 1856; Senghaas, 1989), such as South Africa with its large unskilled working force, low levels of innovation and science, technical, engineering and technology skills (Ernst & Young Global Limited 20, 2013; Blouw, 2015). If subsidies were used, they would perhaps be better put to reducing the cost of licensing permits for small-scale farmers.

Hemp as a fibre product in South Africa appears to be a long-term investment with the potential to supply to the domestic market, given South Africa's lack of experience in this regard compared to countries such as China and the large skills gap. Even in a developed world context, the time it takes for a new agricultural-based industry to mature is estimated at between 10 to 15 years (Rawson, 2005). Hemp oil and CBD, however, seem viable markets and as, even on the global level, they are relatively new markets, South Africa could gain a significant market share and realise immediate economic benefits. These could be used to support the building and expansion of the necessary knowledge base for a hemp industry in the country. It would be critical to quickly overcome the legislative barrier to realise this opportunity.

2.6 Conclusion

This article set out to identify and explore the main barriers faced by the infant South African hemp industry, which have been formed and shaped by the country's particular historical factors – colonial occupation, apartheid and re-entry into a capital-led, globalised world. The study is based on a review of available literature focused on hemp industries, including grey literature comprising research reports, reviews and news articles combined with a series of semi-structured interviews with industry stakeholders. A grounded theory approach enabled a recursive approach as small findings emerging from literature and interviews were confirmed by further investigation, and eventually coalesced into an initial theory about the visible barriers present in the South African context.

The most apparent barrier is the legislative one. There have been various public- and private-sector efforts, including substantial investment, to motivate for the removal of the legislative barrier. It appears though that the desire to position hemp as a saviour crop and the lack of clarity about how to effectively do this will keep the legislative barrier in place. In addition, the combined lobbying for deregulation of both marijuana and hemp could be muddying the waters as hemp remains linked to its narcotic 'cousin' and suffers from the necessary restrictions placed on marijuana.

The desire for hemp to serve as a saviour crop also presents a barrier, as it restricts private-sector involvement and investment. These actors could be crucial to provide the necessary hard infrastructure and market penetration required for market viability. There is a lack of a clearly articulated vision at government level for the industry accompanied by long-term plans for building institutional capacity and mechanisms for knowledge generation and sharing, as well as transfer of skills. While there is merit to the exploration of a hybridised licensing model for South Africa, encompassing both small-scale and commercial elements, there is little point if the systemic structures and skills needed are not in place. The state has a leading role to play in this regard, but seems to have distanced itself from the issue of a hemp industry by withdrawing from the commercial incubation trials and resigning its role as head of the NHF.

The issue of commercial feasibility is raised as the third primary barrier to the establishment of a viable hemp industry in South Africa. Given the lack of experience, capital and skills regarding hemp production in South Africa, the focus on hemp as a fibre crop could be misplaced. The market opening for hemp oil and seeds, as well as the medicinal applications of CBD, could present a far more economically viable and easier to access market for South Africa. In addition, the hemp hurd as a by-product of this process can be used as a cost-effective and low-carbon construction material.

The future of hemp in South Africa is still unclear, but what is clear is that South Africa's particular context is unique. As a result, the way in which the industry is initiated and governed in the country needs to respond to its particular challenges. To this end, South Africa could 'borrow' from the models of other countries, but needs to invest in its own long-term, practical vision for the industry.

Chapter 3: An exploration of the competing narratives within South Africa's hemp industry

3.1 Introduction

The factors influencing the status and progress of the South African hemp industry need to be addressed before hemp can realise the vision of a viable, sustainable, inclusive industry held dear by many stakeholders. Claims about hemp being a 'saviour crop' have often been exaggerated (Rhydwen, 2006), such as that it can grow without fertilisers, pesticides, using minimal water and in poor soil (Nel, 1998; Vermeulen, 2008; Piotrowski & Carus, 2011). Hemp remains, however, one of the most versatile plants known to man with an estimated 25 000 uses (Robinson, 1996; Vermeulen, 2008; Piotrowski & Carus, 2011; Fine, 2014; Johnson, 2015). There is substantial research showing that hemp can be a more eco-friendly alternative to many of the ecologically destructive materials used in the textile, construction, farming and biomass, among other, industries, (Rhydwen, 2006; Vermeulen, 2008; Piotrowski & Carus, 2011; Finnan & Styles, 2013; Perozzo, 2015). There are competing narratives around the rationale for and potential future of a South African hemp industry. Stakeholders include government, private-sector businesses, small-scale and commercial farmers, and researchers. They have often overlapping interests, but sometimes divergent expectations. While there are visible and evident obstacles to the establishment of a legal, commercially viable hemp industry in the country – a legislative barrier, a desire for production to benefit a particular social group, and uncertainty around the commercial viability of the crop – this article argues that there are also invisible barriers. These invisible barriers comprise a combination of themes that emerged during the literature review and in-depth, semi-structured interviews conducted with stakeholders in 2015. These themes, listed below, identify the invisible barriers that emerged during an exploration of the competing narratives of stakeholders, and suggest ways of overcoming them. The themes are:

- A clear demand for hemp in South Africa
- A romanticism around hemp
- Differing expectations of a hemp industry
- An absence of public champions
- Fragmented funding streams
- Presence of gatekeepers
- Industry fatigue.

Some of these on their own present as barriers; for example, the lack of a public champion and the presence of gatekeepers; while others act in combination to create a barrier; for example, the combination of differing expectations and fragmented funding streams.

3.2 Methodological approach

As the study sought to identify 'invisible' barriers, a qualitative approach was more appropriate as nuanced meaning could only be captured through in-depth, semi-structured interviews with industry stakeholders. Once the interview process was completed and transcripts generated, a coding process was followed to identify common themes and outliers. This data was then effectively cross-referenced against the literature comprising both peer-reviewed and grey material to establish a framework of accuracy and relevance. A grounded theory approach was followed in that the research process itself generated small findings, which eventually coalesced into the emergent theory that barriers to initiating a thriving hemp industry in South Africa were perhaps not the obvious and visible ones identified above (Kolb, 2012; El Hussein, 2014).

This process required a significant amount of recursive and iterative work with attention paid to my own personal assumptions and bias. Only by allowing the space for the narratives to give up their own interpretation could the invisible become visible. This 'allowing' was a central theme to my study given the need to overcome one of the limitations to the study. This was my personal involvement in the industry through a relationship with a prominent private-sector stakeholder, employment in a leading private-sector company and personal activism taken around legalising hemp in South Africa. I undertook a recursive approach in this regard and made sure to discuss my interpretation of findings with objective individuals not involved in the industry. The second limitation to the study is the missing 'voice' of government. Despite requests for formal interviews with representatives of the Department of Health and DAFF, they declined to participate in the study. To counteract, while not overcoming, this limitation, I have communicated with other stakeholders in close contact with this group, and reviewed all current publicly accessible literature on the topic, including policy documents.

3.3 Stakeholders

A full list of interviewees can be found in Table 1 in Chapter 1 along with their respective organisation, role and the level of interaction I had with them. They were drawn from across representative stakeholder groups – public and private sector, as well as with small-scale and commercial farmers.

3.4 Emergent themes

The emergent themes are explored in detail below, followed by a synthesis of themes combining to form the invisible barriers to establishing a viable hemp industry in the country.

3.4.1 There is demand for hemp in South Africa

The global demand for hemp is increasing exponentially. One of the leading importers of hemp is the United States, which recently released figures revealing market growth from 7.3% (2011) to 16.5% (2012), 24% (2013) and 21.2% in 2014 (Stansbury, 2015), while the global demand for hemp is estimated to be around \$800 million (Global Hemp Group, 2014).

3.4.1.1 According to the public sector

The latest figures for South Africa are not accurate as the import and export figures of hemp in the latest DAFF report are only for raw/retted hemp fibre and do not include textiles, seed or oil, which are the main selling commodities of the import-based hemp retailers (DAFF, 2013; Budden, 2015; Karg, 2015), nor do they encompass the entire value chain (Quantec Research, 2015). A licence is needed for the import of certified hemp seeds to grow for research and medicinal purposes (Republic of South Africa, 1965) and an import permit is needed to import hemp raw materials certifying that the THC levels have been checked; the seeds must also be sterilised (Republic of South Africa, 1965; Budden, 2015; Sotana, 2015). Hemp production remains illegal in South Africa unless cultivated for research purposes. The most recent commercial incubation trials conducted on farms in the Eastern Cape, Western Cape and KwaZulu-Natal came to a close at the beginning of 2015.

There are figures in official DAFF reports that do not include all the retailers' imports (Budden, 2015) and thus do not provide a true reflection. The values do, however, reflect an increase in demand with an increase in import values (mainly fibre and seed) from R162 (2005) to R714 (2006), R26 310 (2007) to R251 781 in 2008 (DAFF, 2010), and in another DAFF report, R162 million in 2014 (DAFF, 2015) illustrating a massive discrepancy in the dataset values. Processing of imported hemp is also allowed and according to a DAFF dataset, processed goods to the value of R249 million were exported in 2014 mainly to other African countries (DAFF, 2015). A representative of the ARC justified the organisation's continued involvement in hemp research on the basis that:

There is a major demand for hemp (Thompson, ARC, 2015).

3.4.1.2 According to the private sector

There are three major hemp importing companies in South Africa – Hemptons, which sells cosmetics and nutritional products; Hemporium, which sells fabric, cosmetics, nutritional products and owns a fashion label; and House of Hemp, which sells fabric, hemp seeds and oil and is in the process of investigating the market for other products.

All three companies are well-established having been in business since the 1990s. Although exact sales figures from the hemp retailers were not obtained, the interviewees responded that demand and awareness of hemp was growing substantially (Budden, 2015; Karg, 2015; Kunene, 2015). Budden from Hemporium noted that its fabric sales doubled in 2014 (Budden, 2015).

As hempsters we haven't been able to satisfy the demand sufficiently. I think I only get to 1% of the requests that land on my desk... (Kunene, House of Hemp, 2015).

From an end-user perspective, people are more educated and seeking hemp products, although I don't think it's entirely due to our efforts but rather the global increase in awareness (Karg, Hemptons, 2015).

In 2014, we doubled our sales, the demand is not only from hippies or weed smokers, but there seems to be a shift in the mainstream mindset to support sustainable businesses (Budden, Hemporium, 2015).

There is a mystique attached to this maverick crop, famed for its long-standing history of providing for a multitude of uses. Is there a “disconnect between the claims and the reality”? (Gregor, 2015).

3.4.2 A sense of romanticism around hemp

There remains a sense of romanticism around hemp production. This “New Billion Dollar Crop” (Popular Mechanics magazine, 1938) has an estimated 25 000 different uses ranging from textiles and bioenergy applications to agricultural and vehicle components and food/nutrition, paper, construction materials and medicinal properties (Robinson, 1996; Vermeulen, 2008; Fine, 2014; Johnson, 2015). For many its association with marijuana adds another layer of mystique to the crop, while the crop's suitability as a sustainable alternative to fossil fuel-derived materials – plastics, synthetic fibres and products – is of particular relevance today (United Nations, 1987; Vermeulen, 2008; Blouw, 2015; Johnson, 2015; Perozzo, 2015).

Is hemp a saviour crop that can contribute to solving South Africa's environmental and social ills? For many involved in the industry, hemp's potential is undervalued and underexploited.

It is the most versatile crop known to man. The ARC has stayed involved in all hemp activity, it has cost us a lot of money, but we see the potential (Thompson, ARC, 2015).

Interviews conducted with both public- and private-sector players indicate that despite the lack of evidence around commercial feasibility of the crop in South Africa, and the general lack of production experience, that farmers are keen to grow hemp and willing to take the risk.

We are constantly contacted by the public; they ask who to speak to about hemp and how to apply to grow it (Thompson, ARC, 2015).

Commercial farmers and emerging farmers and ordinary people contact us all the time enquiring on how to apply to grow hemp (Budden, Hemporium, 2015).

Private-sector players have continued to support ongoing research trials. Hemptons purchased the oil produced by Indalo Fibre and Oils cooperative (set up as an extension of the ECHPPI trials in 1999) despite its poor quality in an effort to support the project (Karg, 2015). House of Hemp has funded a significant amount of research conducted by the ARC in recent years and continues to directly support small-scale farmers involved in the trials (Kunene, 2015; Thompson, 2015). Hemporium initiated the commercial trial at Rapula Farm and assists with administrative details and communications (Budden, 2015).

Hemp, however, remains a marginal crop even in countries that have never prohibited production, such as China. Hemp production contributes just 0.30% to agricultural land planted with fibre crops in the country (Wang & Shi, n.d.; Li et al., 2003). In Canada, hemp is mainly cultivated for seed, while high-yielding fibre varieties have been a challenge and fibre processing infrastructure is only now starting to be investigated (Canadian Hemp Trade Alliance, 2015). Hemp is a new crop to Canada, cultivated on less than 1% of farming land – perhaps due to uncertainty around yields and lack of experience (Crawford, n.d.). In both countries though, hemp production is being encouraged as global market demand is increasing. The area planted to hemp in Canada has exponentially increased from 1 619 hectares in 2001/02 to 32 375 hectares in 2014 (Crawford, n.d.; Serecon Management Consulting Inc., 2012; University of Kentucky, 2013). In China, the state is encouraging farmers to grow industrial hemp as a way of doubling their income (Xinhua News Agency, 2009).

Interestingly, it is those involved in the commercial feasibility trials at Rapula Farm that do not view hemp in this romantic light.

... there is no saviour crop, except corporate crops like sugar cane or timber ... The biggest mistake of idealistic people who have researched hemp as a crop is that they haven't taken it to a farming level and this creates disconnect between the claims and the reality (Gregor, Rapula Farm, 2015).

The loyalty and belief in the crop is based on particular worldviews and expectations of what the crop could bring about.

3.4.3 Differing expectations of a hemp industry

As discussed in Section 2.5.2, different stakeholders, while sometimes experiencing overlapping interests, have divergent expectations of the crop. Some see it as a saviour crop with the potential to address South Africa's social and economic inequalities, while others perceive it as an environmental substitute for fossil fuel-derived materials, and still others perceive it as commodity from which to derive a profit.

These divergent expectations became explicit when hemp trials entered into the commercial feasibility stage.

Each stakeholder came in with their own interest, including ourselves. This led to competition instead of collaboration. As soon as the topic of the commercial feasibility of hemp came up, we all became highly conflicted... (Blouw, CSIR, 2015).

The desire to 'protect their own turf' was apparent in many of the conducted interviews. In effect, a silo mentality exists with stakeholders not wanting to share information with each other in case it disadvantages them. Unfortunately, this kind of attitude can reduce efficiency and morale (Stone, 2004; Hotaran, 2009; BusinessDictionary.com, 2015). Despite attempts in the trials to incubate a sense of inclusive development through projects conducted to extend the value chain beyond primary production, this silo mentality approach may have hindered these attempts.

3.4.3.1 Hemp as a saviour crop

There is an evident desire for hemp to play a role in improving the plight of millions of small-scale farmers in South Africa. The saviour crop approach is evidenced in government's initial interest in the crop and the work done by House of Hemp and Dr Kunene in her personal role and in her role as head of the NHF. This is exemplified in the quote below.

... the bulk of poor people are black so let's boost them up. They don't have the mining industry so the only place there's a gap is in agronomics; hemp gives you food, shelter, clothes and medicine (Kunene, House of Hemp, 2015).

Hemp could be a 'saviour crop' in alleviating some of South Africa's social ills (Blouw, 2005; University of Kentucky, 2013; Kunene, 2015); however, it needs to be introduced in such a way that it benefits the target group, but does not lead to exclusion of those that have much to offer in terms of experience, capital and expertise.

3.4.3.2 Hemp as a commercial crop

Commercial farmers play a crucial role in driving mainstream crops and helping industries reach economies of scale. This group has years of experience and the capital to invest in ensuring that crops reach commercial yields (National Industrial Hemp Strategy, 2008); this is vital for the hemp industry as large quantities of good quality hemp stalks or natural fibre stalks are needed to substantiate the costs of running a processing plant (Beukes, 2015). There are potentially negative consequences though to a commercial-scale operation, as if hemp is grown as a monoculture crop it is likely that pest populations will increase along with use of pesticides (McPartland, 1999).

Commercial farmers involved in the trials have noted that they felt partially excluded from the process. This sidelines the very tangible contribution they could make in terms of experience, expertise and access to expertise, capital and equipment. This group also notes that it does not make sense to test commercial viability on only two hectares, which is the cultivation area size limit for the trials (Sotana, 2007; Gregor, 2015).

It wasn't like they really wanted us to succeed at the trial ... It wasn't an enabling environment and the value of a commercial trial was undermined (Gregor, Rapula Farm, 2015).

This sense of exclusion felt by the private sector cannot be left unattended despite government's mandate to cater more to those disadvantaged and marginalised groupings. Dr Blouw from the CSIR notes that government's focus, including funding, will continue to be on investments into communities.

While hemp is funded under current legislation, we won't necessarily fund private interests, but will fund communities to make sure there is knowledge and experience within the communities that need it (Blouw, CSIR, 2015).

Both the official developmental approach and commercial farmer approach have tended to take a high-level view of the industry, albeit from two different standpoints – the former wanting the crop to address a social ill and the second wanting it to fulfil its economic generation potential. However, the most affected group are small-scale farmers who seem to have lost out on the opportunities offered by hemp production through a process of mismanagement, lack of adequate training and unmet expectations.

3.4.3.3 Hemp as a small-scale crop

Hemp can be grown on a small-scale level for seed and oil if farmers are grouped in cooperatives to reach the necessary economy of scale to support a processing plant. In China state hemp farms are grouped in areas that are close to processing facilities. It is likely more viable to do this to produce seed and oil, as opposed to fibre, which required large quantities of a high and consistent quality. Unfortunately in South Africa, the initial and ongoing trials focus on hemp for fibre and building value along the chain to retail stores. It also seems that the lack of a governing framework incorporating ongoing education and skills transfer, as well as effective and coordinated extension office support (Sotana, 2013) has hindered the ability of those small-scale farmers involved in the trials to realise any benefit. Also the lack of continuity regarding government involvement (they distanced themselves from the trials in 2006) has led to many projects being effectively stranded with no explanation given to those participating. This includes the African Eye group that was trained to make craft items from hemp material (Madliwa, 2015). There are those calling for an unleashing of creativity to enable small-scale farmers and their production chains to thrive (Madliwa, 2015). Madliwa gives an example of the empty factories from the former Transkei and Ciskei that could be renovated to establish processing stations to press the seed into oil (2015).

It pains us to see our children at home, it pains us to see our land unused; let the people on the ground, the farmers, show the President what it can make and show the eagerness of small-scale farmers (Madliwa, Emerging farmer, 2015).

Due to lack of continuous support (knowledge, investment, etc.) small-scale farmers have not reaped good results in the trials and on a site visit in 2011, representatives from the Department of Trade and Industry noted their disappointment at the poorly maintained hemp crop plots (Sotana, 2013). It was this lack of results that led to the NHF agreeing to the inclusion of a commercial farm (Rapula) in the trials in attempts to generate valid results. Dedicated funding and training would need to be directed towards mobilising this group effectively.

Communities need to take ownership (Blouw, CSIR, 2015).

If one wants to outsource to small-scale farmers, you need a strong organiser and the organiser must have cash.(Gregor, Rapula Farm, 2015).

I'm not saying communities can't master this, but it's going to take an awful lot of time and it's a mindset thing; why would the guy conceivably do this over tomatoes?
(Gregor, Rapula Farm, 2015).

This is not to say that small-scale farmers do not have important knowledge to contribute; they are at the start of any agronomic value chain and have on-the-ground experience that experts may lack (Okry, Van Mele, Nuijten, Struik & Mongbo, 2010). Rather it is to note that the infrastructure necessary to support community-focused projects was not in place, including regular extension support, and provision of inputs, such as fertilisers (Kunene, 2015; Sotana, 2010). In addition, the prohibition against commercial production also blocked the scaling up of any of the initiatives (Sotana, 2010; Kunene, 2015).

3.4.3.4 Moving forward

Canada and South Africa both began exploring the potential of hemp in 1994/95 (Wynn, 1998; Serecon Management Consulting Inc., 2012; Johnson, 2015). Today Canada is one of the main hemp suppliers to the United States market (University of Kentucky, 2013) with trade data accounting for 60-90% of United States hemp demand in 2011, to the value of R6.9 to R10.4 million in 2011 (University of Kentucky, 2013).

The Canadian model places an emphasis on participatory action research enabling learning and co-generation of knowledge through practice. It has allowed those involved – from public-sector players to farmers – to share experiences, both positive and negative – and quickly build up a depository of knowledge about hemp production in the country. A Canadian farmer notes the benefits of this approach (King, 2006 in Owen, 2012:117):

People who are looking at growing industrial hemp need to be sure they have a well thought out plan of how they will physically combine it for grain...You can describe to someone, and we've done it many times, what they need to do to combine hemp. But until you actually do it and learn the sounds of your combine with the hemp going through it, you don't know what it's like.

The participatory action research model is one that would work well in South Africa, given its focus on helping affected parties (in this case, disempowered groups) address problems related to their welfare in an organised way (Bryman & Bell, 2014).

Besides the fact that participatory action research allows for combining commercial production and research, it also enables knowledge sharing, which is more likely to result in increased innovation (Venkatesen, 1994; Mayet, 2012). Particularly relevant for the South African context is that it ensures that farmers, who are normally disconnected from the decision-making process, are actively involved in negotiating policy that directly affects them (Scoones, Devereux & Haddad, 2005).

In addition, a focus needs to be put on transdisciplinary collaboration and skills transfer. A collaborative mentality would allow for skills transfer and knowledge creation (Pahl-Wostl, Tabara, Bouwen, Craps, Dewulf, Mostert, Ridder & Taillieu et al., 2008). This requires leadership and significant investment of resources and funds.

Commercial and small-scale farmers may have valuable lessons to share with each other; however, a collaborative relationship needs to be formed on a strong democratic foundation with full community consultation on partnerships (Garnet et al., 2009). Due to a legacy of inequality from the apartheid era, the South African context contains power relations and tensions that will need to be acknowledged, and there needs to be a committed, well-equipped facilitator that can ensure constructive dialogue occurs between the stakeholders ensuring clear communication and progress (Shackleton, Cundill & Knight, 2009).

The Chinese cooperative model provides some good reference points for South Africa. The advantages of the small-scale, cooperative system that China practices are that it keeps the production value chain within the country, allowing the whole value chain to benefit from favourable prices compared to other countries. It also creates livelihood opportunities for households that can farm on a small scale, as from the point of harvesting an agency comes and collects the crop, and ensures sales and payment according to the quality of hemp produced (Li et al., 2003). It must be noted, however, that hemp farming is concentrated in certain areas to maximise the production and processing facilities, particularly Shandong and Jiangsu, and more recently Yunnan province (Wang & Shi, n.d.; Xinhua News Agency, 2009) and that it invests in hemp breeding research to produce suitable varieties through its agricultural research system (Salentijn et al., 2015).

Funding plays a vital role in determining the future focus and viability of any system. In South Africa funding streams also reflect the diversity of expectations held by stakeholder groups.

3.4.4 Dispersed funding streams

Funding has originated from both public (government and public research agencies) and private stakeholders. Motivations for funding align with the desired outcome, which as discussed above varies quite radically between groups. A more collaborative and coordinated funding focus would be more beneficial to development of the industry (Barbier & Elzen, 2012).

3.4.4.1 A search for sustainable alternatives

The Southern African Hemp Company was the first to invest in local hemp production through the first research trials conducted by the ARC in 1994/95. The objective was to integrate production into a rural development and village model (Wynn, 2015). Possibly this was modelled on China's deregulated, small-scale production through cooperatives model (Wang & Shi, n.d.; Li et al., 2003). The company invited big private-sector actors such as Masonite and PG Bison to join the initiative at the end of 1996 (Wynn, 1998). These companies were interested in hemp's potential to act as an alternative source to wood pulp (Ministry of Water Affairs & Forestry, 1997; Wynn, 1998). These two companies funded a further year of the trials. The research agenda was thus determined by their interest in finding low-cost and sustainable replacements for existing components. They withdrew, however, in 1997 when the research agenda was captured by public-sector agencies and refocused on hemp as a fibre crop.

The private-sector has remained involved in and funded subsequent trials – Rapula Farm has covered their own costs of participating in the commercial incubation trial and House of Hemp contributes towards the ARC's research costs (Budden, 2015; Gregor, 2015; Kunene, 2015). The research agenda, however, remains controlled by the public sector. There have been several efforts from within government to change legislation, including from ECHPPI project manager Mr Sotana, who recommended terms of reference to amend current legislation (Sotana, 2014) and a member of parliament for Inkatha Freedom Party (IFP), Mario Ambrosini, who tabled the Medical Innovation Bill to amend legislation for the *Cannabis* family, including use of hemp in the industrial sphere (Davies, 2014; eNCA, 2014). There have been various private sector efforts to amend legislation of *Cannabis*, including hemp (Fields of Green for All, 2015; Hemporium, 2015).

3.4.4.2 A public-sector focus on fibre

It is difficult to ascertain how much money has been spent on hemp research in the last two decades. It is known that government had a budget of R15 million for ECHPPI from 1999 to 2005, with a focus on training small-scale and emerging farmers to grow hemp as a fibre crop while agronomic research continued (Brough et al., 2005; Sotana, 2013).

In addition to this, the ARC and the CSIR have spent funds from their allocated disbursement from government on hemp trials and research (Blouw, 2015; Thompson, 2015). The ARC and House of Hemp funded the programme to breed two local hemp fibre cultivars (SA1 and SA2). The CSIR has funded research into hemp as a natural fibre technology (Blouw, 2012).

ARC has stayed involved in all hemp activity ... it has cost us a lot of money but we can see the potential (Thompson, ARC, 2015).

Government's focus on hemp as a natural fibre crop has perhaps been misguided. This usage is the most difficult to generate viable income from as it requires a trained labour force with experience of working with natural fibres (Blouw, 2015). For hemp, the retting process that determines the quality of the fibre has not yet been perfected in the local context (Beukes, 2015; Blouw, 2015; Gregor, 2015; Thompson, 2015). To enable this in South Africa would require a long-term commitment to education and skills development for the natural fibre and textile industry sector. The country lacks the relevant technical skills on all levels of production (Blouw, 2015).

In 2011, we looked at textile sector specific science, engineering and technology skills, to see why the textile industry was demised in South Africa; 1% of senior managers in the sector had science, engineering and technology skills, which are the drivers of innovation (Blouw, CSIR, 2015).

There has been funding directed towards seed/seed oil varieties, but not towards the medicinal uses of the plant, such as CBD hemp oil.

In 2004, with a year left of Phase 1 of the ECHPPI project, activity around hemp seed production began (Sotana, 2010). Members of the Eastern Cape communities involved in ECHPPI organised themselves into the Indalo Oils & Fibre Industries Cooperative, with the chairperson, Mr Ziphilele Matinise, and secretary, Ms Thami Madliwa. Mr Sotana as project manager arranged the purchase of 10 oil pressing machines worth about R1.2 million from Germany in 2004. The farmers from Indalo Oils & Fibre Industries Cooperative were trained in all aspects of oils extraction by the machine manufacturers. Karg from Hemptons bought the first batch of oil; however, the cooperative had not confirmed a buyer before production or established a stable environment in which to process the oil.

The cooperative planted before they had a market, pressed the oil and asked me to buy everything. With the money I gave them they registered the cooperative.

The oil I received had a lot of sludge and I couldn't use it for food or cosmetics (Karg, Hemptons, 2015).

Indalo Oils and Fibre Cooperative is inactive at present. Only two of the oil pressing machines were unpacked and are at Dohne Institute in Stutterheim. The rest are still boxed and stored away (Sotana, 2015).

Dr Kunene also brought in international stakeholders that were interested in investing in hemp seed production, but they did not end up investing (Thompson, 2015).

3.4.4.3 The battle to change legislation

A variety of stakeholder groups and individuals have funded various efforts to decriminalise *Cannabis* – the entire plant – or hemp as a variety of the plant. These stakeholders include South African's infamous 'Dagga Couple', Fields of Green for All and Hemporium, as well as individual efforts by Mario Oriani-Ambrosini and Robin Stransham-Ford, based on medical needs (eNCA, 2014; Budden, 2015; The Dagga Couple, 2015).

3.4.5 Absence of a public champion for hemp

The need for a public champion for hemp in South Africa cannot be underrated. Canada's National Industrial Hemp Strategy (2008) notes that the industry needs to identify "specific champions for individual issues who can be mobilized to meet with and address decision makers relevant to their areas of concern" (Agriculture and Agri-Food Canada, 2008:98).

The local hemp industry did have a public champion in the form of Max Mamase, Minister of Agriculture of the Eastern Cape in 1997. He initiated and drove the ECHPPI, which was granted a R15 million budget by the national Department of Agriculture in 1999 (Brough et al., 2005; Sotana, 2013). Unfortunately for the industry, Mr Mamase and his wife, then Eastern Cape Minister for Local Government and Housing, were arrested in March 2005 on charges of fraud and corruption. Mr Mamase had retired from his post a month before as allegations began to surface (Democratic Alliance, 2013). Charges were withdrawn on a technical basis in 2009, but reinstated in 2012. Earlier this year, a regional court found that Mamase's mental state, after a number of strokes, made it impossible for him to defend himself, while also finding that he was probably guilty (HeraldLive, 2015).

It is not clear whether the arrest of Mamase on charges of fraud and corruption had anything to do with Lukile Ngada's, Director of the Department of Agriculture, request that all government involvement in hemp initiatives be discontinued in 2006 (Sotana, 2015).

But it was at this point that government funding for agricultural hemp trials was discontinued and the initiative given over to private-sector players to ascertain commercial feasibility. Government remains involved in the hemp industry only as a regulator. The Department of Health issues permits for hemp research, and the South African Police Service tests THC levels of samples and confirms that licensing requirements have been met. The reins of the industry in a sense were handed over to Dr Kunene, CEO of House of Hemp, in the form of leadership of the NHF in 2006. As a private-sector player, however, with vested interests (both in terms of generating profit for House of Hemp and in fulfilling Dr Kunene's personal objective of directing the industry to create jobs and ensure social upliftment in the rural areas), it is not possible for Dr Kunene to act as a 'neutral' public champion.

Literature seems to suggest the need for a public-sector actor to act as champion both in government and private-sector circles, and then multiple champions for the diverse strands of the hemp matrix (fibre, oil, seeds, etc.) (Agriculture and Agri-Food Canada, 2008). It seems apparent from interviews with representatives of public research agencies that they can also not fulfil this role as they are only partially funded by the state and have to acquire private funding, which necessarily shapes their research agenda. In short, they do not have the autonomy to act as a public champion for the hemp industry (Blouw, 2015; Thompson, 2015). In addition, taking proactive steps to push for a legalised local hemp industry also requires personal sacrifice.

I think the gap here is to say in other countries if this is a priority, government would say, "Sunshine [Blouw] get out of the CSIR, you have enough of this knowledge, go and be part of implementing, but you see Sunshine is risk averse. I get a salary here. We're being selfish in that respect, not to say after five years nothing is happening... But you see we need to assess with government and private sector where are the gaps and how do we address them to get ahead. Because believe me if another multi-million research project comes up and you ask me about hemp I will say I am no longer in hemp (Blouw, CSIR, 2015).

A public-sector champion would need to be embedded in government and be able to influence policy and legislation. Dr Blouw of the CSIR suggests that the champion be at the level of a Deputy Director General (Blouw, 2015). Other industry stakeholders note this lack of public leadership:

In the government sector we haven't had a driver (Thompson, ARC, 2015).

We need a leader to direct us forward (Blouw, CSIR, 2015).

You can just imagine the teatime talk back in the day when the ARC trials were initially done on Cannabis, probably wasn't anyone passionate about it (Gregor, Rapula Farm, 2015).

The role of the public sector as the licensor is important and is identified as one of the emerging themes that could lead to positive development. However, the licensing requirements at present are solely for research and not commercial production, even though groups such as the Indalo Oils and Fibre Cooperative and the African Eye women's group were allowed to sell the produce and products they made as part of the ECHPPI. If licences come with a fee, then the barrier is too high for those it should be benefitting the most (Kunene, 2015; Madliwa, 2015; Perozzo, 2015).

The NHF could possibly fill the role of lead public champion for the crop, but it would require members to invest significant amounts of time and money to position the foundation in this manner. Currently members meet irregularly and the last meeting was held three years ago. There is no website or regular publication/communication material issued. The foundation, could, however, play a catalysing role in terms of supporting knowledge sharing between all stakeholders, which in turn could generate knowledge creation and contribute towards sustaining momentum towards legalising commercial hemp production in South Africa. Appointing an organisation as a public champion in a sense would also reduce the risk of losing the champion – as in the case of Mr Mamase – and thus the momentum.

This risk is amply illustrated in a large-scale kenaf production project initiated in South Africa in 2007. The Industrial Development Corporation in collaboration with the Seardel Investment Corporation invested R100 million in a joint venture to initiate large-scale production of kenaf, a fibre crop used to make paper pulp, thermal and sound insulation, automotive parts and biocomposite, non-woven materials (Sustainable Fibre Solutions, n.d.; Van der Merwe, 2007).

The project was well conceived with significant investment funds (R80 million for Phase 1) (Farmer's Weekly, 2007); a dedicated customer in a sister company Brits Automotive Systems (Sustainable Fibre Solutions, n.d.); established linkages with tertiary institutions to conduct research and development, as well as to provide advisory services to farmers (Van der Merwe, 2007); and alignment with black economic empowerment objectives through inclusion of small-scale farmers, who were offered shares in the company (Farmer's Weekly, 2007; Garnett, Crowley, Hunter-Xenie, Kozanayi, Sithole, Palmer, Southgate & Zander, 2009).

The project provided a grower's manual to farmers and the kenaf decorticating plant in Winterton, KwaZulu-Natal is the largest and most technologically advanced in the world (Van der Merwe, 2007).

This project remains in limbo despite the careful strategising and planning put into it and the ARC and the CSIR continue to investigate the potential of kenaf as a natural fibre. Those involved are reluctant to talk about what went wrong, but it appears as if the death of the project initiator on the night of the company's opening party effectively left a large knowledge gap behind (Beukes, 2015), particularly regarding the processing knowledge required to turn fibre into yarn.

IDC [Industrial Development Corporation] invested in the Winterton factory, but nobody looked at the step in between, the retting and scutching. So brittle fibres were going in and brittle fibres were coming out (Thompson, ARC, 2015).

Thus there is a lesson to be learnt from the death of the kenaf project initiator about not concentrating knowledge in a limited number of actors, but from the start to set up systems to spread the knowledge.

3.4.6 The presence of gatekeepers

Even though the industry has not taken off yet in terms of deregulated production, it is apparent from the interviews that there are efforts to protect access to or control over the industry by varied groups of stakeholders. In effect these different groups act as gatekeepers. Gatekeepers can play either a positive or negative role, depending on the motivation.

Good gatekeepers closely manage and enforce fair trade practices (Gatekeepers to Quality, 2012); have a strong management presence and engage in extensive communication with relevant stakeholders (Veitch, Clavisi & Owen, 1999; Mumford, Scott, Gaddis & Strange, 2002); and can identify and work with other gatekeepers and key actors (Veitch, Clavisi & Owen, 1999). Characteristics of bad gatekeeping practices include instances when an individual or select group holds authority over the sector and can influence public opinion to favour the group over its competitors; when partnerships are based on short-term, business-as-usual models that aim for quick profiteering for a select group (Veitch, Clavisi & Owen, 1999); and when a select group or individual takes over projects, exacerbates social divisions and inequalities in order to fulfil its own agenda (Sapountzaki & Wassenhoven, 2005).

There are existing gatekeepers in the South African hemp industry. While it may not yet be possible to identify them as ‘good’ or ‘bad’ gatekeepers, as described above, it is worth noting their presence in the still infant market. Gatekeepers hold power, but also the responsibility to wield it well.

We have weak industry strategies as the behaviour and mentality are very much ‘I want to protect my turf’, which isn’t productive (Blouw, CSIR, 2015).

The industry in South Africa is over-protected and I believe there is space for many people. Some roleplayers would like to manage the process from beginning to end (Karg, Hemptons, 2015).

Government plays a gatekeeping role as it controls legislation and regulation of the market, preventing the private sector from developing the industry, apart from participation in research trials. If hemp production is deregulated and government remains involved only in terms of licensing processes, it will then play its role as enforcer of fair trade practices (Li et al., 2003; Gatekeepers to Quality, 2012). Through the government’s legislative gatekeeping it also prevents the untapped knowledge of growing Cannabis that already exists in South Africa from being utilized in order to benefit the growth of the industry and remove South Africans with knowledge and skills in growing Cannabis from the black market to a more formalized economy (The Green Times, 2016).

The House of Hemp is a gatekeeper in that it is the only private-sector player to have been granted a research licence for hemp production and, in addition, its CEO is the national coordinator of the NHF. While there is the potential for this organisation to hold authority over the sector and influence public opinion to its benefit (thus aligning with a characteristic of bad gatekeeping (Veitch, Clavisi & Owen, 1999), it is apparent that the intention is to ensure that the benefits of a hemp industry are directed towards ameliorating rural poverty (Kunene, 2015). Because this vision for hemp in South Africa is embodied in an individual, who is also a vocal champion for hemp production, there is a danger that without her at the helm, the gatekeeping role of the company could become more ambivalent. It perhaps has been necessary to first introduce one private-sector partner with ideal black economic empowerment credentials, however List (1856) mentions that although infant industries should be protected, it should be temporary and not excessive with the next step being to introduce local competition (Shafaeddin, 2000).

House of Hemp along with Hemporium and Hemptons also play gatekeeping roles in terms of their dominant share of the current niche market. Hemporium is mainly integrated into the Cape Town market while House of Hemp focuses on Johannesburg, and Hemptons is a wholesaler and distributor selling products across the country. All three have been market leaders for more than a decade and have invested significant resources in capturing and developing their market share.

This could present a barrier to small-scale processors, manufacturers and retailers entering the market after deregulation. In addition, these three companies could find themselves continuing to act as importers for quality and consistency reasons and not supporting local production following deregulation; however, the transport, travel insurance, storage and import taxes all add additional expense that would not be added to local produce. As the commercial feasibility study, proving the local production viability, has not yet been completed for South Africa, it is not possible to determine whether it would be feasible for the three major retailers to support a local industry or not.

3.4.7 Industry fatigue

While countries such as Canada have managed to stake out a lucrative share of the global hemp market and establish a working institutional and regulatory framework for hemp production (Crawford, n.d.) South Africa remains mired in a legislative battle and research trials have not generated much beyond confirmation of the agronomic feasibility of growing the crop in the Eastern and Western Cape provinces, and an outdated growers' handbook. Stakeholders appear to be becoming increasingly fatigued.

I am sad that it hasn't worked out ... because I have a lot of passion and have spent a lot of time imparting knowledge. But I need to turn around and benefit too, especially with business (Karg, Hemptons, 2015).

I started working with hemp at the same time I had my daughter, nothing has changed with hemp, but my daughter is 15 years old (Sotana, ex-DAFF, 2015).

Will the government really go to the effort to legalise and amend legislation to start a complexity riddled industry that feeds into a niche market? (Thompson, ARC, 2015).

Because believe me if another multi-million research project comes up and you ask me about hemp I will say I am no longer in hemp (Blouw, CSIR, 2015).

Some role players may move on to investigate other options in terms of crops or other markets that offer more favourable regulatory conditions. Thus the experience and expertise gained in the last two decades could be lost, putting attempts to establish a thriving industry back significantly. Budden from Hemporium recently visited Malawi to consult on initiating trials, and has shown interest in getting involved in projects outside the borders of South Africa (Budden, 2015). There have been concerns raised about whether the benefits of a hemp industry in Malawi would go to international stakeholders or local communities (Mizere, 2015) echoing the desire for hemp to be a saviour crop in that country as well.

3.5 Conclusion

It is evident that there is demand for hemp in South Africa, as there are three main import-based hemp companies in South Africa that have been around since the early 1990s and they report that interest and sales are growing. However, there isn't an accurate dataset displaying the true demand of hemp in the country and for which uses that could be used to motivate for legalising production and give direction to the industry.

The sense of romanticism around hemp is possibly due to its association with marijuana, giving it the status of a 'maverick' crop as well as the myriad uses to which it can be put, in particular as a substitute material for currently unsustainable synthetic and fossil fuel-based industries. The differing expectations of what the hemp industry should look like and who it should benefit go hand in hand with the silo mentality behaviour apparent among role players in the industry. This has resulted in reduced efficiency and morale, stifling progressive development.

Funding streams have been affiliated with these diverse expectations with private companies focusing on sustainable alternatives, public-sector research groups on fibre varieties, and individuals and other organisations on the medicinal use of the *Cannabis* family (marijuana and hemp), contributing to existing confusion on the differences between hemp and marijuana.

Gatekeepers are present in the South African hemp industry and can play a good or bad role: government with regards to controlling legislation, House of Hemp as the national coordinator of the NHF and all three major South African hemp retailers currently dominating the local hemp market. It is important to protect an infant industry such as hemp, but this should be temporary and not excessive.

Role players are burning out and looking into concentrating their energy on producing hemp in less complicated places, such as Malawi. This could result in lost expertise and experience for the country.

Since the withdrawal of government as driver of the ECHPPI initiative with Mamase as the public champion, it has shifted to the role of a regulator enforcing legislation while partially state-funded research institutes and private-sector members make uncoordinated efforts to make progress. The NHF offers the potential to fill the public champion role; however, there needs to be a strong public-sector presence, with committed time and funding to ensure it is well positioned and effective.

By exploring the above-mentioned themes, it is evident that there are nuanced, invisible barriers beyond and possibly linked to the more obvious barriers of legislation, hesitation to deregulate production due to uncertainty on how to address social issues and uncertainty around commercial feasibility.

These barriers need to be confronted and grappled with in order to establish a legal and commercially viable hemp industry in South Africa.

Chapter 4: Conclusion

4.1 A drama of hope and disappointment

The South African hemp story is one of passion, vision, good intentions and hope, while also being one of conflicting interests, power struggles and discordant efforts and funding. The first journal article in Chapter 2 attempts to understand the more visible barriers of legislation, social inequality and the view of hemp as a possible 'saviour crop' to address social issues, and uncertainty as to the crop's commercial feasibility in South Africa. The second journal article in Chapter 3 attempts to unravel the more nuanced and often invisible barriers to moving the industry forward. These barriers were identified as a sense of romanticism about the crop, differing expectations, misdirected funding aligned with the differing expectations, the lack of a public champion and the presence of gatekeepers. Through a recursive approach within a grounded theory framework, small findings from interviews were analysed against the literature before being explored in further interviews to generate a list of emergent hidden barriers. Both the visible and invisible barriers interact to create a stalemate situation for the South African hemp industry, leaving key stakeholders fatigued and disillusioned.

4.2 A fragmented approach

Humanity has a long history working with *Cannabis*, but the distinction between its sub-species of marijuana and hemp has never been clearly defined. Within the last 100 years *Cannabis* was prohibited by a blanket law in many western nations creating even more confusion as to the inherent differences between the two. In South Africa, this confusion is compounded by efforts to decriminalise both through the same campaigns; for example, South Africa's proposed Medical Innovation Bill and the work done by Fields of Green for All. South Africa's institutionalised approach to *Cannabis* stems from the latter part of the colonial era (1800s–1948), in which British rulers of the colony regarded it as a habit-forming drug that led to indolence, thus posing a threat to the security of settlers. South Africa was the first country in the world to call for an international ban on the plant for this reason. Once the United States has prohibited production in the 1930s, many western nations followed suit.

The differing stakeholder visions and expectations of the industry diverge on the issue of whether hemp is a saviour crop or one that should be promoted on the commercial level to open up high-level value-chains, particularly for its medicinal applications. Public-sector funding and government's role as gatekeeper to the industry through the issuing of research permits have concentrated resources on hemp as a fibre crop. This is perhaps because it is considered a viable crop to be grown by small-scale farmers and the resultant value-chain does not require high-level technical skills.

As illustrated, however, in the example given of the Chinese system, labour-intensive production does not necessarily equate to increased productivity and competitiveness on the global market. In addition, the market for fibre is dominated by countries, such as China, with years of experience, institutionalised knowledge centres and support for the industry. South Africa's insufficiently skilled workforce and lack of experience place it at an immediate disadvantage in the fibre market. The relatively easier to produce applications, such as hemp seed and CBD oil, have not been investigated fully, despite that they would generate immediate returns in an emerging market that looks set to grow exponentially. In addition, cultivating hemp for these purposes would allow the stalks and other by-products to be used as well. Cultivating hemp for its seed and oil could also contribute to increasing nutritional levels in a country where over a quarter of the population is food insecure and millions of children are undernourished. While the processing of hemp for oil and CBD require more sophisticated and technical skills, the revenue generated could be invested in long-term plans for building a fibre industry in the country. In addition, the hemp hurd created as a by-product during this process can be used for as a construction material, contributing towards cost-effective, low-carbon housing solutions.

4.3 A lack of data

Although research on hemp in South Africa started 20 years ago, the only official and publicly accessible output is a publication by the ARC and Eastern Cape Department of Agriculture called *Hemp (Cannabis sativa L.) Production in South Africa*. This was compiled from the agronomic findings of Phase 1 of the Eastern Cape trials and published in 2005. This publication is available to buy from the ARC and the Dohne Agricultural Development Institute. Since then no updated research publications have been released.

While trying to calculate the legitimate demand for hemp it became apparent that there isn't a reliable data set specifically for South Africa. DAFF produces a yearly hemp market value chain report, which is supposed to supply accurate information on the status of hemp imports and exports. The values given, however, are only for raw, retted and processed, but not spun, hemp (Quantec Research, 2015). This excludes hemp seed, seed oil, CBD oil and fabric, which are growing global markets with local companies already selling into the domestic market.

The lack of clarity as to the actual extent of the existing and potential market for hemp in South Africa and the absence of a commercial feasibility report and official hemp business documentation (from cultivation to finished product) make it difficult to estimate the economic viability of hemp in South Africa. Investors want to know facts, figures and the potential risks of an industry before they invest.

Additionally, the commercial incubation trials have been restricted to two hectare plots, which is too small an area to estimate commercial viability, especially with regards to cultivating for fibre, as economies of scale are needed to substantiate investing in the processing equipment.

It is essential that the outstanding commercial feasibility study is completed and shared among all stakeholders. Subsidies for initial start-up capital and short-term training courses have proved unsuccessful, so perhaps subsidies should be more wisely aimed at building the necessary mechanisms for knowledge generation and transfer, ensuring the necessary institutional framework is in place to support research and development.

It is evident that there is demand for hemp in South Africa as there are three main import-based hemp companies in South Africa that have existed since the early 1990s, and interviewees from this sector confirm that their businesses are growing.

4.4 Differing expectations and visions

Even though there seems to be a sense of romanticism around hemp that is perhaps misguided, the possibilities of it being a more sustainable resource for a multitude of currently unsustainable materials makes it worth consideration. In addition, if sustainable and long-term structures, well-funded and researched, were put in place, it could open up space for small-scale and emergent farmers to participate in a new agronomic value chain. This would, however, require dedicated resources and will to support long-term education and skills transfer, co-generation of knowledge through participatory action research and transparency as to motivations and expectations.

The differing expectations of what a hemp industry should look like and who it should benefit are the possible causes of the silo mentality behaviour apparent among role players in the industry. It is viewed as a possible saviour crop, creating hesitation around how it should be implemented to ensure the desired objectives are achieved. Some role players are more interested in the environmental benefits, while others see it as a possible industry to improve rural livelihoods while boosting the economy. The silo mentality has led to miscommunication between stakeholder groups and resulted in reduced efficiency and morale, which has stifled progressive development.

These differing expectations have also resulted in a lack of collaboration and full utilisation of the skills that are already available, such as research bodies and commercial farmers, who can benefit other stakeholders through skills transfer. By collaborating more effectively, the currently diverse funding streams (legislative battles, research into fibres, subsidised projects, etc.) could be better aligned to bring about real progress for the industry.

4.5 The role of government and gatekeepers

The legislative barrier, the most apparent, perhaps serves to keep role players in a holding pattern until a clearer vision for the industry, including its focus and licensing procedures, emerges. It is not clear how this will happen given the apparent lack of integration and communication between stakeholders and a working, vibrant forum of interaction.

Government's role as a gatekeeper with respect to legislation is apparent; however, there are other gatekeepers in the industry and while they may not yet exert a significant influence – either positively or negatively – it is worth noting their presence. House of Hemp as national coordinator of the NHF plays a gatekeeping role as all those wanting to conduct research on hemp in South Africa need to apply through and work with the company. In addition, the three private companies – House of Hemp, Hemporium and Hemptons – dominate the local market. They have built up market share over the past few decades and it is unclear what effect this will have on small-scale actors attempting to enter the market when the legislative barrier is lifted or whether purchasing from local suppliers will be more economically feasible than importing from overseas. A long-term strategic vision for the hemp industry should plan for temporary protection for small-scale producers before opening up to the broader market.

The absence of a public-sector champion is evident. Government played an effective leading role in the ECHPPI initiative with Mamase as the public champion; however, since 2005 they have stepped back from driving the hemp industry and now play the role of a regulator enforcing legislation while partially state-funded research institutes and private-sector members make uncoordinated efforts to make progress.

What is needed is a credible, strong and transformational leader that can facilitate, encourage constructive dialogue across sectors, and ensure that social and environmental ethics are incorporated into decision making. The NHF has potential to fill the public champion role, however, there needs to be a strong public-sector presence within the forum to provide credibility and harness the dedicated resources needed.

4.6 Moving forward

This study attempted to uncover the barriers to establishing a commercially viable hemp industry in South Africa. In this process it unearthed hidden barriers. It attempts to provide a reflection of the industry to contribute towards a shift towards a different way of thinking that moves past or around the apparent barriers. It is hoped that it proves useful to those in the industry and those wanting to get involved by clarifying blocking points. It could also prove useful to those looking to start hemp industries in countries facing similar challenges to South Africa by highlighted potential obstacles.

There is an evident sense of industry fatigue among South African hemp industry role players. Many of them have held or are still holding onto the notion of hemp as a saviour crop that could contribute to solving some of South Africa's social ills. Many have spent the last two decades investing time and resources trying to bring the industry into being. Some have started exploring other production locations in the hopes of realising their dream of a viable African hemp industry. It would be a pity to lose their expertise and experience.

While hemp may not be a short-term saviour crop, it is one with multiple uses and benefits, including its potential to replace fossil fuel-derived components, as a low-cost and sustainable construction material, and as a nutritional supplement. In addition, it offers the possibility of establishing a new and inclusive agronomic value chain in the country, of a medium through which to generate much-needed innovative research and development, and of generating local and export-led revenue. To realise the benefits it could bring South Africa rests on the existence of a collaborative and supported long-term vision for the industry, dedicated resources, institutionalised support for knowledge generation and sharing, a context-appropriate licensing system, and lastly, the lifting of the legislative barrier.

Several areas for further research are identified below:

- A suitable licensing system for South Africa.
- Commercial feasibility and value-adds from hemp and CBD oil.
- The potential future role of the NHF.
- South African CBD and hemp seed oil varieties/cultivars.
- Appropriate production technology for each value chain.
- The possibilities for integration of natural fibre knowledge and technologies into curriculums to contribute towards establishing a sound technical skills and expertise base.

References

Chapter 2 (Journal 1):

Agriculture and Agri-Food Canada. 2008. National Industrial Hemp Strategy. [Online]. Available:https://www.votehemp.com/PDF/National_Industrial_Hemp_Strategy_Final_Complete_2.pdf. [2015, October 1].

Bah, I., & Amusa, H. 2003. Real Exchange Rate Volatility and Foreign Trade: Evidence from South Africa's Exports to the United States. *African Finance Journal*, 5, 1-20.

BBC News. 2014. *Jamaica's marijuana growers split on legalisation* [Online]. Available: <http://www.bbc.com/news/world-latin-america-26559204>. [2015, October 16].

Bergoffen, M. & Clark, R. L. 1996. Hemp as an Alternative to Wood Fiber in Oregon. *HeinOnline*, 11:119.

Beukes, J. 2015. Email communication to J. Beukes. 14 August. Available email: johanb@herdmans.co.za.

Blouw, S. & Sotana, M. 2005. *Performance of four European hemp cultivars cultivated under different agronomic experimental conditions in the Eastern Cape Province, South Africa*. Port Elizabeth: Council of Scientific and Industrial Research.

Blouw, S. 2015. Personal interview. 3 June. Port Elizabeth. Eastern Cape.

Bourhill, C. J. G. 1912. *The Smoking of Dagga (Indian Hemp) Among the Native Races of South Africa, and the Resultant Evils*. PhD Thesis. Scotland:University of Edinburgh.

Brough, C., Sotana, M. & Mhlontlo, S. 2005. *Hemp (Cannabis sativa L.) Production in South Africa*. Rustenburg: Agricultural Research Council.

Bryman, A. & Bell, E. 2014. *Research Methodology: Business and Management Contexts*: Oxford: Oxford University Press.

BTL. 2015. *Medical Dagga Promising as Medical Innovation Bill Moves Through Parliament*. [Online]. Available: <https://btl.co.za/medical-dagga-promising-as-medical-innovation-bill-moves-through-parliament/>. [2015, October 19].

Budden, T. 2015. Personal interview. 10 June. Cape Town, Western Cape.

Butler, K. 2011. *EU Probe into Subsidies for Hemp Farmers* [Online]. Available: <http://www.independent.co.uk/news/eu-probe-into-subsidies-for-hemp-farmers-1167374.html>. [2015, October 15].

Cantore, N., Kennan, J. & Page, S. 2011. *CAP Reform and Development: Introduction, Reform Options and Suggestions for Further Research*. London, UK: Overseas Development Institute.

Chang, H. 2002. *Kicking Away the Ladder: How the Economic and Intellectual Histories of Capitalism Have Been Re-Written to Justify Neo-Liberal Capitalism* [Online]. Available: <http://www.paecon.net/PAEtexts/Chang1.htm>. [2015, September 1].

Clarke, R. C. & Pate, D. W. 1997. Cannabis in Medical Practice: A Legal, Historical and Pharmacological Overview of the Therapeutic Use of Marijuana. *Potential of Cannabis*, 192.

Cole, C. & Zurbo, B. 2008. Industrial Hemp - A New Crop for NSW. *Primefacts*, 801, 1-6.

Cops to spray poison again in Eastern Cape. 2016. [Online]. Available: <http://thegreentimes.co.za/cops-to-spray-poison-on-dagga-again-in-eastern-cape/#comments> [2016, February 9].

Council of Higher Education. 2009. *Higher Education Monitor: Postgraduate Studies in South Africa: A Statistical Profile*. Pretoria, South Africa: The Council of Higher Education.

Crawford, R. n.d.. *Hemp*. Canada: Canadian Hemp Trade Alliance.

Datwyler, S. L. & Weiblen, G. D. 2006. Genetic Variation in Hemp and Marijuana (*Cannabis Sativa* L.) According to Amplified Fragment Length Polymorphisms. *Journal of Forensic Sciences*, 51(2), 371–375.

Davies, R. 2014. *Mail & Guardian: IFP MP Oriani-Ambrosini Tables Medical Marijuana Bill* [Online]. Available: <http://mg.co.za/article/2014-02-20-ifp-mp-oriani-ambrosini-tables-medical-marijuana-bill>. [2015, September 29].

Department of Agricultural Economics, University of Kentucky. 2013. *Economic Considerations for Growing Industrial Hemp: Implications for Kentuckys' Farmers and Agricultural Economy*. Kentucky: University of Kentucky.

Department of Agriculture, Forestry and Fisheries. 2010. *Hemp Market Value Chain Profile* [Online]. Available: <http://www.daff.gov.za/docs/AMCP/HempMVCP2009-2010.pdf>. [2015, October 6].

Department of Agriculture, Forestry and Fisheries. 2011. *A profile of the South African Hemp Market Value Chain*. Pretoria: Department of Agriculture, Forestry and Fisheries [Online]. Available: <http://www.arc.agric.za/arc-iic/Pages/Hemp.aspx>. [2015, July 14].

Department of Agriculture, Forestry & Fisheries. 2012. *South African Hemp Market Value Chain*. South Africa: Department of Agriculture, Forestry & Fisheries.

Department of Agriculture, Forestry and Fisheries. 2013. *A Profile of the South African Hemp Market Value Chain*. South Africa: Department of Agriculture, Forestry and Fisheries.

Dictionary.com. 2015. *Savior crop* [Online]. Available: <http://dictionary.reference.com/browse/savior>. [2015, 19 June].

Dutta, S. & Lanvin, B. 2013. *Global Innovation Index 2013: The Local Dynamics of Innovation*. United States: Johnson Cornell University.

El Hussein, M. 2014. Using Grounded Theory as a Method of Inquiry: Advantages and Disadvantages. *The Qualitative Report*, 9: 1-15.

eNCA. 2014. *Controversial IFP MP Mario Ambrosini Dies of Cancer* [Online]. Available: <https://www.enca.com/ifp-mp-mario-ambrosini-dies-cancer>. [2015, September 29].

Ernst & Young Global Limited 20. 2013. *The Power of Three*. South Africa. Ernst & Young Global Limited.

Esmail, A. M. 2010. *Cannabis Sativa: An Optimization Study for ROI. Bachelor of Science in Mechanical Engineering*. Massachusetts: Massachusetts Institute of Technology.

Fernández-Ruiz, J., Devinsky, O., Cilio M. R., Cross, H., French, J., Hill, C., Katz, R., Di Marzo, V., Jutras-Aswad, D., Notcutt, W.G., Martinez-Orgado, J., Robson, P.J., Rohrback, B.G., Thiele, E., Whalley, B. & Friedman, D. 2012. Cannabidiol: Pharmacology and Potential Therapeutic Role in Epilepsy and Other Neuropsychiatric Disorders. *PubMed.gov*, 55(6), 791–802.

Fields of Green for All. 2015. [Online]. Available: [201http://fieldsofgreenforall.org.za/about-us/](http://fieldsofgreenforall.org.za/about-us/) [2015, August 10].

Fine, D. 2014. *Hemp Bound: Dispatches from the Front Lines of the Next Agricultural Revolution*. White River Junction, Vermont: Chelsea Green Publishing.

Global Hemp Group. 2014. [Online]. Available: <http://globalhempgroup.com/historic-info-on-hemp-cannabis/about-industrial-hemp-in-the-usa/market-analysis/>. [2015, April 17].

Godwin, H. 1967. The Ancient Cultivation of Hemp. *Antiquity*, 41(161), 42–49.

Gregor, M. & Budden, T. 2013. Elandsberg Hemp Trial 2012/2013. Western Cape: Rapula Farming & Hemporium.

Gregor, M. & Budden, T. 2014. *Report Schedule and Yield Register: Hemp Commercial Research Trials 2013-2014*. Western Cape: Rapula Farming & Hemporium.

Gregor, M. 2015. Personal interview. 15 June. Rapula Farm, Elandsberg.

Grigoryev, Dr. S. 2015. *Hemp (Cannabis sativa L.) Genetic Resources at the VIR: From the Collection of Seeds, Through the Collection of Sources, Towards the Collection of Donors of Traits* [Online]. Available: <http://www.vir.nw.ru/hemp/hemp1.htm>. [2015, August 23].

Grobbelaar, F. & Heinemann, N. (n.d.). *Hemp: The Economic Imperative*. South Africa: Southern African Hemp Lobby.

GW Pharmaceuticals. 2014. [Online]. Available: <http://www.gwpharm.com/>. [2015, September 24].

Health Canada. 2012. [Online]. Available: <http://www.hc-sc.gc.ca/hc-ps/substancontrol/hemp-chanvre/about-apropos/faq/index-eng.php#a21>. [2015, August 12].

Health Canada. n.d.. *Industrial Hemp Regulations: Application for an Industrial Hemp Licence*. Canada: Office of Controlled Substances, Licenses and Permits Division.

Hemp Industries Association. 2014. *Hemp Industries Association's Position on CBD Extracts Misbranded and Marketed as "Hemp Oil"* [Online]. Available: <http://www.thehia.org/Resources/PressReleases/HIA-position-CBD-FINAL.pdf> [2015, August 9].

Hemp University. 2015. *Countries Growing Hemp*. [Online]. Available: <http://www.hempuniversity.com/hemp-university/growing-hemp/countries-growing-hemp/>. [2015, April 1].

Hemporium. 2015. [Online]. Available: <http://www.hemporium.com/>. [2015, October, 14].

Herrington, M., Kew, J. & Kew, P. 2009. *Tracking Entrepreneurship in South Africa: A Gem Perspective*. Cape Town. UCT Graduate School of Business.

Holbery, J. & Houston, D. 2006. Natural-fibre-reinforced Polymer Composites in Automotive Applications. *JOM*, 58(11), 80–86.

Horton, C. 2009. *GoKunming: China Looks to Hemp for Poverty Alleviation* [Online]. Available: http://www.gokunming.com/en/blog/item/839/china_looks_to_hemp_for_poverty_alleviation. [2015, October 10].

House of Hemp. 2015. [Online]. Available: <http://www.houseofhemp.co.za/about>. [2015, October 15].

Industrial Policy Action Plan. 2015. *Economic Sectors and Employment Cluster* [Online]. Available: <http://www.gov.za/sites/www.gov.za/files/IPAP2014.pdf>. [2015, August 9].

Johnson, R. 2015. Congressional Research Service. *Hemp as an Agricultural Commodity* [Online]. Available: <https://fas.org/sgp/crs/misc/RL32725.pdf>. [2015, April 5].

Karg, A. 2015. Personal interview. 2 June. Johannesburg, Gauteng.

- Karus, M. & Vogt, D. 2004. European Hemp Industry: Cultivation, Processing and Product Lines. *Euphytica*, 140(1), 7–12.
- Kolarikova, M., Ivanova, T., Hutla, P. & Havrland, B. 2015. Economic Evaluation of Hemp (*Cannabis sativa*) Grown for Energy Purposes (briquettes) in the Czech Republic. *Agronomy Research*, 13(2), 328–336.
- Kolb, S. M. 2012. Grounded Theory and the Constant Comparative Method: Valid Research Strategies for Educators. *Journal of Emerging Trends in Educational Research and Policy Studies*, 3(1), 83-86.
- Kraenzel, D. G., Petry, T., Nelson, B., Anderson, M. J., Mathern, D. & Todd, R. 1998. *White Paper Study of the Markets, Profitability, Processing, Agronomics and History*. Agricultural Economics Report No. 402, 23 July. North Dakota State University: The Institute for Natural Resources and Economic Development.
- Kunene, T. 2015. Personal interview. 15 June. Johannesburg, Gauteng.
- Lash, R. 2003. Industrial Hemp: The Crop for the Seventh Generation. *American Indian Law Review*, 27(1), 313–357.
- Leaf Science. 2014. [Online]. Available: <http://www.leafscience.com/cannabinoids/cbd> [2015, April, 28].
- Li, Y. Yao, L. & Yeung, K W. 2003. *Technology and Engineering: The China and Hong Kong Denim Industry* [Online]. Available: https://books.google.co.za/books?id=HLijAgAAQBAJ&pg=PA6&lpg=PA6&dq=Chinese+hemp+cooperatives&source=bl&ots=GKfBGUp90Y&sig=9pW9vgTckHkuv_9dJ_J9i_6wiT4&hl=en&sa=X&ved=0CEQQ6AEwBmoVChMI7rKU5f2-xwIVCJgaCh2uDARW#v=onepage&q=Chinese%20hemp%20cooperatives&f=false. [2015, August 23].
- List, F. 1856. *The National System of Political Economy*. Philadelphia, JB Lippincott and Co.
- Madiwa, S. 2015. Personal interview, 16 June. Komga, Eastern Cape.
- McKee, S. (ed.) 1934. *Papers on Public Credit, Commerce and Finance*. New York, Colombia University Press.

Millie, U. (n.d.). *Arrested MEC, Neo Moerane-Mamase, Should Be Suspended*. Press release. Rhodes University.

Mills, J. H. 2007. Colonial Africa and the International Politics of Cannabis, in J. H. Mills & Mitchell, D. 2013. *Modern Farmer: Why Legalised Hemp will not be a Miracle Crop* [Online]. Available: <http://modernfarmer.com/2013/10/legal-industrial-hemp-wont-matter/> [2015, August 25].

Ministry of Water Affairs & Forestry. 1997. *White Paper on Sustainable Forest Development in South Africa*. The Policy of the Government of National Unity, March.

Mizere, A., D. 2015. *Maravi Post: Focus on Sunday with Dumisani: Of Malawi Becoming a Leading "Chamba" Nation* [Online]. Available: <http://www.maravipost.com/national/opinions/general-scope/9760-focus-on-sunday-with-dumisani-of-malawi-becoming-a-leading-chamba-nation.html>. [2015, October 19].

Mohr, P. (2015). Email communication to P. Mohr. 21 October. Available email: philippa@hemporium.com.

Moon, Y. H., Song, Y. S., Jeong, B. C. & Bang, J. K. 2006. Variation of Cannabinoids Content in Hemp (*Cannabis sativa* L.) Produced with Mixed Seeds of Drug and Non-drug Type Varieties. *Hanguk Jakmul Hakhoe Chi*, 51, 187–190.

Moon, Y.H. 2008. Food and Agricultural Organization of the United Nations. *Reviews for Legislation of Industrial Hemp Regulation: The Proposal to Legislate Industrial Hemp (Cannabis sativa L.) and their Research Review and Regulation in Korea* [Online]. Available: <http://agris.fao.org/agris-search/search.do?recordID=KR2009003552>. [2015, September 3].

Moroke, T. P. 2009. An Analysis of the Housing Need in South Africa with Special Reference to the North West Province. Unpublished dissertation. North West Province: Potchefstroom Campus, North West University.

MPR News. 2015. [Online]. Available: <http://www.mprnews.org/story/2015/07/21/bcst-marijuana-hemp-cannibis-genetics>. [2015, August 12].

National Conference of State Legislatures (NSCL) 2015. *State Industrial Hemp Statutes* [Online]. Available: <http://www.ncsl.org/research/agriculture-and-rural-development/state-industrial-hemp-statutes.aspx>. [2015, August 25].

National Industrial Hemp Strategy. 2008. [Online]. Available: http://compositesinnovation.ca/biofibre_reports/07-020-09.pdf. [2015, October 14].

National Planning Commission [NPC]. 2012. *South Africa National Development Plan 2030 – Our future: make it work*. [Online]. Available: <http://www.poa.gov.za/news/Documents/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf> [2015, 26 September].

Nel, C. 1998. *Cannabis Sativa: Miracle Crop or Pipedream?* *Farmer's Weekly*, August 5. 50-57.

North American Hemp Co. 2010. [Online]. Available: http://www.northamericanhempco.com/hemp_history.html. [2015, August 13].

Owen, A.C. 2012. *Industrial and Nutritional Hemp in Manitoba: A Case Study Exploring Stakeholder Strategies and Legitimacy*. Unpublished Master of Arts in Social Science: Environment and Community. California: Humboldt State University.

Paterson, C. 2009. *Prohibition & Resistance: A Socio-Political Exploration of the Changing Dynamics of the Southern African Cannabis Trade*. Unpublished Master's thesis. Grahamstown: Rhodes University.

Perozzo, F. 2015. *Innovative and Triple Bottom Line Supply Chain Based on Integrated Management: Design Implications and Key Factors for Dual Crop Hemp to Target the Food and Building Industry*. Unpublished Masters of Science in Architecture. London: University of East London.

Popular Mechanics Magazine: *New Billion-Dollar Crop*. 1938. [Online]. Available: http://www.votehemp.com/new_billion_dollar_crop.html. [2015, August 16].

Prade, T., Svenson, S. & Mattsson, J. E. 2012. Energy balances for biogas and solid biofuel production from industrial hemp. *Biomass and Bioenergy*, 40, 36-52.

Quantec Research. 2015. *Imports and exports of hemp (raw/retted and raw/processed, but not spun) 2010–2014* [Online]. Available: www.quantecresearch.co.za. [2014, October 23].

Rawson, J. M. 2005. *CRS Report for Congress: Hemp as an Agricultural Commodity*. Congressional Research Service: The Library of Congress.

Republic of South Africa. 1992. Drugs and Drug Trafficking Act 140 of 1992. Government Gazette no. 14143, 15 July.

Republic of South Africa. 1965. Medicines and Related Substances Control Act 101 of 1965. Government Gazette no. 14143, 7 July.

Rhydwen, G. R. 2006. A model for UK hemp cultivation and processing to supply the building industry with hurds for hemp and lime concrete and fibres for insulation bats, with the ethos of environmental protection as a priority. London: University of East London.

Robinson, R. 1996. *The Great Book of Hemp*. Rochester, Vermont: Park Street Press.

Salentijn, E. M. J., Zhang, Q., Amaducci, S., Yang, M. & Trindade, L. M. 2015. New Developments in Fiber Hemp (*Cannabis sativa* L.) Breeding. *Industrial Crops & Products*, 68, 32-41.

Senghaas, D. 1989. Friedrich List and the Basic Problems of Modern Development. *Economics*, 40, 62–76.

Serecon Management Consulting Inc. 2012. Alberta Hemp Cost of Production & Market Assessment. Edmonton, Alberta. Serecon Management Consulting Inc.

Shafaeddin, M. 2000. What did Frederick List Actually Say? Some Clarifications on the Infant Industry Argument. *UNCTAD*, 149, 1–27.

Sides, H. 2015. High Science. *National Geographic*, June.

Soko, M. & Balchin, N. 2014. The South African Labour Market: A Prolonged and Worsening Crisis: South Africa. *New Agenda: South African Journal of Social and Economic Policy*, 36–39.

Sotana, M. 2010. *Hemp Project Status Report*. Bhisho. Hemp Foundation South Africa.

Sotana, M. 2013. *ECHPPI Hemp Seminar: Challenges on Transfer of Hemp (Cannabis sativa) from Agricultural Feasibility to Commercial Reality*. Eastern Cape: Eastern Cape Dept. of Rural Development & Agrarian Reform.

Sotana, M. 2015. Personal interview. 15 June. King Williams Town, Eastern Cape.

Stansbury, L. 2015. *Hemp Industries Association. 2014 Annual Retail Sales for Hemp Products Estimated at \$620 Million* [Online]. Available: <http://thehia.org/PR/PDF/2015-03-12%20HIA%20Hemp%20Market%20Data%202014%20-%20PR%20FINAL.pdf>. [2015, April 2].

Stearn, W. T.. 1974. TYPIIFICATION OF CANNABIS SATIVA L. *Botanical Museum Leaflets, Harvard University*, 23(9), 325–336.

Steenekamp, A.G., van der Merwe, S.P. & Athayde, R. 2011. *An Investigation into Youth Entrepreneurship in Selected South African Secondary Schools: An Exploratory Study* [Online]. Available: http://reference.sabinet.co.za/webx/access/electronic_journals/sabr/sabr_v15_n3_a3.pdf. [2015, April 15].

Suddell, B. C. 2007. The Increasing Trend of Utilising Biobased Materials in Automotive Components. *Journal of Biobased Materials and Bioenergy*, 1(3), 454–460.

Swanepoel, S. 2014. *Seed Politics: An Exploration of Power Narratives in the South African Seed Industry*. Master's Thesis. Stellenbosch: Sustainability Institute, Stellenbosch University.

Swilling, M. 2015. *Catalysing Transformative Social/System Innovation Through a Transdisciplinary Approach*. (Forthcoming).

The Dagga Couple. 2015. [Online]. Available: <https://www.daggacouple.co.za/about/>. [2015, August 20].

The Scientist – Dr Mechoulam. 2015. [Film]. Israel: Y. Klinik Productions.

Thompson, G. 2015. Personal interview. 8 June. Stellenbosch, Western Cape.

Tobacco and Cotton Research Institute. n.d.. *Response of Hemp Varieties to Cultivation Practices in South Africa*. Rustenburg: Tobacco and Cotton Research Institute.

UK Home Office. 2014. *Low THC Cannabis (Industrial Hemp) Licensing Factsheet* [Online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/386907/Hemp-FAQs-Grower_notes-2014.pdf. [2015, May 15].

United Nations. 1961. *Article 28: Control on Cannabis* [Online]. Available: http://www.levellers.org/cohip/PAGES/IND_HEMP/SINGCON.HTM. [2015, July 19].

United Nations. 1987. *Brundtland Report: Report of the World Commission on Environment and Development: Our Common Future*. United Nations.

United Nations. 2002. *Agricultural Subsidies, Market Access, Support for Small Farmers among Issues Discussed at Sustainable Development Summit* [Online]. Available: <http://www.un.org/press/en/2002/envdev671.doc.htm>. [2015, August 10].

United Nations. 2004. *Economic Report on Africa 2004: Unlocking Africa's Potential in the Global Economy*. United Nations.

United Nations. 2015. *Informal Interactive Hearing with the Civil Society on Financing for Development Summary* [Online]. Available: http://www.un.org/pga/wp-content/uploads/sites/3/2015/05/050515_summaries-key-messages-informal-interactive-hearings-april.pdf. [2015, August 10].

United Nations Office on Drugs and Crime. 2008. *World Drug Report 2008* [Online]. Available: <https://www.unodc.org/unodc/en/data-and-analysis/WDR-2008.html>. [2015, July 12].

United States Department of Agriculture (ASDA) & Economic Research Service (ERS), 2000. *Industrial Hemp in the United States: Status and Market Potential, Agricultural Economic Report No. AGES-ERSAGES001* [Online]. Available: <http://www.ers.usda.gov/Publications/AGES001e/> [2015, September 2].

Vahanvaty, U.S. 2009. Hemp Seed and Hemp Milk: The New Superfoods? *ICAN: Infant, Child & Adolescent Nutrition*, 1(4), 232–234.

Van Der Merwe, C. 2007. *SA's First Biocomposite Processing Plant StartsUp* [Online]. Available: <http://www.engineeringnews.co.za/print-version/sa039s-first-biocomposite-processing-plant-starts-up-2007-04-20>. [2015, August 20].

Van Rooyen, C.J., Swanepoel, F.J.C., van Zyl, J. Rwelamira, J., Stroebel, A. & Doyer, O. T. 2001. Education and Change Management in Africa: A New Framework for Human Capital Development in Agriculture. *S. Afr. J. Agric. Ext/S. Afr. Tydskr. Landbouvoorl.* 30, 125–146.

Vantreese, V. L. 1998. *Industrial Hemp: Global Operations, Local Implication* [Online]. Available: www.uky.edu/Classes/GEN/101/Hemp/HEMP98.PDF. [2015, August 26].

Vantreese, V.L. (n.d.). *Hemp Support: Evolution in EU Regulation*. Forthcoming.

Vermeulen, J.F. (2008). *From the Grave to the Cradle: Exploration of Hemp as an Eco-design Material*. Published Master's Thesis. Cape Town: Cape Town University of Technology.

Wang, Q. & Shi, G. 1999. Industrial Hemp: China's Experience and Global Implications. *Review of Agricultural Economics*, 21(2), 344–357.

Winn, P. 2013. *MinnPost: Who Won the Drug War? Drugs Did* [Online]. Available: <https://www.minnpost.com/christian-science-monitor/2013/03/who-won-drug-war-drugs-did>. [2015, August 19].

World Wide Fund for Nature. 2015. *Farming Facts and Futures: Reconnecting South Africa's Food System to its Ecosystems*. South Africa: World Wildlife Fund.

Wynn, J. 1998. *South African Hemp Feasibility Report*. South Africa: Southern Africa Hemp Company.

Wynn, J. 2015. Email communication to J. Wynn. 20 August. Available email: globalgardener@hotmail.com.

Xinhua News Agency. 2009. *China.org.cn: More Hemp to Increase Farmers'Income* [Online]. Available: http://www.china.org.cn/government/local_governments/2009-04/15/content_17607198.htm. [2015, August 23].

Yablan, J. S. 2017. *ProCon.org. What are the differences between Cannabis Indica and Cannabis Sativa and how do they vary in their potential medical utility?* [Online]. Available: <http://medicalmarijuana.procon.org/view.answers.php?questionID=000638> [2015, February 9].

Chapter 3 (Journal 2):

Agriculture and Agri-Food Canada. 2008. National Industrial Hemp Strategy. [Online]. Available: https://www.votehemp.com/PDF/National_Industrial_Hemp_Strategy_Final_Complete_2.pdf. [2015, October 1].

Barbier M. & Elzen B. (eds). 2012. System Innovations, Knowledge Regimes, and Design Practices Towards Transitions for Sustainable Agriculture. Inra [Online], posted online November 20, 2012. URL: http://www4.inra.fr/sad_eng/Publications2/Free-e-books/System-Innovations-for-Sustainable-Agriculture.

Beukes, J. 2015. Email communication to J. Beukes. 14 August. Available email: johanb@herdmans.co.za.

Blouw, L. S. 2012. Effect of Cultivar on the Quality of Flax and Hemp Grown in South Africa. Unpublished PhD. Port Elizabeth: Nelson Mandela Metropolitan University.

Blouw, S. & Sotana, M. 2005. *Performance of four European hemp cultivars cultivated under different agronomic experimental conditions in the Eastern Cape Province, South Africa*. Port Elizabeth: Council of Scientific and Industrial Research.

Blouw, S. 2015. Personal interview. 3 June. Port Elizabeth. Eastern Cape.

Brough, C., Sotana, M. & Mhlontlo, S. 2005. *Hemp (Cannabis sativa L.) Production in South Africa*. Rustenburg: Agricultural Research Council.

Bryman, A. & Bell, E. 2014. *Research Methodology: Business and Management Contexts*: Oxford: Oxford University Press.

BTL. 2015. *Medical Dagga Promising as Medical Innovation Bill Moves Through Parliament*. [Online]. Available: <https://btl.co.za/medical-dagga-promising-as-medical-innovation-bill-moves-through-parliament/>. [2015, October 19].

Budden, T. 2015. Personal interview. 10 June. Cape Town, Western Cape.

Businessdictionary.com. 2015. *Silo Mentality* [Online]. Available: <http://www.businessdictionary.com/definition/silo-mentality.html>. [2015, October 6].

Canadian Hemp Trade Alliance. 2015. [Online]. Available: <http://www.hemptrade.ca/>. [2015, August 9].

Cops to spray poison again in Eastern Cape. 2016. [Online]. Available: <http://thegreentimes.co.za/cops-to-spray-poison-on-dagga-again-in-eastern-cape/#comments> [2016, February 9].

Crawford, R. n.d.. *Hemp*. Canada: Canadian Hemp Trade Alliance.

Davies, R. 2014. *Mail & Guardian: IFP MP Oriani-Ambrosini Tables Medical Marijuana Bill* [Online]. Available: <http://mg.co.za/article/2014-02-20-ifp-mp-oriani-ambrosini-tables-medical-marijuana-bill>. [2015, September 29].

Democratic Alliance. 2013. *DA Reveals Corruption in Land Reform Deals* [Online]. Available: <https://www.da.org.za/2013/05/da-reveals-corruption-in-land-reform-deals/>. [2015, 1 October].

Department of Agricultural Economics, University of Kentucky. 2013. *Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy*. Kentucky: University of Kentucky.

Department of Agriculture, Forestry and Fisheries. 2010. *Hemp Market Value Chain Profile* [Online]. Available: <http://www.daff.gov.za/docs/AMCP/HempMVCP2009-2010.pdf>. [2015, October 6].

Department of Agriculture, Forestry and Fisheries. 2013. *A Profile of the South African Hemp Market Value Chain*. South Africa: Department of Agriculture, Forestry and Fisheries.

Department of Agriculture, Forestry and Fisheries. 2015. *Markets and Economic Research Centre and Directorate of International Trade: International TradeProbe, Issue No. 56*. South Africa: National Agricultural Marketing Council.

El Hussein, M. 2014. Using Grounded Theory as a Method of Inquiry: Advantages and Disadvantages. *The Qualitative Report*, 9: 1-15.

eNCA. 2014. *Controversial IFP MP Mario Ambrosini Dies of Cancer* [Online]. Available: <https://www.enca.com/ifp-mp-mario-ambrosini-dies-cancer>. [2015, September 29]

Fields of Green for All. 2015. [Online]. Available: <http://fieldsofgreenforall.org.za/about-us/> [2015, August 10].

Fine, D. 2014. *Hemp Bound: Dispatches from the Front Lines of the Next Agricultural Revolution*. White River Junction, Vermont: Chelsea Green Publishing.

Finnan, J. & Styles, D. 2013. Hemp: A more sustainable annual energy crop for climate and energy policy. *Elsevier: Energy Policy*, 58: 152-162.

Garnett, S.T., Crowley, G.M., Hunter-Xenie, H., Kozanayi, W., Sithole, B., Palmer, C., Southgate, R. & Zander, K. 2009. Transformative Knowledge Transfer through Empowering and Paying Community Researchers. *Biotropica*, 41(5), 571–577.

Gatekeepers to Quality. 2012. *The Dairy Mail*. 19, 44–45.

Global Hemp Group. 2014. [Online]. Available: <http://globalhempgroup.com/historic-info-on-hemp-cannabis/about-industrial-hemp-in-the-usa/market-analysis/>. [2015, April 17].

Gregor, M. 2015. Personal interview. 15 June. Rapula Farm, Elandsberg.

Hemp University. 2015. *Countries Growing Hemp*. [Online]. Available: <http://www.hempuniversity.com/hemp-university/growing-hemp/countries-growing-hemp/>. [2015, April 1].

Hemporium. 2015. [Online]. Available: <http://www.hemporium.com/>. [2015, October, 14]

HeraldLive. 2015. *Mamase Out of the FiringLine* [Online]. Available: <http://www.heraldlive.co.za/mamase-firing-line/>. [2015, October 1].

Hotaran, I. 2009. Silo Effect vs. Supply Chain Effect. *Review of International Comparative Management*, 1, 216–221.

House of Hemp. 2005. [Online]. Available: <http://www.houseofhemp.co.za/about>. [2015, October 15].

Johnson, R. 2015. Congressional Research Service. *Hemp as an Agricultural Commodity* [Online]. Available: <https://fas.org/sgp/crs/misc/RL32725.pdf>. [2015, April 5].

Karg, A. 2015. Personal interview. 2 June. Johannesburg, Gauteng.

Kolb, S. M. 2012. Grounded Theory and the Constant Comparative Method: Valid Research Strategies for Educators. *Journal of Emerging Trends in Educational Research and Policy Studies*, 3(1), 83-86.

Kunene, T. 2015. Personal interview. 15 June. Johannesburg, Gauteng.

List, F. 1856. *The National System of Political Economy*. Philadelphia, JB Lippincott and Co.

Madliwa, S. 2015. Personal interview, 16 June. Komga, Eastern Cape.

Mayet, M. 2012. Seed Systems and Seed Sovereignty in Africa: Key Issues and Challenges. In *Seed Freedom: A Global Citizen's Report*. New Delhi: Navdanya.

McPartland, J.M. 1999. A Survey of Hemp Diseases and Pests. in P. Ranalli (ed.). *Advances in Hemp Research*. New York: Food Products Press. 109–131.

Ministry of Water Affairs & Forestry. 1997. *White Paper on Sustainable Forest Development in South Africa*. The Policy of the Government of National Unity, March.

Mizere, A., D. 2015. *Maravi Post: Focus on Sunday with Dumisani: Of Malawi Becoming a Leading "Chamba" Nation* [Online]. Available: <http://www.maravipost.com/national/opinions/general-scope/9760-focus-on-sunday-with-dumisani-of-malawi-becoming-a-leading-chamba-nation.html>. [2015, October 19].

Mohr, P. 2015. Email communication to P. Mohr. 21 October. Available email: philippa@hemporium.com.

Moon, Y. H., Song, Y. S., Jeong, B. C. & Bang, J. K. 2006. Variation of Cannabinoids Content in Hemp (*Cannabis sativa* L.) Produced with Mixed Seeds of Drug and Non-drug Type Varieties. *Hanguk Jakmul Hakhoe Chi*, 51, 187–190.

Moroke, T. P. 2009. An Analysis of the Housing Need in South Africa with Special Reference to the North West Province. Unpublished dissertation. North West Province: Potchefstroom Campus, North West University.

Mumford, M. D., Scott, G. M., Gaddis, B., Strange, J. M. 2002. Leading Creative People: Orchestrating Expertise and Relationships. *The Leadership Quarterly*, 13(6), 705-750.

National Industrial Hemp Strategy. 2008. [Online]. Available: http://compositesinnovation.ca/biofibre_reports/07-020-09.pdf. [2015, October 14].

National Planning Commission [NPC]. 2012. *South Africa National Development Plan 2030 – Our future: make it work*. [Online]. Available: <http://www.poa.gov.za/news/Documents/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf> [2015, 26 September].

Nel, C. 1998. *Cannabis Sativa: Miracle Crop or Pipedream?* *Farmer's Weekly*, August 5. 50-57.

Okry, F., Van Mele, P., Nuijten, E., Struik, P. & Mongbo, R. 2010. Organizational Analysis of the Seed Sector of Rice in Guinea: Stakeholders, Perception and Institutional Linkages. *Exploratory Agriculture*, 47(1), 137–157.

Owen, A.C. 2012. Industrial and Nutritional Hemp in Manitoba: A Case Study Exploring Stakeholder Strategies and Legitimacy. Unpublished Master of Arts in Social Science: Environment and Community. California: Humboldt State University.

Pahl-Wostl, C., Tabara, D., Bouwen, R., Craps, M., Dewulf, A., Mostert, E., Ridder, D. & Taillieu, T. 2008. The Importance of Social Learning and Culture for Sustainable Water Management. *Ecological Economics*, 64, 484–495.

Paterson, C. 2009. Prohibition & Resistance: A Socio-Political Exploration of the Changing Dynamics of the Southern African Cannabis Trade. Unpublished Master's thesis. Grahamstown: Rhodes University.

Perozzo, F. 2015. Innovative and Triple Bottom Line Supply Chain Based on Integrated Management: Design Implications and Key Factors for Dual Crop Hemp to Target the Food and Building Industry. Unpublished Masters of Science in Architecture. London: University of East London.

Piotrowski, S. & Carus, M. 2011. *Nova Institut: Ecological benefits of hemp and flax cultivation and products* [Online]. Available: <http://eiha.org/media/2014/10/Ecological-benefits-of-hemp-and-flax-cultivation-and-products-2011.pdf>. [2015, June 24].

Popular Mechanics Magazine: New Billion-Dollar Crop. 1938. [Online]. Available: http://www.votehemp.com/new_billion_dollar_crop.html. [2015, August 16].

Quantec Research. 2015. *Imports and exports of hemp (raw/retted and raw/processed, but not spun) 2010–2014* [Online]. Available: www.quantecresearch.co.za. [2014, October 23].

Republic of South Africa. 1965. Medicines and Related Substances Control Act 101 of 1965. Government Gazette no. 14143, 7 July.

Robinson, R. 1996. *The Great Book of Hemp*. Rochester, Vermont: Park Street Press.

Salentijn, E. M. J., Zhang, Q., Amaducci, S., Yang, M. & Trindade, L. M. 2015. New Developments in Fiber Hemp (*Cannabis sativa* L.) Breeding. *Industrial Crops & Products*, 68, 32-41.

Sapountzaki, K. & Wassenhoven, L. 2005. Consensus Building and Sustainability: Some Lessons from an Adverse Local Experience in Greece. *Environment, Development & Sustainability*, 7, 433–452.

Scoones, I., Devereux, S. & Haddad, L. 2005. Introduction: New Direction for Agricultural Agriculture. *IDS Bulletin* 36(2).

Serecon Management Consulting Inc. 2012. Alberta Hemp Cost of Production & Market Assessment. Edmonton, Alberta. Serecon Management Consulting Inc.

Shackleton, C., Cundill, G. & Knight, A. 2009. Beyond Just Research: Experiences from Southern Africa in Developing Social Learning Partnerships for Resource Conservation Initiatives. *Biotropica*, 41(5), 563–570.

Shafaeddin, M. 2000. What did Frederick List Actually Say? Some Clarifications on the Infant Industry Argument. *UNCTAD*, 149, 1–27.

Sotana, M. 2007. Unpublished minutes on hemp permit conditions held between National Department of Agriculture, National Department of Health, Eastern Cape Provincial Department of Agriculture and South African Police Service. Pretoria: South African Police Service offices.

Sotana, M. 2010. *Hemp Project Status Report*. Bhisho. Hemp Foundation South Africa.

Sotana, M. 2013. *ECHPPI Hemp Seminar: Challenges on Transfer of Hemp (Cannabis sativa) from Agricultural Feasibility to Commercial Reality*. Eastern Cape: Eastern Cape Dept. of Rural Development & Agrarian Reform.

Sotana, M. 2015. Personal interview. 15 June. King Williams Town, Eastern Cape.

Stansbury, L. 2015. *Hemp Industries Association. 2014 Annual Retail Sales for Hemp Products Estimated at \$620 Million* [Online]. Available: <http://thehia.org/PR/PDF/2015-03-12%20HIA%20Hemp%20Market%20Data%202014%20-%20PR%20FINAL.pdf>. [2015, April 2].

Stearn, W. T.. 1974. TYPIIFICATION OF CANNABIS SATIVA L. *Botanical Museum Leaflets, Harvard University*, 23(9), 325–336.

Stone, F. 2004. Deconstructing Silos and Supporting Collaboration. *Employment Relations today*, 31(1), 11–18.

Sustainable Fibre Solutions (Pty) Ltd. Nd. *Revolutionising the Fibre Industry – Naturally*. [Online]. Available: <http://www.kenaf.co.za/news.html>. [2015, April 21].

Swanepoel, S. 2014. *Seed Politics: An Exploration of Power Narratives in the South African Seed Industry*. Master's Thesis. Stellenbosch: Sustainability Institute, Stellenbosch University.

Thompson, G. 2015. Personal interview. 8 June. Stellenbosch, Western Cape.

United Nations. 1987. *Brundtland Report: Report of the World Commission on Environment and Development: Our Common Future*. United Nations.

Vahanvaty, U.S. 2009. Hemp Seed and Hemp Milk: The New Superfoods? *ICAN: Infant, Child & Adolescent Nutrition*, 1(4), 232–234.

Van Der Merwe, C. 2007. *SA's First Biocomposite Processing Plant Starts Up* [Online]. Available: <http://www.engineeringnews.co.za/print-version/sa039s-first-biocomposite-processing-plant-starts-up-2007-04-20>. [2015, August 20].

Veitch, J., Clavisi, O. & Owen, N. 1999. Physical Activity Initiatives for Male Factory Workers: Gatekeepers' Perceptions of Potential Motivators and Barriers. *Australian and New Zealand Journal of Public Health*, 23, 505–10.

Vermeulen, J.F. 2008. *From the Grave to the Cradle: Exploration of Hemp as an Eco-design Material*. Published Master's Thesis. Cape Town: Cape Town University of Technology.

Wang, Q. & Shi, G. 1999. Industrial Hemp: China's Experience and Global Implications. *Review of Agricultural Economics*, 21(2), 344–357.

Wynn, J. 1998. *South African Hemp Feasibility Report*. South Africa: Southern Africa Hemp Company.

Wynn, J. 2015. Email communication to J. Wynn. 20 August. Available email: globalgardener@hotmail.com.

Xinhua News Agency. 2009. *China.org.cn: More Hemp to Increase Farmers' Income* [Online]. Available: http://www.china.org.cn/government/local_governments/2009-04/15/content_17607198.htm. [2015, August 23].

Addenda

Addendum A: Helping to build one of South Africa's first hemp-crete houses



Caption: Hemp-crete mixture ratios



Caption: hemp-crete: hurd, lime, water and small amount of cement



Caption: Mixing hemp-crete



Caption: Hemp-crete layers drying



Caption: Hemp-crete building in action

Addendum B: Images of processes and products



Caption: Retting hemp stalks and the final product



Caption: Seeds from Rapula Farm harvest



Caption: Hemp fabric