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Assessing the Readiness of Cannabis Production for Agripreneurship Development in Limpopo Province of South Africa

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Abstract

Cannabis sativa (hemp) is a crop known for its many uses since it is used in the production of technical textiles, paper, food, cosmetics, and automobiles. Hemp industrialisation can play a major role in job creation and poverty alleviation faced by the South African community, most importantly Limpopo Province. Small-scale farmers in Limpopo face the difficulty of growing cannabis for the purpose of developing agripreneurship. The purpose of the study was to assess the readiness for cannabis production for agripreneurship development in Limpopo Province. This study employed a qualitative form of research. The qualitative method was used to provide a comprehensive grasp of the state of cannabis production readiness. A sample of 21 registered cannabis farmers were selected out of a population 31 registered cannabis farmers in Limpopo Province. The selection was based on the availability of farmers during the period of research and on budget restrictions. The study revealed that cannabis farmers require production, marketing, and processing skills. The study recommended the

development of suitable policies and a dedicated fund to support further development in the cannabis industry.

Keywords: *Agripreneurship, Cannabis production, Farmers, Limpopo Province, Readiness.*

1. Introduction

This study aims to assess the readiness for cannabis production for agripreneurship development in Limpopo Province. *Cannabis sativa* L. (hemp) belongs to the family of *Cannabaceae* (Cattaneo et al., 2021). The family of cannabis is believed to have originated in central Asia (Van der Werf et al., 1996; Kalpani et al., 2022). Cannabis has been reported to be one of the most colonised plant species on Earth, because it can be found on nearly every continent, except for Antarctica (Clarke & Merlin, 2013). There are three well known species within this genus which are *Cannabis sativa*, *Cannabis indica*, and *Cannabis ruderalis* (Johnson et al., 2018; Schluttenhofer & Yuan, 2017). Hemp is regarded as possibly one of the oldest non-food crops used by humans for, at least, 6000 years (Van der Werf et al., 1996). Cannabis is thought to have come from China's Yanghai Tombs in Central Asia (Kalpani et al., 2022; The Stone, 2022). China has been reported to be the largest hemp-producing and exporting country, with Europe and Canada playing a role in the global market (Crini et al., 2020). Hemp and marijuana belong to the same plant species (Cannabis News, 1999) and are differentiated by the tetrahydrocannabinol (THC) level having more than 0.2% for marijuana and less for hemp (Xu et al., 2020; Ahmed et al., 2022). The THC level of hemp varies per country, with South Africa having less than 0.2%, Mexico is 0.1%, Malaysia is 0.5, and Canada is 0.3% (Kaur et al., 2023). The existence of psychostimulant cannabinoids led to the plant species' criminalisation and the further cessation of cannabis growth in several nations (Van der Werf et al., 1996; Kepe, 2003). In 1928, South Africa restricted this plant species because of its high THC content and possible psychoactive effects (Ngobeni et al., 2016). In July 2019, the South African cabinet took a decision that cannabis needs to be commercialised nationally in South Africa to boost the country's economy, generate jobs, and reduce poverty. The master plan was developed, and the Department of Agriculture, Land Reform and Rural Development (DALRRD) was the convener. The master plan's main goal is to offer a comprehensive

framework for growth and development of the South African cannabis industry to contribute to economic development, job creation, inclusive participation and rural development, and poverty alleviation.

Cannabis sativa has been grown all over the world and throughout history for a variety of purposes, including food, fuel, nutritional supplements, body care products, paper, building materials, medicine, and textiles (Harstell et al., 2016). Hemp cultivars are rich in cellulose used for biofuel, primary fibres for pulping, fine fibre textiles, and dense flowering varieties that offer abundant seed (Harstell et al., 2016). Several researchers have reported the potential of hemp as a high energy-yielding feedstock for biogas and biofuels (Kreuger et al., 2011), presenting South Africa with an opportunity to increase the standard of living in rural areas by integrating the production of hemp with biofuels, so giving people without access to sustainable sources of energy. Being a crop of many uses, hemp offers the opportunities in value adding, giving farmers the opportunity to become agripreneurs. Agripreneurship is the farmers' willingness to leave outdated patterns and embrace new farming methods influenced by sustainability, free markets, and technology (Condor, 2020). An agripreneur is a person who initiates, plans, and oversees a business initiative with an emphasis on the agriculture industry (Mukhopadhyay & Mukhopadhyaya, 2020).

Growing hemp in the province of Limpopo may lead to the creation of new jobs in the manufacturing, processing, and agricultural industries, which would boost the economy of the nation. In the province of Limpopo, hemp growing can also aid in rural development and poverty alleviation because the newly created jobs may raise rural populations' incomes and standards of living. The Limpopo hemp farmers, being new to hemp production, face different challenges including inadequate technical skills of hemp production and lack of proper infrastructure, marketing skills, and farm management skills. The study was guided by the following research questions:

- What are the key factors that influence the readiness of cannabis production for agripreneurship development in Limpopo Province?

- What are the specific skills and knowledge gaps among cannabis farmers in Limpopo Province?

- What are the policy and infrastructure requirements for supporting the growth of the cannabis industry in Limpopo Province?

Therefore, the purpose of the study is to assess the readiness of cannabis production for agripreneurship development in Limpopo Province. The following section deals with the literature review.

2. Literature Review

The literature review is demarcated into empirical reviews and conceptual framework. Empirical reviews consist of the agronomic practices, the concept of agripreneurship, infrastructural requirements, challenges in cannabis production, and opportunities in cannabis production. Conceptual framework consists of legal framework and uses of hemp.

2.1 Empirical Review

2.1.1 Agronomic practices

Cannabis sativa is adaptable to different environmental conditions (Cattaneo et al., 2021). The best growing temperature of hemp ranges between 13 and 22 ^{o}C (Žydelis et al., 2022). Hemp is sensitive to photoperiods requiring a photoperiod of 12-14 daylight hours (Zhang et al., 2021; Sebastian et al., 2023). Hemp growing conditions require a soil pH of between 5.8 and 7.5 (Adesina et al., 2020). Hemp production is environmentally friendly and sustainable because it has high water and fertiliser use efficiency, no herbicides requirement and high economic value (Tang et al., 2022; Kalpani et al., 2022). Hemp is able to suppress weeds; it is also a pesticide-free crop (Adesina et al., 2020; Viskovic et al., 2023). Several literatures have reported that variation in environmental conditions can influence the flowering time and sex characteristics resulting in cannabinoids and oil content, yield, and biomass (Zhang et al., 2021; Petit et al., 2020; Sebastian et al., 2023). Flowering is regarded as the most important growth stage influencing harvesting floral and fibre hemp (Sunoj Valiaparambi Sebastian et al., 2023).

Flowering time, sex characteristics and environmental factors highly affect hemp fibre quality (Petit et al., 2020). Fibre and seed yield is highly influenced by genotype and environment (Xu et al., 2021). The timing of the shift from vegetative growth to flowering is essential for a hemp crop with a high yield and satisfactory fibre quality (Zhang et al., 2021). There is a need for breeding programmes aimed at developing high-yielding,

low-THC varieties, bigger seeds to make hulling easier, certain fatty and amino acids profiles (Xu et al., 2021; Fike, 2016).

Plant density is an important agronomic management factor determining the productivity and economic return of field crops. In hemp production, the plant population is determined by the desired product (fibre, seed, CBD, and biomass) (Adesina et al., 2020). Seed production requires lower plant density (90 plants m^{-2}) compared to 100 to 260 plants m^{-2} for fibre production. High plant density is recommended for fibre production since it results in slender stems which are most required for their high bark content (Tang et al., 2022).

Irrigation plays an important role in fibre yield and quality (Viscovic et al., 2023). Drought stress results in early flowering, leading to 70-80% reduction in CBD and THC production (Park et al., 2022). Hemp requires 500 to 700mm irrigation during the growing season and 250 to 300mm during the vegetative stage (Viscovic et al., 2023).

Nitrogen fertilisation plays an important role in the yield and quality of hemp biomass and requires proper management since excess N promotes rapid stem elongation resulting in the crop susceptible to lodging (Schumacher et al., 2020; Kaur et al., 2023; Adesina et al., 2020). High nitrogen application reduces nitrogen use efficiency (Saloner & Bernstein, 2020). Nitrogen fertiliser improves stem, seed and fibre yield as well as protein content while reducing fibre quality. Higher and lower nitrogen application than recommended affects floral development of hemp (Saloner & Bernstein, 2020; Kaur et al., 2023). General mineral application improves CBD production. Phosphorus has been reported to improve CBD production, Application of N, P, and K combined, with humic acids significantly improving the level of CBG in flowers (Park et al., 2022). Stem, fibre, and seed yield was increased with N fertilisation while reducing fibre strength $^{-1}$ (Saloner & Bernstein, 2020; Kaur et al., 2022; Ekren et al., 2023). The recommended rate of N fertilisation for hemp ranges between 60 and 273 $kgNha^{-1}$ (Kaur et al., 2022). Higher rates and lower rates than required affect floral development of hemp (Kaur et al., 2022). Soil conditions with less than required N result in stunted growth and pale leaves, leading to necrosis and dying off (Kaur et al., 2022). Hemp N fertilisation must be based on the desired product since plant N demand varies with desired output seed, fibre, or cannabinoids crop (Kaur et al., 2022).

2.1.2 The concept of Agripreneurship

Agriculture is dynamic in nature and provides a variety of entrepreneurial prospects along the whole agribusiness value chain. Agripreneur uses rural human resources to add value to agricultural resources (Mukhopadhyay & Mukhopadhyaya, 2020). For agripreneurship development to take place, farmers would need to engage in entrepreneurial activities, which calls for cultivating traits like inventiveness, risk-taking, strategic planning, and growth orientation in the next generation of farmer entrepreneurs (Gulsia & Yadav, 2023). When creating and putting into practice strategic adjustments to their farming methods to better meet agricultural difficulties, farmers take on the role of entrepreneurs.

Agripreneurship in the agricultural sector can bring new technologies and practices to maximise farm productivity and efficiency, resulting to increased yields and profitability (Kharga et al., 2021).

Gulsia and Yadav proposed two ways to promote agripreneurship as follows:

- increasing agricultural output for productivity and efficiency; and

- expanding to include new products and enterprises through value addition of agricultural produce (processing, packaging, logistics, services, cooking, and recycling waste.

Hemp industrialisation has the opportunity for agripreneurship throughout the value chain from cultivation, processing up to the shelf since it has many uses. There will be a need for a raw material production, marketing, processing and value adding, branding, and transportation.

2.1.3 Infrastructural requirements for cannabis production

The section focuses on the required infrastructure for cannabis production. An irrigation system is needed for the production of hemp in areas with insufficient annual rainfall. Fibre producers will need decorticators, i.e. hemp-harvesting machine, while oil producers require oil pressers and processing units.

2.1.4 Challenges in cannabis production

The section discusses the challenges faced by the cannabis production in South Africa. The South African Cannabis Master Plan Draft (2021) suggested the challenges as follows: Legal– The largest legal obstacle is that South Africa has no laws allowing the commercialisation of cannabis. Seed supply– there is no formal seed supply since there is no registered seed currently in the country. Manufacturing– The right equipment and knowledge for producing a wide range of cannabis products are lacking in the country. The nation may have to import equipment and knowledge from abroad. Negative perceptions– There's a widespread belief that cannabis will act as a gateway to more harmful substances. If the existing limits are loosened, the authorities won't be able to stop the rise in illegal trafficking. Black universities have historically been underrepresented in strategic infrastructure and human resources, and many marginalised, and impoverished cannabis growers are located near these universities. Fragmentation– The cannabis market is incredibly scattered because there are still illegal producers out there. Market challenges– In the early stages, it is expected that the local market will need to accept a larger proportion of local produce. Currently, several cannabis products are imported into South Africa and sold there.

2.1.5 Opportunities in cannabis production

Hemp offers a variety of opportunities in the value chain. Hemp cultivation, compared to other crops in the textile industry, comes with the advantages of decreased cost of production estimated at 77% (Schumacher, 2020). Hemp fibres are preferred for their excellent absorbency, resistance to UV rays, aseptic qualities, and lack of allergic effects (Kostic et al., 2008), and for the production of eco-friendly clothes (Kostic et al., 2008).Further, its medicinal potential, especially cannabinoid content (Pain, anxiety, epilepsy, and inflammation) (Kaminski et al., 2024). Hemp is a source of protein containing all the essential amino acids (Kaminski et al., 2024). It is equally a source of seed oil for the cosmetic and skin care industry (Kaminski et al., 2024). Hemp reduces nematodes (Żuk-Gołaszewska & Gołaszewski, 2020) and fungi in the soil (Viskovic et al., 2023), growing consumer desire for environmentally friendly, organic, and sustainable products (Sebastian et al., 2023). Weed suppressor advantage making hemp suitable for crop rotation (Sebastian et al., 2023). Feedstock for Bioenergy production

(biodiesel, bioethanol, biogas, and combined heat and power) (Rheay et al., 2021). Crop residue and hemp oil are environmentally safe options for organic pesticides and insecticides (Bell et al., 2018).

2.2 Conceptual Framework

2.2.1 Legal framework

The following is the legal framework governing cannabis production in South Africa:

Table: *1 Legal framework for cannabis production*

Regulation	Description
Plant Improvement Act (PIA), 1976 (Act No. 53 53 of 1976)	Establish legal guidelines for the production, sale, and distribution of hemp.
Plant Breeders' Rights, 1976 (Act No. 15 of 1976)	Provide for a system whereunder rights relating to new varieties of hemp To be granted and registered for the defence of such rights, the granting of licences for their exercise, and the provision of incidental concerns.

Source: *Own compilation (2024)*

2.2.2 Uses of hemp

Cannabis sativa is an exceptional plant used as a nutritional supplement, building material, food, textiles, body care products, and medicines (Fordjour et al., 2023. Hemp has the potential to be used as a valuable source of protein, fat, and fibre to increase the quality and meat composition of meat, milk, and eggs (Cattaneo et al., 2021; Ely & Fike, 2022; Lanzoni et al., 2024). A hemp seed contains about 25% protein, 35% oil, and antioxidants (Burton et al., 2022). Fibre hemp cultivation has been reported to influence soil structure and absorbing toxic elements from the polluted soil (Adesina et al., 2020). Previous studies have indicated that hemp is able to reduce the nematodes and fungi in the soil (Saeed et al., 2021; Viskovic et al., 2023). Hemp is used in textiles (fabrics, carpets, yarn, and cloth), paper making, animal bedding, and construction (Viskovic et al., 2023). Hemp, compared to cotton as crops used in the textile industry, comes with the advantage of decreased cost of production by about 77% (Schumacher et al., 2020). Hemp improves

soil structure (Gizlenci et al., 2019). Hemp seed have been used as bird feed and bait for fish (Xu et al., 2021). Studies have been conducted on hempseed cake usage as protein feed for cattle compared to soybean and barley (Xu et al., 2021). Hemp contains deep tap roots that are effective at enhancing soil structure, storing carbon, and facilitating efficient water acquisition (Burton et al., 2022). Hemp contains two phytochemicals which are tetrahydrocannabinol (THC), which is intoxicating, and the non-intoxicating compound cannabidiol (CBD) but may have medical benefits (Burton et al., 2022).

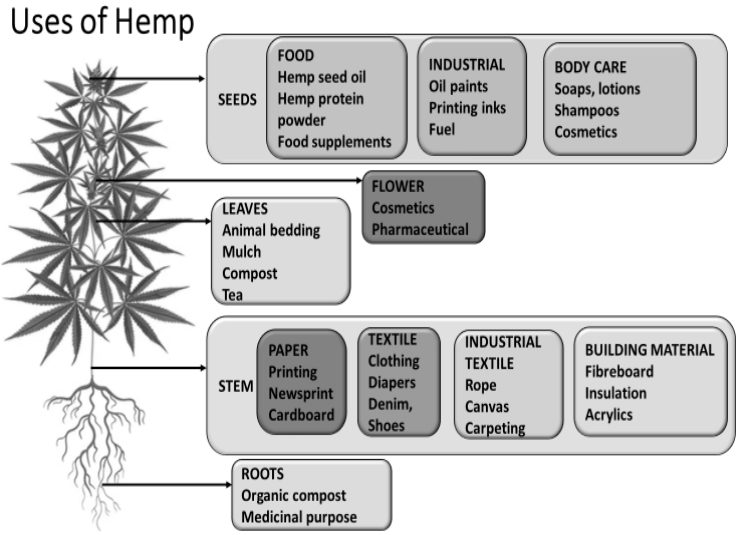

Figure 1: *Uses of hemp*

3. Methodology

The qualitative method was employed in this investigation. According to Saunders, Lewis, and Thornhill (2019:175), any technique for gathering data that generates or employs non-numerical data, such as interviews or data analysis procedures, is referred to as a qualitative method. According to Taherdoost (2022), qualitative methods use naturalistic and interpretative approaches to various subject matters in an effort to address the scientific and practical problems facing society. The process of using numerical values obtained from observations to characterise and explain the phenomena that the observations may reflect on is known as quantitative research (Taherdoost, 2022).

The qualitative method was used in this study to gain deeper understanding of cannabis production in Limpopo Province. The study used non-probability sampling using purposive sampling. With purposive sampling, the researcher selects the components they want to include in the sample based on a set of criteria. The researcher considers the population and the research topic, identifying features from the population that are relevant to the study (Pascoe, 2021). A sample of 21 registered cannabis farmers were selected out of a population of 31 registered cannabis farmers in Limpopo Province. The selection was based on the availability of farmers during the period of research and on budget restrictions. Qualitative data collection involves selecting and producing audio (and video) materials to analyse and understand situations, social contexts and collective experiences, and culture-making processes (Flick, 2018). The primary data were gathered by means of in-person interviews with farmers (Kiplagat, 2014) so as to obtain a better comprehension of cannabis production (Wang et al., 2004). The results were analysed through thematic analysis (Wang et al., 2004). Strydom (2021) points out that thematic analysis is an interpretative method that has recently garnered attention and is rapidly emerging as a widely utilised approach across diverse qualitative research strategies. In this study, thematic analysis was used for the analysis. Thematic analysis is technique for methodically locating, classifying, and providing insights into meaningful patterns within a data set (Braun & Clarke, 2012). Qualitative researchers evaluate the reliability and integrity of their study findings using criteria rather than numerical data (Koonin, 2021). In this study, the researcher ensured credibility and accuracy of the data by personally interviewing the participants.

4. Findings

The section covers the findings from the study. The findings from the study include biographical results and qualitative results.

4.1 Demography Results

The biographical results of the study are presented hereunder using graphical presentations.

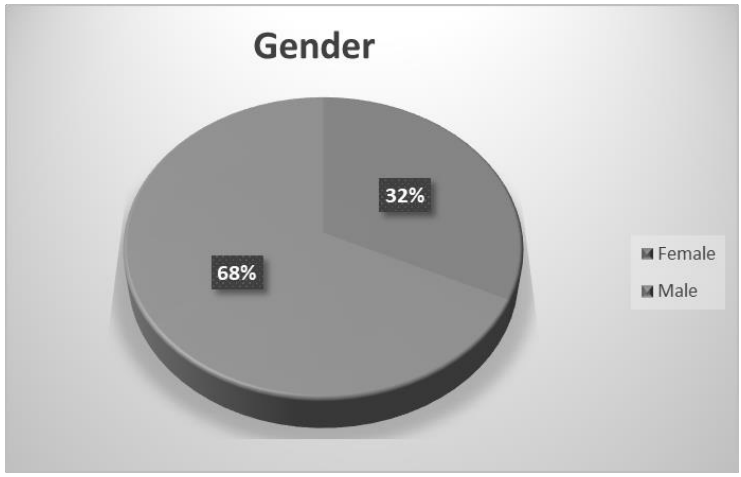

Figure 2: *Distribution by gender*

Figure 2 above shows the gender distribution of the participants as follows: the male participants made up 68% of the study, while the female participants made up 32%. Women are more involved in agricultural activities which are for food production (Hart & Aliber, 2012). Meinzen-Dick (2019) argues that gender discrimination, regional laws, policies, programmes, and norms that significantly disfavour them, thereby causing African women farmers to frequently have little harvest to show for their labour. Due to persistently unfavourable customary tenure regulations and practices, women's access to land is restricted (Adebayo & Worth, 2024).

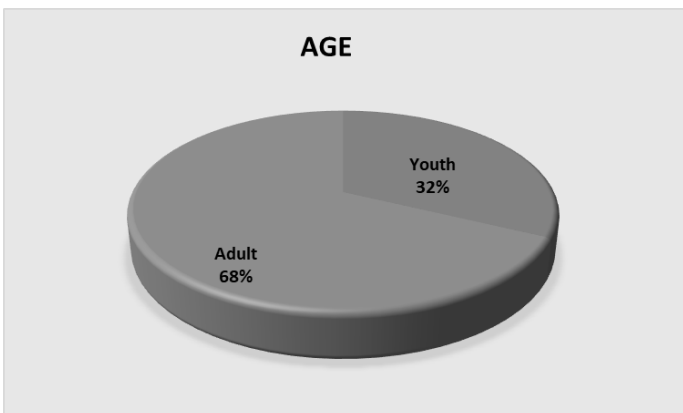

Figure 3: *Distribution by age (Adult: 35 years and above, Youth: <35)*

Figure 3 above shows that 68% of the participants are adults (35 years and above) while 32% represent youths (34 years and below). The unemployment rate of the youth of South Africa can be reduced by introducing cannabis farming as a business to them. Youth participation in agriculture is viewed as a chance to enhance employment, raise living standards in rural areas, and strengthen the economy (Widiyanti et al., 2020). Since young people represent not just the country's future but also could create economic prospects in the agriculture sector, it is imperative that they receive agricultural skills training. Involving young people in the agricultural sector guarantees continuity and the application of emerging technologies (Taole-Kolisang, 2024). Community-based hemp workshops that provide knowledge and training can help overcome the lack of youth involvement in agriculture (Artemides, 2021).

4.2 Qualitative Results

The researcher used a qualitative approach. The data were collected using face-to-face interviews. The qualitative data were interpreted using thematic analysis (Schoultz et al., 2022). Below are discussions according to the themes that emerged from the qualitative primary data.

4.2.1 Training

Technical skills

The interviewees indicated that they needed technical skills on hemp production since they are new in the production of the crop. They require training in agronomic practices like soil preparation, planting, plant population, irrigation requirements, fertilisation, harvesting, and storage. Little information about agronomical practices is currently accessible to farmers (Campiglia et al., 2017).

Managerial skills

The interview indicated that farmers lack managerial skills to manage the farm as an agripreneur. Farmers need to be trained on farm record keeping, marketing of hemp produce, and value adding. There is also a need to understand the whole value chain of hemp production. Farmers were not aware that it is better to produce and be involved in value adding to maximise the profit. Hemp has a lot of potential as a substitute

rotation crop because of its many crop attributes, which could enhance farmers' agronomic and financial sustainability (Campiglia et al., 2017). During the transitional stage, agripreneurs will require managerial and technical skills for business management (Condor, 2020).

4.2.2 Cannabis infrastructural requirements

The interviews suggested that farmers do not have infrastructure required for hemp production. Limpopo climatic conditions transit from warm deserts to semi-arid and humid subtropical conditions. Farming in Limpopo Province requires supplemental irrigation. Farmers will need boreholes and irrigation infrastructure to produce good quality hemp crops. Since the industry is new in South Africa, there is a need to import specific machinery for hemp processing. Fibre producers also require decorticators; they will equally need oil pressers for oil production. Burton et al. (2022) also report that there is a shortage of planting and harvesting equipment for hemp farmers.

4.2.3 Access to funding

The interview indicated that farmers need funding to procure inputs and infrastructure for running their farms. The interviewees indicated that they lack funding. They need funding for inputs (seeds, fertilisers, and infrastructure) and soil preparation. The information received during interviews indicated that the farmers needed business plans to apply for financial support. Some do not own any asset that they can use as collateral when applying for loans, preventing them from sourcing loans from banks. There is a need for funding opportunities from both private and public institutions to fund this crawling industry. The lack of funding in the industrial hemp value chain has been reported (Liu et al., 2023; Stevens, 2017). The crop has a lot of opportunities in it, but the processes need to be funded. The opportunities to add value by processing raw hemp ingredients into valuable products has been identified and the sales of hemp products underscores that it is growing very fast (Kaur & Kander, 2023). Adding value to farm produce by producing and promoting unique goods is essential for agripreneurship to flourish (Gulsia & Yadav, 2023).

4.2.4 Access to markets

The information from the interview indicated that farmers do not have the market. Over 25,000 items are believed to be available on the worldwide hemp market. Without processing, industrial hemp cultivation won't be able to expand beyond an established market (Lowitt, 2020). There is a shortage of standardised and thorough data on the size and value of the global hemp market because of its dynamic nature, which is brought about by new competitors and innovative processing methods that lead to new uses for the crop (Coogan, 2016). By 2026, the global hemp market is expected to have increased from its estimated USD 4.6 billion worth in 2019 to USD 13.03 billion (Quansah Amissah, 2023; Matuszak, 2024). The primary markets now are those for food and nutrition, paper and textiles, and insulation and building, while the markets for cosmetics and automobiles are expanding (Crini et al., 2020). Budhathoki et al. (2024) acknowledge that, to guarantee a steady supply of high-quality textile fibre, farmers and primary processors need to form network consortiums.

5. Conclusion

The study was undertaken to assess the readiness of cannabis production for agripreneurship development in Limpopo Province. Limpopo cannabis farmers are experiencing challenges of not having required information on the agronomic practices for cannabis production, no access to funding and no market access.

The findings of the study showed that cannabis farmers require technical production skills, marketing skills, and processing skills for agripreneurship development in Limpopo Province. However, the growing demand for hemp-based goods is predicted to fuel the growth of the worldwide industrial hemp business in the upcoming years. Cannabis industrialisation in Limpopo Province can contribute to economic development, job creation, rural development, and poverty alleviation throughout its value chain.

6. Recommendations

The study recommends the following to policymakers, stakeholders, and organisations to support the cannabis industry in Limpopo Province:

- **Policy development:** Policy which will create a more enabling environment for cannabis production and agripreneurship that will support export market.

- **Training and capacity building:** Development of training programmes to enhance the skills and knowledge of cannabis farmers.

- **Market access:** Development strategies to improve market access for cannabis products, including domestic and international markets.

- **Financial support:** The government must come up with a dedicated fund to provide financial support and access to capital for cannabis farmers.

7. Additional Considerations

- **Environmental impact:** Hemp has a high carbon absorption, is good for biodiversity, and doesn't need pesticides or herbicides to flourish. Compared to cotton and other natural fibre plants, hemp requires a lot less water and chemicals.

- **Social impact:** Building local and regional supply chains is one of the ways that industrial hemp adds value as a raw material for social sustainability.

- **Ethical consideration:** One requires a permit for production.

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