The paradox of community seed systems

A case of Lumezi and Chasefu districts

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Abstract

Availability of quality seeds is very key to production in agrarian societies such as Zambia. However, the focus on cereals like maize, a staple, has negatively affected the availability of quality seed for other crops like legumes which are equally important. This has been one of the reasons the community seed initiatives have been necessitated. This study has been designed to investigate the effectiveness of community seed systems in rural communities. The focus was Seed Grower Associations in Lumezi and Chasefu districts in Eastern Zambia in the Community Based Seed project supported by a non-governmental organisation. In this study, I set out to find out whose knowledge is included in the community seed initiatives. I also asked how rural areas experience community seed initiatives. This work draws upon political ecology and food sovereignty as an approach and concept respectively to answer the research questions. This is a qualitative study therefore I conducted 20 interviews, a focus group discussion, and observations to collect empirical data. The findings reveal that local knowledge has been incorporated into the seed systems but that which complies with regulations for seed growing. Contrary to the narrative that community seed banks are avenues to improving access to seed in rural communities, evidence in this study shows that locals have been excluded from accessing seed. Finally, this study shows that seed growers boast of their livelihoods improving as a result of their participation in the seed initiatives. However, they have been dependent on the NGO to procure seed for multiplication for years. Overall, this scholarly work contributes to research on seed systems on how political ecology and food sovereignty can be deployed to understand community seed banks.

Keywords: Community-based seed systems, Seed, Seed sovereignty, Zambia

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Abbreviations

CSB	Community Seed Bank
DUS	Distinct, Uniform, and Stable
FGD	Focus Group Discussion
FISP	Farmer Input Support Programme
FRA	Food Reserve Agency
IMF	International Monetary Fund
NGO	Non-Governmental Organisation
SCCI	Seed Control and Certification Institute
SGA	Seed Growers Association
PVS	Participatory Variety Selection
ZARI	Zambia Agriculture Research Institute

1. Introduction

Seeds are essential for human life and have existed side by side with human society for generations and generations (Mayet, 2015). Seeds are at the foundation for crops in the food systems as well as crops used by people for other purposes (ibid). Communities have therefore preserved and kept these valuable 'items' to propagate their agricultural livelihoods.

Access to quality seeds is critical to attaining development goals (Kansiime et al., 2021; FAO, 2018). This is because seeds are essential to increasing productivity in farming, especially among small-scale farmers (FAO, 2018). This can in turn lead to livelihoods being improved (ibid).

1.1 Research problem

The agriculture sector in Sub-Saharan African countries is the biggest employer (Dercon & Gollin, 2014). In Zambia, which is the focus of this thesis, about 50% of the overall workforce is employed in the sector (Mulenga et al., 2021; GRZ, 2011). Nevertheless, the agriculture sector in Zambia faces hurdles to significantly contribute to the Gross Domestic Product (GDP) (Mulenga et al., 2021). One of the challenges that agriculture faces is the lack of inputs (seeds) by smallholder farmers (GRZ, 2011). The availability of seed is very key to production in agrarian societies the world over.

Several efforts have been made by successive governments in Zambia to diversify the economy by prioritizing agriculture among other sectors since most of the population is in rural areas (55%) (GRZ, 2017; World Bank, 2020). However, it must be noted that the focus on agriculture interventions by the government has always centred around maize, almost to the detriment of other crops (Chapota et al., 2015). Scholars regard maize as a 'political crop' as it is considered critical to the food security of the nation (Fischer et al., 2022; Scott, 1995). Therefore, it has the potential to swing the political pendulum either way (ibid). Scott (1995:12) argues that *"maize had become the very language of discourse between the people and their leaders".*

The market for maize production has always been assured except for the phase of the International Monetary Fund (IMF)/World Bank imposed market reforms in the 1990s when market access by farmers was a challenge (Zulu et al., 2015;

Simateele, 2006). Besides, the government-supported, Farmer Input Support Programme (FISP) and the Food Reserve Agency (FRA) account for almost half of the agricultural sector's budgetary allocation (Chapota et al., 2015). FISP has mainly been focusing on maize seeds and fertilizer (ibid). FRA buys the maize produced by the farmers. On this premise, seed companies in Zambia are mostly involved in the production of hybrid maize seed taking advantage of the business opportunities maize provides (Nakaponda, 2012). Therefore, hybrid maize seed production led to farmers becoming dependent on buying maize seed every farming season.[1]

It is worth noting that after the adoption of economic liberalization policies in Zambia in the early 1990s, Zamseed a parastatal which used to distribute seed to rural communities was privatized (Chapota et al., 2015). This meant a withdrawal of seed services from areas that were thought not to have meaningful seed business. This necessitated the government to enact a new law, the *Plant and Seed varieties Act of 1995,* to facilitate the entry of new players in the seed sectors such as private seed companies and farmers since the government in the past was the only player.[2] However, the focus of the private seed companies has centred on maize and other profitable crops which created shortages in quality seeds for other crops such as legumes (Contextual Network, 2016: Nakaponda, 2012). It is on this account that the government and Non-governmental Organisations (NGOs) started promoting community-based seed systems in rural farming communities (McGuire & Sperling, 2016; Nakaponda, 2012).

The need for nutritional security is another aspect that invoked calls for diversification from maize, 'the political crop'. This is explained by the national agriculture policy for the period 2004-2015 which sought to address "high malnutrition and stunting which stood at 20% and 54% respectively" (GRZ, 2011:8). This was because while the government has always fostered that the nation was self-sufficient in the staple(maize), not much effort was placed on producing food crops that complemented maize such as groundnuts and vegetables (ibid). It is against this background that the multiplication of legumes seeds is viewed as an opportunity to make seeds available to rural communities by some development actors. This is essential to improving dietary diversity and other nutrition indicators in the long run.

Development Fund (2011:4) refers to community seed systems or community seed banks (CSBs) as being a *"collection of seeds that are maintained and administered by the communities themselves"*. It is worth noting that CSBs may play and serve different purposes depending on who is championing them. Almekinders (2001) makes mention of those which conserve local varieties while others improved varieties or both. In Zambia, most CSBs focus on improved

[1] An informal conversation with a Zambian development practitioner on 15/05/2022

[2] An interview with a Senior Officer at SCCI on 1/02/2022

varieties which they earmark for the market (Development Fund, 2011; Almekinders, 2001).

The problem I therefore address is whether and how community seed initiatives are equitably addressing the problem of low accessibility of quality legume seeds in Zambia. In doing so, the process of these initiatives (who is controlling them) and their outcomes, that is who is benefitting from them or not will be interrogated. Groundnuts and beans are the legume crops under consideration in this study.

David (2004) contends that while community-based seed initiatives have the potential to improve access to seed by rural communities they face challenges in implementation in most of Eastern and Southern Africa. Kansiime et al. (2021) point out that it is not easy for these initiatives to access seed for multiplication as well as to have their fields inspected. Scholarly work by Westengen et al. (2019) highlights seed policy as being a factor in the successful implementation of community seed initiatives.

1.2 The aim of the study

My study seeks to assess the effectiveness of community-based seed systems in rural communities. The focus are Seed Grower Associations (SGAs) in Lumezi and Chasefu districts in the Eastern Province of Zambia, supported by an international NGO, Agriculture Development Initiatives (ADI)[3].

To guide my study the following two main research questions and sub-questions will be considered:

i. Whose knowledge is included in community seed initiatives?
   - How is local knowledge included in the seed initiative?
   - How do expert and local knowledge intersect?
   - What synergies are there between the formal and informal seed systems?

ii. How do rural areas experience community seed initiatives?
   - How accessible is the seed multiplied to smallholder farmers in villages or communities where the seed grower associations are?
   - What are the perceptions of farmers on the community seedbanks?
   - How have the seed growers' livelihoods changed?

This scholarly work seeks to contribute to improving the understanding of the concept of food sovereignty when deployed to examine community seed systems. This paper further contributes to the comprehension of how different actors in the seed sector either promote or constrain community seed banks.

[3] The name of the NGO has been anonymized in this study to protect its identity.

1.3 Literature Review

Globally community seed banks have been in existence for over 30 years (Vernooy et al., 2015). It must be noted that they take different forms as well as functionalities (ibid). There are some countries with a lot of seedbanks while others still have a few (Vernooy et al., 2015).

The factors that have shaped the establishment of community seed banks are many and varied. It is worth noting that the emergence of community seed banks is largely attributed to the work of NGOs in various countries (Vernooy et al., 2015). At the core of NGOs promoting seed initiatives have been the conservation of indigenous seed varieties from disappearing hence losing important genetic plant materials (ibid).

Catastrophic events like floods, droughts, and famine have also been drivers of the setting up of seed banks (Vernooy et al., 2014). For instance, organisations that pioneered seed bank initiatives in Africa, Ethiopia, and Zimbabwe did so in response to drought situations in those countries (Mujaju et al., 2003; Feyissa, 2000). The aim was to restore the seed that was lost due to the disasters.

Proponents of community seed initiatives contend that they are intended to make local farming communities more seed secure (Development Fund, 2011). Further, it is argued that they are also supposed to add to the use of local diverse genetic materials (ibid).

Community-based seed initiatives have been considered as having potentialities to address seed accessibility in agrarian communities (Kansiime et al., 2021). This is supported by studies that show that seedbanks could improve farmers' access to seed nearby as opposed to travelling long distances to buy seed (Reisman, 2017). Further, the study shows challenges in the availability of seed as well as the unreliability of government input supplies prompt the implementation of seed bank projects (ibid).

Research conducted in India and Ghana shows that climate change is considered the driver of community-based seed initiatives as farmers risk losing seeds due to poor rainfall and exhausting available seed to avoid hunger (Reisman, 2017; Nyantakyi-Frimpong, 2019). It is argued that farmers can access seed in difficult times from seedbanks (Nyantakyi-Frimpong, 2019). Therefore, village seedbanks and traditional seed systems through conserving agrobiodiversity play a crucial role in building the resilience of farmers (Reisman, 2017). For instance, many farmers in Mali, Niger, and Burkina Faso participated in the seed value chain as a way of diversifying their agriculture and income sources due to the vulnerability of their farming enterprises (Jones, 2017). However, it is interesting to note that poor rainfall experienced by farmers leads to poor seed recoveries as farmers have poor yields (ibid).

Some scholars argue that there seems to be a disconnect between the intents and the operationalization of seedbanks from what the farmers are experiencing

(Reisman, 2017; Nyantakyi-Frimpong, 2019). The seed bank's purpose was to improve accessibility to crops that are not prioritized by seed companies or underutilized (Reisman,2017). The studies, however, show that organisations promoting seed bank initiatives were more concerned with pleasing their funders hence they promoted crops not prioritized by the local farmers despite them doing need assessments before the project started (Nyantakyi-Frimpong, 2019). Added to this, is that local knowledge was not considered in the project in Ghana and as such farmers decided to default on seed loan repayment to show their displeasure (ibid).

There is not much in-depth research on community seed banks and mostly they are skewed to showing successes recorded by those who implement or sponsor them (Reisman,2017). Another researcher, also posits that there is a gap in studies on the role and impact of community seed initiatives (Vernooy,2013). Nyantakyi-Frimpong (2019) in his study on seed systems in Ghana argued that social relations were critical of how seedbanks operated and not just climate vulnerability. I, however, argue that political and economic structures are essential in our understanding of community seed banks and how they interface with different actors.

1.4 Thesis Outline

The structure of this thesis is as follows: The second chapter details the background by giving the contexts of the project sites, the project being researched, the agriculture policies in Zambia, and seed systems in Zambia. In the third chapter, the theoretical framework adopted in this study is explained. The fourth chapter is the research methodology, where I explain my data collection, how the study sites and participants were selected, researchers' reflexivity, ethical concerns, and data analysis. The fifth chapter details the empirical findings and discussion in tandem with the study research questions and the adopted theoretical and conceptual framework. Finally, in the sixth chapter, the conclusion of the thesis, I highlight the key findings, provide an analytical reflection of the theoretical and conceptual framework and I also bring out the policy implications of the study.

2. Background

This chapter gives details on the context of the districts where the fieldwork was conducted and the seed project. It further highlights the history of the agriculture policy and the seed systems in Zambia. In this chapter, I also define and explain the relationships of some players in the community-based seed project.

2.1 Context of Lumezi and Chasefu districts

Zambia is politically divided into ten provinces which are further divided into districts. The districts where my research was conducted are Lumezi and Chasefu in Eastern Province. These districts used to be part of Lundazi district before they were created as new districts in 2018 by the government. Chasefu has an estimated population of 99,829 people while Lumezi has 109, 219 people (GRZ, 2020).

Lumezi and Chasefu districts fall within livelihood zone 17, *Eastern Plateau, maize, groundnut, tobacco, and trade* in Zambia (FEWSNET, 2014). Zambia has 21 livelihood zones (ibid). Holzmann et al. (2008: xii) define a livelihood zone as a *"geographical area within which people share broadly the same patterns of access to food and income, and have the same access to markets".* In addition, the two districts fall in agro-ecological region II receiving average rainfall *"ranging from 800-1,000 mm per rainfall"* (FEWSNET:44). In these districts, livelihoods are mostly centred on crop production and livestock rearing. On average the poor have less than one hectare of land while the better off have more than 1.5 ha (ibid).

Chasefu district is surrounded by Lundazi and Lumezi districts in the south, while in the north and west, Chama district (Chasefu Town Council, 2018; GRZ, 2020). It borders Malawi on its east (ibid). On the other hand, Lumezi district shares its boundaries in the south with Chipangali, the north with Lundazi, and in the south-west with Mambwe District (GRZ, 2020). On its, north-west is Mpika while on the eastern side it has an international boundary with Malawi (ibid).

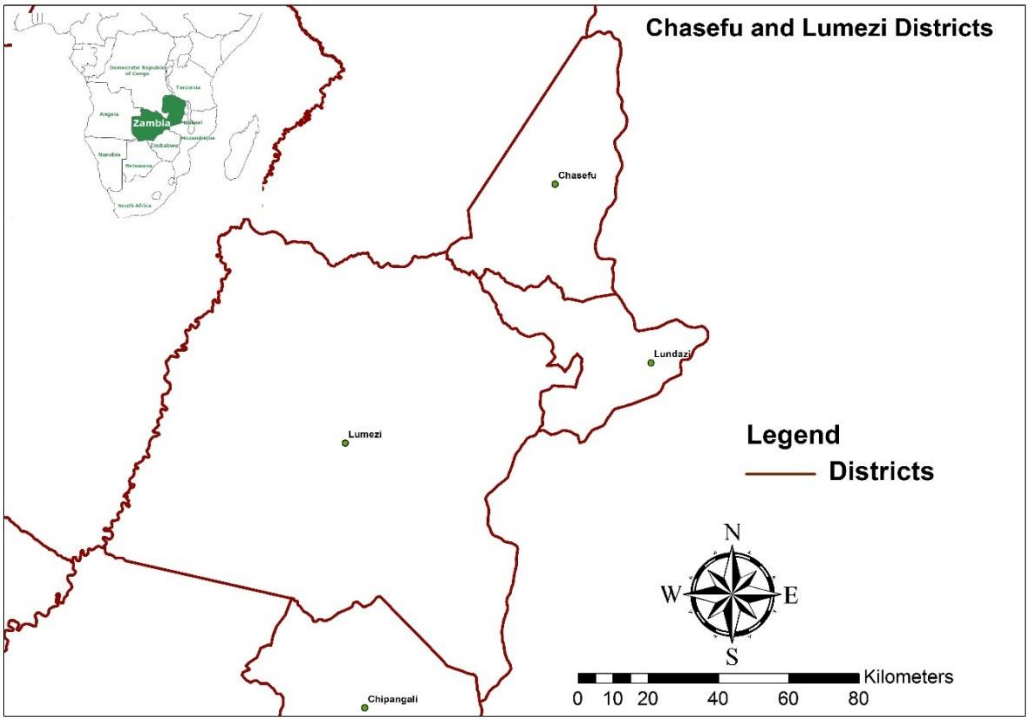

Figure 1: Map of Chasefu and Lumezi Districts.Copy right by Peter Samende

2.2 Project context

There are several community seed initiative projects in Zambia but my focus is on one supported by ADI, which I refer to in this thesis as the Community-based Seed (CBS)project. The project aims to increase the availability and smallholder farmers' access to improved varieties of legumes (ADI, 2015)[4]. Improved varieties are those which are certified. In addition, the project seeks to improve accessibility to agro-ecologically suited planting materials (landraces or local varieties) (ibid). Subsequently, the project would like to see improved production of legumes and producers having diversified income sources.

In this project, farmers are organised in Seed Growers Associations (SGAs) and are called seed growers. The implementing partner to ADI in this project is a local NGO which I refer to as Kukaya Community Organisation (KCO) in this thesis[5]. Therefore, the SGAs are under KCO. The seed growers are supported with inputs(seed) and capacity building (ADI, 2015). The trainings offered to the seed growers are in seed production, conservation agriculture, business skills, and governance skills among others (ibid). The project is promoting open-pollinated

[4] This information is from the project proposal for the CBS project. It is not included in the reference as a way hiding the identity of the NGO

[5] The name of the local NGO has been anonymised to protect its identity and that of the study participants

varieties of legumes like beans, cowpeas, and groundnuts (ADI, 2015). In Lumezi and Chasefu groundnuts and beans are promoted by the project because the soils are suitable, “coarse-textured and sandy loam soils” (Context Network, 2016:28). These legumes are considered an important component of the smallholder farming system in Eastern Province where the study sites are located. This is also explained by the region registering the highest production figures of legumes(groundnuts) in Zambia as shown in the Crop Forecast Survey report for the 2020/21 farming season (Ministry of Agriculture, 2021).

The growing of legumes is critical to agriculture in Zambia in a broad context. This is because groundnuts and beans are a source of very much-needed plant proteins which is cheaper compared to that from animals [6]. The growing of these crops is in tandem with the nutrition-sensitive agriculture programmes being promoted as part of Scaling Up Nutrition in Zambia(ibid). In addition, the cost of production is not as high as that of maize which requires a lot of inputs (ibid). In addition, the fixing of nitrogen in the soil is critical for the enhancement of soil fertility and can increase the yields of maize when incorporated into crop rotation (Mofya-Mukuka & Shipekesa, 2013). Of noteworthy is the fact that legumes were considered as crops for women as they were produced majorly by the womenfolk in comparison to other crops mainly produced for sale (Context Network 2016; Mofya-Mukua & Shipekesa, 2013). This means that interventions to promote legume production in Zambian agriculture are poised to boost the empowerment of women farmers economically (Mofya-Mukuka & Shipekesa, 2013).

2.3 Agriculture policy in Zambia

Agriculture policies in Zambia since independence have undergone some changes based on political leadership (Zulu et al., 2015). However, the focus on maize has been constant regardless of who wielded political power. As alluded to earlier this is because maize is the staple food and critical for national food security. The First Republic (1964-1971) saw small-scale farmers focusing their farming on traditional cereals such as millet and sorghum, as well as groundnuts (ibid). During this period policies from the colonial administration still shaped agriculture in the country (Zulu et al, 2015). The Second Republic (1972-1991) on the other hand, was characterized by the introduction of subsidies for agriculture, especially for maize (ibid). However, with the advent of the new government in November 1991, the economy was liberalized (Scott, 1995). Agricultural subsidies were therefore done away with as a way of meeting the conditionalities of IMF and World Bank-sponsored Structural Adjustment Programmes (SAPs) (Zulu et al., 2015).

[6] An interview with an official from ADI on 21/02/2022

In 2002, during the Levy Patrick Mwanawasa regime, the government reintroduced the Fertilizer Support Program, a subsidy on maize inputs to increase access to inputs by smallholder farmers (Zulu et al., 2015). Evidence shows that a big component of the agricultural budget has been going towards subsidizing the production of maize in Zambia (Chapota et al., 2015).

The current National Agricultural policy (2012-2030) emphasizes diversifying the agriculture sector in line with Zambia's vision 2030 (GRZ, 2011). One of the strategies is to increase the availability of inputs to farmers (ibid). The promotion of a community-based seed system could be one way of achieving this.

2.4 Zambia and seed systems

The broad categories of seed systems are formal and informal in Zambia. The formal is one where the seed is certified by the government while the informal is the farmer-saved system (Context Network, 2016; Nakaponda, 2012). The community seed banks mostly fall in the formal category, however, if they also promote landraces then they are in between the formal and informal seed systems. This is because landraces or local varieties are not certified.

The legislation (Chapter 236 of the Plant Variety and Seed Act) defines seed as "part of any of plant… intended for planting". As will be highlighted in detail in chapter 5(empirical findings and discussion) the informal seed system is where local seed varieties are promoted, exchanged, and planted. On the other hand, improved varieties are certified seeds. The process of producing improved seed varieties starts with the smallholder farmers, in this case, being registered as seed growers by the SCCI. They need to identify a registered seed variety for planting. The seed crop has to be inspected by government-sanctioned inspectors at least twice during the farming season. Since the legume seed grown by the seed growers in this study is rainfed, it is harvested around July. When it is harvested, seed inspectors sample 10-15% of the fields for the seed growers and take it to the lab to be examined that it meets the criteria of seed[7]. When it passes through the certification system, SCCI certifies that seed and it can be sold as a seed. If does not pass then it cannot be treated as seed but as grain.

After attaining its independence, the government of Zambia led all aspects of the seed value chain such as breeding, production, marketing, and quality control.[8] In 1981, the government set up Zamseed, a parastatal, to produce seed for most of the crops save for tobacco and cotton to reach the farmers country-wide (Mbaya et al., 2017). However, with the liberalization of the economy, the parastatal was

[7] From an interview with an officer at Seed Control and Certification Institute

[8] This information emerged from an interview with a Senior Officer at the Seed Control and Certification Institute (SCCI) on 1/02/2022

privatized in the 1990s (ibid). The free-market economy necessitated private seed companies to gain entrance into the seed sector (Mbaya et al., 2017).

The formal seed sector is made up of public entities such as Zambia Agriculture and Research Institute (ZARI), Seed Control and Certification Institute (SCCI), the department of agriculture as well as the University of Zambia's School of Agriculture Sciences (Sperling et al., 2013). SCCI is a department in the Ministry of Agriculture mandated to regulate the seed sector in Zambia (Context Network, 2016). ZARI is also a department in the same ministry but is responsible for agriculture research in crop and soil, and plant improvements as well as providing farmers with cost-effective innovations (ibid). Other actors include international agriculture research institutions such as the International Institute of Tropical Agriculture (IITA) and private seed companies (Context Network, 2016). The NGOs also come to fill the void left by other players in the rural areas to increase access to seeds (Nakaponda, 2012).

2.4.1 Definition and relationships of players in the seed project

In this sub-section, I define players in the community seed project and explain their relationships. This is key to understanding community seed systems' functionality.

Breeders in this case refer to those agricultural researchers from the Public agricultural research stations (ZARI) who develop and improve seed varieties. Seed growers are smallholder farmers who are engaged in the production of seed, in our case legumes. During the process of developing varieties, farmers (seed growers or non-seed growers) are engaged in multilocational trials to "try the varieties in different performance environments"[9].In addition, since legumes seed for multiplication of improved seed is sourced from ZARI, the government breeder and seed growers form a symbiotic relationship.

It must be stated that those who qualify to be recruited into seed growing in the seed project are smallholder farmers. Non-seed growers are farmers who are not engaged in seed multiplication in the seed project. Since these non-seed growers are residents in the project locations, it was intended that they should access quality seed produced by the seed banks. However, the project offers opportunities for every smallholder farmer interested to learn sustainable agricultural practices to participate in its capacity building activities regardless if they are seed growers or not.

[9] An interview with a scientist/breeder from ZARI during the field work on 22/02/2022.

3. Theoretical and Conceptual framework

This chapter exposes the approach and concept that I employ in analysing the empirical results on the effectiveness of the community-based seed systems in Lumezi and Chasefu districts, Zambia. I first of all focus on Political ecology and then the concept of food sovereignty in relation to this research. Political ecology and food sovereignty are related as they both examine issues of power relations, access, knowledge, and justice which are in tandem with the research questions of this study (Fernandez et al., 2013; Watt & Scales, 2015).

3.1 Political Ecology

Political ecology is an approach premised on the struggle people have over resources and the environment and how this is shaped by power relations (Batterbury, 2018). In this thesis, our consideration is the political ecology of community seed systems.

Fernandez et al. (2013:6) explain that political ecology focuses on understanding relationships *"between economics, politics, technology, social tradition and the biological environment by analyzing issues of access, control and power".*

Some scholars posit that political ecology examines how producers and their environment are shaped by political and economic factors (Walker, 2005). This is critical in this study as it assists to understand how agricultural policies and seed laws promote or constrain seed bank initiatives amongst smallholder farmers.

Critical in political ecology and relevant to this scholarly work is the concept of access. Ribot and Peluso (2003) define access as the ability to draw upon benefits from resources, people and institutions, etc. The analysis of access is important in understanding who is benefiting from the seed bank and how. Further, how power is embodied and plays out in the different arrays of mechanisms in the community seed systems is of the essence. Of importance also is the mediation of access to resources (Rangan, 1997). In this study for instance, which actors mediate the accessibility of seed to farmers is examined. This in other words looks at those with control to access.

Ribot and Peluso (2003) argue that the access analysis goes beyond the circumference of resource benefit, in this case participating in the seed bank

initiative. Relevant to this study, is what impact the farmers' access to seed cause and how the local community benefit. These are congruent with my research questions.

Another feature of political ecology as stated by Dodd (1998:83) is that it *"seeks to link macro-level political economic process with micro-level aspects of human ecology".* In this thesis, we are looking at different players such as farmers, the local NGO, who are at the grass-root level, and ADI and government at the national level. This research project attempts to interrogate the interaction among these players concerning the effectiveness of community seed systems.

Political ecology examines how power is deployed or plays out in knowledge systems (Leff, 2015). Power could be used to decolonize the knowledge by embracing indigenous knowledge(ibid). This is borne from the premise that local people also have knowledge that is good and has been tested (Nyantakyi-Frimpong, 2019). Political ecologists also analyse the deconstructing of the epistemes implying that doing away with knowledges which may not be sustainable (Leff, 2015). One of the research questions of this study is whose knowledge is included in the community seed systems. Therefore, the analysis of power in knowledge is key to this work.

3.2 Food sovereignty

The concept of food sovereignty was championed by *La Via Campesina* to counter the concept of food security and industrial agriculture (Bezner Kerr, 2013). Food security focuses on the production and accessibility of food but not the control of it (ibid). Industrial agriculture is one that is characterized by large capitalized farms and the displacement of smallholder farmers (Alteiri & Toledo, 2011). Food sovereignty is therefore defined as the right of local people to shape their food systems (Patel, 2009). It considers aspects such as *"control over markets, land, water, seeds and production methods"* (Bezner Kerr, 2013:869). An important element of food sovereignty is seed sovereignty which is relevant to my research on community seed systems as it involves small-scale farmers producing improved and local varieties of seed. Seed sovereignty is defined as the power local people have over seed systems (Wittman 2009 see Bezner Ker 2013). This is opposed to seed enclosures being perpetuated by seed companies through patenting planting materials (Bezner Kerr, 2013).

In this study, the concept of food sovereignty is helpful in understanding who has control over the choice of seeds. Most NGOs claim that they undertake needs analyses before project commencement to understand the needs of their beneficiaries (Nyantakyi-Frimpong, 2019). In this research, this analytical concept is critical in assessing the role farmers play in the legume seed varieties they settle for.

Most community-based seed projects implemented are market-oriented as promoted by funders (David, 2004). The implications are that the producers are expected to sell most of their produce. The concept of food sovereignty is relevant in understanding if the producers have control over their harvest. In addition, assesses if they do exchange seeds with their kin and neighbours in their communities.

One of the aspects promoted by seed projects is participatory variety seed selection. The views of the farmers are critical to this exercise as they understand the contextual issues and have situated knowledge. This is important to know if the seed being promoted receives acceptance by the farming community and whose voice matters the most (Patel, 2009).

The combination of the conceptual framework of food sovereignty and political ecology permits us to analyse power relations shaping relations among stakeholders involved in the seed system. For example, we may consider reviewing the seed legislations to consider power relations within the seed sector (Peschard & Randeria 2020). Within the farming community or beneficiaries, this analytical framework aids us to analyse how the seed is distributed and if there are inequalities in its access (Bezner Ker, 2013).

Research shows that international organisations have helped to promote seed bank initiatives by providing grants to kick start these projects (Reisman,2017). Initial capital has been provided in form of basic seed to be multiplied and thereafter the seedbanks are to be self-sustaining. To assess how effective community seedbanks in Lumezi and Chasefu have been achieving in being self-sufficient we will find out if they are still dependent on aid to attain seed security (Bezner Ker, 2013). If seed growers are still dependent on the NGO for seed for their operation it diminishes their food sovereignty

4. Methodology

In this chapter, I will explain the research design employed in this study. I will further show how the study site and participants were chosen. The process of how qualitative data was practically collected is also subjected to a discussion in this chapter.

This is a qualitative research and is anchored on social constructivism philosophically. I, therefore, sought to explore the meanings of all participants, and stakeholders in the seed sector (Creswell & Creswell, 2018; Robson & Cartan, 2002).

4.1 Qualitative data collection

My data collection was conducted within a period of six weeks in February and March 2022. This was after I had developed two interview guides, one for the farmers (seed growers and non-seed growers) and the other for key informants (officials). Informants help provide context.

The data collection methods that were used in this study included semi-structured interviews, a focus group discussion, and observations. I obtained informed consent from the participants before going ahead with data collection (Creswell & Creswell, 2018). Issues of confidentiality and the right to participate in the study were equally addressed in advance before the commencement of data collection (ibid).

Semi-structured interviews were conducted with 12 smallholder farmers (10 seed growers and two non-seed growers). An interview guide was prepared for this purpose to help the research focus but at the same time flexible to make follow-up questions (Robson & McCartan, 2002). The interviews were done within the farmers' villages in Lumezi and Chasefu districts to understand the local context. However, some participants had to move to a central location to be interviewed. Others were interviewed on phone. The interviews allowed me to understand different perceptions about the process and the outcomes of community seed production initiatives. I sought to find out among other things how seed growers source seed for multiplication and their role in different aspects of the seed bank initiative. How the project impacted seed growers and access to legume seed to non-seed growers was also examined.

I also conducted interviews with key informants who are stakeholders in the seed sector. My fieldwork started with an interview with a senior official at SCCI who gave me an account of the background and the status of the seed sector in Zambia. He later referred me to his subordinate, the Seeds Officer, who works with smallholder farmers engaged in seed growing. Through this interview, I found out about the regulatory aspect of the seed sector and the community seed systems. Later on, during my fieldwork, I had an interview with another Seeds Officer from SCCI but based in Eastern Province. This officer worked directly with the seed growers I was doing my research on. This was meant to get specific issues relating to the said seed growers.

Furthermore, a scientist (legume breeder) from ZARI was interviewed on phone. The role of ZARI in the community seed systems was explained during the semi-structured interview.

An Interview was also conducted with an official from ADI to find out the motivations for supporting community seed banks and how the implementation is going. In the same vein, I interviewed the former project manager for the CBS project to get his views on community seed systems. This was from the realization that he had headed the project for almost six years and he was a resource. I was unable to interview his successor as he was unavailable during my fieldwork. An in-depth interview was done with the Project Coordinator of the local NGO, KCO.

In this study, I also interviewed a crops officer from the Ministry of Agriculture who was recommended by one of the informants through the process of snowball sampling to talk about the issues of seed systems (ibid). Most of the interviews were audio-recorded with the permission of the participants and transcribed for analysis (Creswell & Creswell, 2018). I also took notes during the interviews. The reason for recording and transcribing interviews was to ensure a *"more thorough examination of what people say"* (Heritage 1984 see Bryman 2016:479).

In Chasefu district, one focus group discussion (FGD) with the seed growers was conducted. I elected to employ this method of data collection because people feel more relaxed with their peers. In addition, one can stimulate a natural conversation in an FGD. While I had planned to do two separate FGDs, one for men and another for women, I opted to do one for both men and women. This was after consulting the participants if it is culturally allowed for them to be in one discussion group. The seed growers present agreed that they have been having meetings together and that does not hinder women from speaking. While the group had a lot of seed growers, I decided to settle for a group of eight participants (four men and four women) which is within the recommended size of 8-12 people for an FGD (Robson & McCartan, 2002). I also ensured that the group was representative. An FGD discussion schedule was prepared in advance to guide the session. To help with the sessions, I engaged an assistant who acted as a facilitator/moderator and I was taking notes of the proceedings. I did not need an interpreter since I speak and

understand the language, *Nyanja*, spoken by the participants. However, I realized that there were a few participants who would use some words in *Tumbuka* (a local language) that I could not understand. In those instances, my assistant helped to translate for me. The perception of farmers on the seed bank initiative and their experiences were elicited during the focus group discussions. Like interviews, the FGD was recorded with the permission of participants (ibid). Seed growers felt free and motivated to speak because of the presence of their fellow farmers. To make the discussions interactive, I ensured that every participant was given a chance to speak.

To better understand how the seed growers carry out their seed production, I observed some of their fields of groundnut seeds. I also had an opportunity of visiting the main farmer field school which is located at the KCO field centre and one located in the community where seed growers reside. The participants explained to me different treatments and technologies which are tested in the farmer field school and it is a platform for knowledge sharing on best agronomic practices. While I wanted to observe how the seed bank operates by checking its records and storage facilities, I was informed that there was no seed in the shed during my visit. All the seed had been loaned out to the beneficiaries. During these visits, I also took notes from informal conversations I had (Creswell and Creswell, 2018).

4.2 Study site selection and participant choice

Lumezi and Chasefu districts in Eastern Province were chosen as sites in my study due to their agricultural productivity. Another reason for choosing to undertake my research in these locations is that seed production has been taking place for a long time, since 2006. Therefore, I felt that they have a lot of experience to help answer my research questions. At the same time, the SGA has given birth to new producer groups which I also considered part of the research to get a comprehensive view of the aspects under investigation. Further, I have an existing working relationship with the local NGO and smallholder farmers in the two districts. I have worked in the communities when I worked for ADI as Monitoring and Evaluation Officer for more than five years. This was important for the initiation and execution of this research. This background was useful in terms of building trust between the participants and the researcher.

The local NGO, KCO, helped select seed growers who participated in the study with the guidance of the researcher. The participants comprised seed growers of different age groups, both men and women, those who hold leadership positions, and those who do not. My data collection took place at times when the seed growers also had association activities. For, example, the engagement with the seed growers from Chasefu district, coincided with them working on their Farmer Field School. As for those in Lumezi district, there was a governance training taking place for the

members of the association. Selections of some of the study participants were through the snowball method. For example, the coordinator of the local NGO referred me to the Crops Officer under the Ministry of Agriculture who was facilitating the governance training for the seed growers. I interviewed him during the break of the training. As for the non-seed growers, they were randomly selected in the localities of the seed growers.

The key informant from ADI was interviewed in Lusaka. The two SCCI staff were interviewed at their headquarters in Chilanga district.

4.3 Researchers' reflexivity

Berger (2015) defines reflexivity as the introspection and acknowledgement by a researcher of their position and how it can affect the study. This introspection will help identify biases and values a researcher has which if not taken care of can jeopardize the research and the quality of the findings. For example, the researcher may hold different political views to the researched hence the need to keep reappraising himself or herself(ibid).

I have worked with some of the participants during my work with ADI as a Monitoring and Evaluation Officer. No doubt this has created certain positionality concerning the issue and the participants I am researching. However, being self-reflective at every point of the research helped ensure that I took on the lens of my new position as a researcher and lay aside biases (Berger, 2015; Creswell & Creswell, 2018). At the same time, my role helped create rapport quickly as the seed growers consider me an "insider" as opposed to if I was very new to them. There were moments when the participants still referred to me as an officer from the NGO and I reminded them of my new role, that of the researcher. My not going with the transport from ADI helped them understand that I am not an agent of the NGO.

It is worth noting that I conducted my fieldwork at a time when the farmers were spending most of their time in their fields as it was farming season. The fact I come from the capital city I may have power over them. However, I told the local NGO which facilitated my work that I was going to work within the schedule of the farmers, when they were not busy working in their fields hence minimizing any disturbance caused by research to the farmers (seed growers and non-seed growers) (Prowse, 2010:213)

During the research, I envisaged a situation where maybe I take the voices of the seed growers based on the narratives I have heard during my work with other colleagues. To overcome this, I took the stance that as a researcher I needed to hear the voices of all stakeholders. Triangulation of data sources was useful in this regard (Prowse, 2010:213).

4.4 Ethical concerns

Since social research deals with human beings, ethics are very important in the process. This is because the research can have some disturbances on the people being studied.

When I was considering the research, I got in touch with ADI and KCO who gave me a go-ahead. This is in line with what Creswell and Creswell (2018) espouse that one needs to engage gatekeepers before venturing into research. In this case, the two organisations are responsible for the research sites where the seed growers operate.

In the same vein, the participants were informed about the purpose of the research (Creswell & Creswell, 2018; Punch, 1994). At the beginning of the interviews and focus group discussion, I made sure that I got informed consent verbally from the participants. This applied to smallholder farmers (seed growers and non-seed growers) as well as key informants. I also assured them of the confidentiality of whatever they told me. Before I recorded an interview, I asked for permission to go ahead and also mentioned that the recording is for my private use and not for the public. The participants were informed that the audio recording was meant to facilitate the transcribing of the interviews to aid my data analysis.

Similar to the issue of confidentiality during data collection is the assurance of anonymity of the study participants in this thesis to avoid them being victimized in any way. The names of all the participants are not captured in the thesis. For the organisations, I have given them pseudo names to make it difficult for readers to identify them.

There were no expectations of payment by participants and local NGO staff. However, some payment was given to the local NGO for fuel which helped facilitate our movements to the field where the farmers were. There was a time when the vehicle we were using got stuck in the mud and the driver had to ask for help from nearby community members. The researcher had to pay the helpers a token of appreciation for the help rendered. In addition, I conducted all of the interviews myself and I only engaged an assistant to facilitate the focus group discussions while I took notes of the ensuing discussions. I paid this assistant a small token of appreciation for helping me.

On the first day of the fieldwork, we were delayed because of the vehicle getting stuck in the mud. We reached the farmer field school late and we apologized for keeping the participants waiting though they were aware of our ordeal. While I had planned a focus group discussion and interviews with the seed growers, I had to just do the latter so as not to take much of their time. Fortunately, the local NGO

organized lunch for them so that they do not go hungry after our interaction. For interviews, I decided to take the phone numbers of the potential interviewees and called them later during their free time.

4.5 Data analysis

The process of data analysis started during the data collection in the field. This was done by making sure that during the fieldwork when the participants were being interviewed that I thought about how data was to be teased out from their responses (Robson & McCartan, 2002). This was to ensure that they addressed the research questions. In instances when I felt that there were areas that were not adequately responded to, I got back to the participants for more clarity and also cross-checked with others.

The first step that I took after data collection was to transcribe audio recordings from the interviews and a focus group discussion. Part of transcribing started after fieldwork in the evening but due to limited time, it extended beyond. During the transcription of words in *Tumbuka* which were difficult for me to understand I called one of the farmers to help explain them. The field notes which were typed helped to understand the data from the transcript and its context. Thereafter, I read the transcripts through and through to understand the data collected (Robson & McCartan, 2002).

Based on research questions I developed themes and I went to read all the transcripts and began to colour interesting parts corresponding to my themes. I thereafter placed them under appropriate themes. This further informed my writing of the empirics in this thesis.

5. Empirical findings and discussion

In this chapter, the research questions will be discussed in relation to the data obtained through interviews, a focus group discussion, and related studies. Political ecology and the concept of food sovereignty are used in the analysis of the empirical data.

5.1 The management of community seed systems

In this section, I consider the research question which examines whose knowledge is included in the community seed systems. The focus is the discussion of the knowledge systems in the CSBs and the intersection of the formal and informal seed systems. In addition, the farmers' rights concerning landraces are equally interrogated.

5.1.1 Seed growing and knowledge systems

Community seed production in Chasefu and Lumezi is anchored on different knowledge systems, expert and local, those in compliance with seed regulations. In trying to examine the seed systems and knowledge systems, I explored how local knowledge is included in seed bank initiatives. Another question in this regard sought to find out how expert and local knowledge intersect. It must be noted that the CBS project itself, had a research component with a strategy to bring in different players in the agricultural sector. These included agriculture researchers, agriculture extension officers, and local farmers to share knowledge. This mix of different agriculture actors was able to test different technologies in farmer field schools and used these platforms to share local and expert knowledge. A farmer field school is like a living classroom, a knowledge-sharing platform that allows for both experts and locals to see what works practically. In these platforms, the local farmers were able to take an active participatory role. Research participants disclosed that technologies from both the locals and experts are tried in the farmer field school. Based on the observations, seed growers make decisions on which technologies or practices to adopt. A participant from the local NGO explained that:

> Previously we used to do demo[stration] sites but now there are no more demo sites we have transformed them into farmer field schools. When they were demo sites the information flow

> was coming from the experts […] So, now we … do what we call participatory kind of arrangements where farmers come to observe and share experiences they have observed and how they encounter the challenges they are facing. The information flow is in both ways coming from the experts and the feedback from the farmers. (Informant local NGO, 11/02/2022)

The inclusion of local knowledge in community seed systems resonated with some of the seed growers in the two districts. The participants in the focus group discussion in Chasefu district acknowledged that the knowledge of how to grow groundnuts has been passed on from previous generations. One participant during the session noted that:

> In land selection, it was not allowed to grow groundnuts in areas where there were Masuku trees *(Uapaca Kirkiana)* but where there are sandy loamy soils. So, site selection[knowledge] for our ancestors helps us in seed production. (Participant in an FGD, Chasefu district-9/02/2022)

The above quote goes to show that the seed growers have been able include some local knowledge, especially in selecting land to undertake groundnut seed production on. The seed growers report that some of the principles in growing legume grain apply to seed production. This result of local knowledge being incorporated into the seed system differs from research by Nyantakyi-Frimpong (2019) in Ghana where indigenous epistemes were not regarded in the running of a community seed initiative.

Another participant in the FGD also shared how they use ridges to grow the groundnut seed. The use of ridges is one of the conventional methods they used to grow maize and other crops in the past. Ridges as explained by the seed growers allow the groundnut pods to have room to grow. Local sustainable techniques like potholing which have been adopted and promoted by conservation agriculturalists are being used in seed growing. This shows that some technologies promoted by the agriculturalists are not new to the local farmers. While projects like CBS promote sustainable agriculture practices, the inclusion of ridging may send a mixed message to seed growers. Conservation agriculturalists posit that this practice negatively affects the soil in the long run.

There are points of departure in the knowledge systems of the community seed systems. This is evidenced by some seed growers who complained that knowledge from agricultural experts came to sideline the indigenous knowledge. For example, mixed farming is not allowed as a seed crop is supposed to be a pure stand to avoid cross-pollination. Some perceptions by the participants could be that they are yet to understand what makes seed farming unique. One local seed grower explained that is the reason why "… *farmers who join seed growing have to be trained and also have to come to the [farmer] field school to learn some techniques".* This is premised on the understanding that the prior knowledge farmers have is insufficient to undertake seed growing.

While findings show some local knowledge has been integrated into community seed bank initiatives, it is only that which conforms to the rules of how seed should be grown. However, these rules are developed by experts. It is also interesting to note from this study that not every expert technology is allowed in seed production. Intercropping is the case in point of a practice promoted by agriculturalists in conservation agriculture yet it is not permitted in seed growing.

From this research project, I see farmer field schools as being vital to seed growers having control of agricultural technologies used to some extent. However, the limitation is that those technologies are supposed to adhere to the rules and regulations that govern seed production set by the government.

5.1.2 The intersection of formal and informal seed systems

This research sought to find out how the formal and informal seed sectors come together. As indicated by the literature earlier and also confirmed by informants during my fieldwork, Zambia has two broad seed systems: the formal and informal seed systems. The informants from the government emphasized that the formal system is one where the seed is grown as prescribed by the laws of the country. An official from the SCCI explained in detail:

> […] Chapter 236 [of the laws of Zambia] defines what is seed and what should be sold. It must be a seed of verifiable variety. It means the variety was approved and produced according to the laws of the land. It means it was registered by SCCI, tested, and provided in the market in the right way after it has been tested in the laboratory and has passed and has met minimum standards. That's when it can be considered a certified seed. But in the informal everything is done by a single person, a farmer. He produces like crops to eat. So, he is the one who selects what is …that this one I can plant and he starts giving other people. So, when they are sharing the information at that level it's business at its minimum. Otherwise, that is not really[certified] seed per se. (Informant 1 SCCI, 2/02/2022)

Further investigation with SCCI but this time with another officer shows that the seed regulator is aware of the presence of local varieties and the informal exchange of seed in rural communities.

> As for SCCI, the law is very clear and explicit we cannot accept a landrace in the certification system because it is not known. Suffice to say that we do recognize an informal seed sector. We are aware that seed is changing hands outside the certification process. We know that people exchange seeds, sometimes they sell, and sometimes they give them as gifts. Sometimes there is a batter system in our villages. It could be cassava cuttings, it could sweet potato vines, it could be grain, cereals, it could be legumes. So, there is that system, that is at the back of our minds we know it is happening but Zambia in its quest to improve food security and improving productivity hence we have developed a seed system where certification must take place at all levels. (Informant 2 SCCI, 2/02/2022)

The participants from SCCI explained that for seed to be certified, it has to pass the criteria of it being *Distinct, Uniform, and Stable (DUS).* This is according to the

Zambian Plant Breeder's Rights Act of 2007. However, the landraces fall short of this criterion as they may only meet one or two of the DUS elements. A participant from an NGO which has been part of deliberations on seed policy in Zambia felt that the government can do something to address the situation. He posits that:

> […]as far as landraces may not conform to one of the criteria either distinctiveness, uniformity, or stability, they still need to come up with a way to recognize landraces. (NGO Informant, 20/02/2022)

The criteria set by the government for seed certification or recognition are detrimental to the preservation of agro-biodiversity as well as smallholder farmers benefiting from the local varieties. I agree with the NGO informant's suggestion that alternative seed certification systems can be set up to accommodate the local varieties. However, the lack of consideration of the farmers' varieties in the aforementioned piece of legislation seems to have been influenced by private sector interests. In his commentary on the Plant Breeder's Act in Zambia, Mwila (2016) explains that the seed companies' interests took pre-eminence over coming up with legislation that was going to be all-encompassing by including farmers' rights. A similar study in Malawi also shows how seed policies were influenced by commercialization to the detriment of the local farmers (Westengen et al, 2019).

Both improved and local varieties are promoted by seed growers in this research. Therefore, they fall in between formal and informal seed systems. They are growing improved groundnuts and beans varieties. For a local variety, they are producing *Lundazi* beans.

The informants in the study gave different ways they felt the formal and informal seed systems interact. The presence of the informal is regarded by the government as an opportunity to sensitize the adoption of improved seeds by rural farming communities. Community seed systems are a way to improve access to improved seed as explained by an official from SCCI.

> Where they meet, the interaction is that our seed systems, the rural seed systems are aiming at penetrating the informal there so that some form of quality is assured to the buyer of the seed. (Informant 1 SCCI, 2/02/2022)

This position by the informant is borne out of the concern that not many smallholder farmers are adopting improved varieties save for maize in Zambia (Kuteya et al. 2020). Further, the seed regulator in keeping with its mandate views the informal seed sector as not providing sufficient information to farmers on the local varieties useful for planning purposes.

Another area of convergence of the formal and informal seed systems as explained by informants from SCCI and ZARI is that landraces are the base for crop improvement. A scientist from ZARI specified that *"landraces are a source of traits of the economic importance of the [crop]breeding program"*. The scientists

find it useful to conserve the local varieties either in-situ or ex-situ as explained by the informant from ZARI.

> We are not saying farmers should not literally grow landraces, they should because they serve a certain need in the community. In addition, they are actually keeping or maintaining is a better word not just for themselves but also for institutions like ours. (Informant ZARI, 22/02/2022)

The importance of landraces as explained by the informants, in agriculture research stations, serves to cajole policymakers to give them the prominence they deserve. This should be so because they have traits that are suited to local agro-ecological conditions. My research project shows the intersection of the formal and informal seed systems from the government position is very strong with the agriculture researchers (ZARI). On the other hand, SCCI is focused on enforcing the law concerning the seed sector. There is a need for mandates of the two government departments to be synchronised to better serve the smallholder farmers and enhance the food systems. This is because agriculture researchers require landraces to developing improved varieties.

5.1.3 Farmers' rights on landraces

Farmer rights are framed as important to the development of rural farming communities. In this study, I inquired with participants from the SCCI and ZARI if rural farming communities have a share in the rights of the local varieties which are improved upon by the breeders. Evidence shows that in Zambia anyone is free to have the landraces improved upon if they are in high demand. In addition, they can do so without obtaining consent from the locals where the variety is domiciled. The breeder, therefore, owns the rights to the improved variety according to the breeders' rights as stipulated in the laws. From my analysis, it seems that those with financial resources can easily privatise a community ‘resource’, in this case, a local seed variety. This shows that seed laws on plant breeding in their current state mainly serve those with money and power which the local people lack.

The informant from ZARI reported that awareness of the issue of farmers' rights is very low among farmers. The lack of sensitization can be attributed to the lack of laws supporting farming communities to claim ownership of ‘their’ varieties. Therefore, this calls for activism by development actors so that the farmers’ rights can be legislated. However, the informant pointed out that:

> we recognize the fact that we have given names to some varieties that have been discovered in a certain location in honour of those locations or group of farmers or origin… even in our documentation, we specify the origin of the variety and so forth. We, definitely acknowledge. (Informant, ZARI-22/02/2022)

The ‘honour’ accorded to farming communities by the research institutions as explained in the quote above by an agriculture researcher from ZARI is not sufficient. The government should come up with comprehensive legislation that will ensure that the local communities benefit from the local varieties. For instance, *Lundazi* beans, a local variety in the research sites, which is preferred for nutritional purposes, if recognized would fetch a better price than currently is the case. This will mean increased incomes for those growing the local variety.

5.2 Mechanism of receiving seed and relevance of varieties received

This section details how decisions on seed sourcing and distribution are made and negotiated. The decisions around the governance of seed in the CBS have been determined by the funding NGO. However, at the local level, the seed growers also have structures for managing their operations.

5.2.1 Source of seed

Community seed banks in Zambia are engaged in the production of legume seeds and other ‘orphan crops’, source their planting material from public research stations, at ZARI[10]. From interactions with the seed growers during the FGD and interviews, it was clear from all of them that ADI has been procuring seed for them since the inception of the project. ADI also offers support to other aspects of the CBS project. One of the key elements of the CBS project design is that seed growers get seed loans from the seed bank and pay back the seed. This was meant to build sustainability but that has not been the case. This is explained by an SGA which has been receiving seed procurement grants for more than 10 years. With this, it is evident that a dependency syndrome has been created therefore placing the seed growers under the control of their donor. This situation is detrimental to seed growers sustaining their work. It calls for development actors to ensure that they have exit strategies and begin to implement them early during the project life.

The lack of agriculture finance for smallholder farmers is attributed to seed growers’ continued reliance on support from ADI by some research participants. For example, an informant from ZARI who reported that indeed seed growers do not purchase seed for themselves from the breeders voiced out the following:

> [there is] also a gap in financial institutions supporting farmers. There are not many of these institutions. For one, farming is not cheap even I, am struggling to get and make the best out of

[10] An orphan crop is the one that private seed companies are not interested in producing as they are considered not profitable.

> my crop. I can imagine the small-scale farmer [seed grower] who doesn't have a source of [income]…They have a myriad of demands, especially during the rain or farming season. (Informant, ZARI, 22/02/2022)

Being registered as a member with the SGA and subsequently with the seed regulator, SCCI, as specified by the participants is critical to one accessing seed for multiplication. Furthermore, another key requirement to accessing seed that was stressed by participants is to be trained in seed production. The former CBS project manager explained that seed has a lot of compliance issues compared to growing commercial crops. For example, the timing of weeding is critical in seed production. One seed grower during the interview session shared his views on the importance of them being trained.

> For one to access seed they have to become a member of the SGA. Then you have to be trained on how to grow seed. This is the seed, so one has to be trained since this is different from grain. Intercropping is not allowed. After training the member is given the seed. (Male farmer, Lumezi 10/02/2022)

Much as the project is funded by ADI, the operations of the SGAs are guided by their constitutions and they have elected executive boards in place to provide leadership. This is evidenced by the way seed is distributed among members. Participants reported mechanisms through which the seed growers obtain seed from their seed bank is on a loan basis and they sign agreements. The seed growers pay back the seed that has been multiplied in the ratio of 1:2 after harvest, failure to which they receive a penalty. The payment of money instead of seed and in some cases being expelled from the farmer group are some of the penalties meted out to defaulters. One participant explained that:

> […] if we get 10kg [of legume seed] on a loan basis. We return 20 kg [of legume seed]. That 20 kg is what will be loaned to new members" (a participant in a Focus Group Discussion-9/02/2022).

The seed growers appreciate this loan recovery system of paying back the legume seed as they do not have to pay cash. This seed pass-back system as it is called enables the SGA to recruit more farmers to its membership as its seed soars in its seed bank. The local governance structures of SGAs and the way politics play out are very critical once the seed is sourced for them by the ADI. It emerged during the study that in some SGAs some leaders abuse their authority by loaning themselves more seed than others. A related study in Ghana also shows how the elite captured the operations of community seed banks for their benefit (Nyantakyi-Frimpong, 2019). This derails seedbanks from achieving their set objectives. To address governance challenges, KCO has been organising governance trainings for SGA leadership.

5.2.2 Farmers' role in seed variety selection and seed relevance

The CBS project shows a semblance of traits of seed sovereignty going by the testimonies that seed growers are called months before the next farming season for the variety selection. This selection is participatory as seed growers are asked to choose from the varieties tried at the farmer field school. However, one participant who has been on the project since inception pointed out that it was not so in the beginning. The funding organisation used to purchase seed for seed growers without consulting them on which varieties they wanted. The participant added *"but after some time maybe it was in 2013-15 that is when they introduced the research system [component of the project]".* It is this research component that has brought to the fore the aspect of Participatory Variety Selection (PVS) which presents seed growers with opportunities to choose their preferred seed variety depending on their performance. The participant explained that because of this new research component, *"That is when we started demanding the varieties we wanted"*.

Much as seed growers are given opportunities to select varieties that seem suitable to them, the participants in Lumezi and Chasefu explained that there are other factors at play. One of these factors is the availability of the said legume variety. The availability of seed is a function of many factors such as how much has been recovered and which varieties. Some of the factors may be outside the control of the seed growers. For example, the supply is determined by the breeders. A seed grower can choose which variety of groundnuts or beans they get sometimes from the seed bank as one participant pointed out.

> So, it depends on the type or quality of seed that seed growers pay back to the seed bank. Sometimes what happens is that the seed when it loses vigour after being grown for three seasons then it is phased out, it also determines what seed you receive. When it becomes like that it becomes grain.[11](female grower,10/02/2022)

From the foregoing, we can state that the PVS if not matched with the availability of seed it just serves the objectives of the research agenda of the funding organisation. Seed growers should only be allowed to choose those crop varieties that are available. It is also important to define how 'participatory' is the PVS.

5.2.3 Relevance of seed received

The relevance of the seed obtained from the seedbanks by growers in Lumezi and Chasefu is demonstrated by its ability to address certain challenges and meet their needs. The responses to the question of how relevant the seed is, were diverse. Most of the participants revealed that the seeds they received were early maturing

[11] Grain in this context is the seed that can now be planted by ordinary farmers, non-seed growers.

varieties which are ideal for their situation of reduced rain season. In a focus group discussion, a participant reported that*: "I chose Wamusanga [a certain groundnut variety] because it is early maturing even if rains are not sufficient it does well"*. From conversations with the farmers engaged in seed production in the two districts, it was brought to my attention that the rains consistently started falling in January 2022. The reduction in the duration of rainy seasons in the two districts is due to climate change (GRZ, 2020). The relevance of seed to growers due to climate change was expressed by a key informant from the ADI. During the interview, the ADI official posited that when designing and supporting the interventions, the suitability of crops/varieties for particular agroecological regions was considered.

Participants in the study in Chasefu expressed that a groundnut variety was chosen for them by the local NGO. This was because of the delay in the rain. One of the seed growers who also doubles as part of the leadership of an SGA narrated that *"they chose for us from there [local NGO field offices]"*. The participant was however quick to mention that the variety received was early maturing hence ideal to their situation at that time. This shows that the local NGO was able to choose seed growers' varieties that met their needs. The KCO Coordinator said that *"Wamusanga [the variety they received] is better because it only requires about 75 days of rainfall".* This demonstrates that the funding organisation and the local NGO do take into consideration the seed growers' needs and the ecological/climate factors when selecting seeds.

It was interesting to also note that some participants complained about the choice of the varieties they received and did not find them relevant. A participant in the interview revealed that there was a certain variety of groundnuts, *MGV4*, which seed growers did not like because it had a disease called *Rosette*.

Further, some participants received a local variety, *Lundazi beans*, to multiply since it is liked by most local people for nutrition purposes. This view was also shared by an informant from the local NGO, KCO:

> It is the preference of consumers, not only in Lundazi [Lumezi and Chasefu] but around the country. The red beans commonly known as *Lundazi* has more flavour and is needed in most nutritional arrangements. So, we promote that for the nutrition needs of the households and it is suited to [the] local environment for production. It is resistant to ailments, and pest attack incidences. (Informant local NGO, 11/02/2022)

However, another participant had a different view on this bean variety when he received it.

> Lundazi[beans] was not relevant because when you have more rain it will just grow without producing grains. When there is less rainfall it is ok but it very difficult to control it[...] The grading is an issue for example, at the market customers, will demand red beans but Lundazi has got different colours. (Male farmer, 9/02/2022)

The different viewpoints of the participants could be attributed to differences in conditions such as soil in their various localities. It is also important to note that there are differences in opinions with regard to relevance among farmers because of pests and diseases. This all means that the supporting institutions, not just ADI and local NGO, but also government should step up and help farmers manage these pests and diseases and other challenges faced in their farming. This is because seed support is not going to solve all of the problems for farmers. Therefore, capacity building in seed growers is needed to deal with different issues they face in their livelihood activity, pests, and diseases included. Additionally, alternatives that also meet all needs of climate resistance, pests, and disease resistance, as well as nutritional value, should be considered by agricultural research institutions.

5.2.4 Low quantities of seed for seed growers

The quantities of legume seed distributed and received by the seed growers play an important role in the success of seed growing. The participants expressed concern about the quantities of seed they received from the seed grower association to multiply. A woman seed grower voiced out that:

> seed is not enough. We need to get at least 80 kg so that the yield is higher. For *MGV5*[a groundnut variety] we got 45 kg. (Female seed grower, 1/03/2022)

The seed growers receive as low as 5 kg of basic seed for them to multiply. The participants were concerned that this affected the tonnage of legume seed to market. The agro-dealers demand much seed but the seed growers are unable to supply the required quantities. Another participant added his dissatisfaction during the interview, *"we produce low quantities of seed. Maybe now that our members will be increasing maybe we will increase the tonnage".* The implication of new members in the SGA is that they will add to the seed being repaid to the seed bank.

ADI as the supporting organisation also raised concern over the insufficient foundational seed of preferred varieties as being one of the challenges of community seed systems. The key informant from the NGO pointed out the public agriculture research institution lacks the capacity to deliver sufficient seed:

> We tell them we want so much tonnes [of seed], we want five tonnes, they say they can only release 200 kg. Usually, they are not able to meet the demand. (NGO informant, 21/02/2022)

The scientist from ZARI when asked why there are low quantities of legume foundation seed produced, he explained that there has been a lack of huge investment. He said that producing groundnuts seed by research stations and seed companies is more expensive than maize.

> If you plant one seed of maize it gives you 200 seeds. If you plant one seed of groundnut it gives you 11 seeds. So, the seed multiplication rate is 20. We are talking about…actually 20

> times less**.** So now if the seed multiplication rate is less, then it is expensive to produce legume seed. So, we need more investments in producing legume seed because we are planting and getting less from that. (Informant ZARI,22/02/2022)

Further, the scientist pointed out that the low multiplication rate of legumes does not favour private investment as they choose to go for maize where they make huge profits. This is because legumes are mostly open-pollinated varieties and can be grown for more than one season without losing vigour. Private seed companies prefer producing hybrid varieties which farmers have to buy every farming season.

> So as the result you have a perennial inadequacy in terms of legume seed. The private sector is restricted because profit is not made at early generation seed. Profit is only made at certified seed but the initial investment which [is] basic seed they are reluctant to because they are not getting the profit. (Informant ZARI, 22/02/2022)

A similar study by the African Union (2021) also shows that public agricultural research institutions in Africa do not receive adequate funding. The same research also reveals that the huge investments by most seed companies go to maize breeding (ibid). Another explanation is that being in a liberal economy the government may want to provide a 'conducive' environment for private seed companies to thrive. Peschard and Randeria (2020) argue that private seed companies may become more powerful and begin to control the seed sector in a country and later on, the way the food system is shaped.

5.3 Farmers' perspectives on seed production

The market orientation of the CBS project made seed production attractive to most farmers in the communities where it is being implemented. During the focus group discussion and interviews the participants were asked to share their reasons for starting seed growing. The participants seemingly elated by the decision could not hide their reasons for their choice. The seed growers in this research attributed the lucrative prices of seed as being key to them diversifying their farming to legume seed production. This, the participants explained is essential in meeting their household needs.

> We learn that certified seeds have better yields while the other[recycled] seeds have lower yields […] For commercial crops[groundnuts] much as the harvest may be good it is difficult for us to have enough income to meet household needs. It was not for the local crop to accomplish that. But for seed under good management, the price is very good and lucrative. (FGD in Chasefu District, 9/02/2022)

The price instability of other cash crops was another driving factor for the participants to venture into seed production. One participant expressed the following in an FGD:

> The reason I joined seed growing is that the prices were stable compared to the ones by briefcase buyers [commercial crops], yes. When they [buyers] decide on the price of seed the price does not fluctuate (change) but for commercial crops, you will find today is K13 and tomorrow it changes K7. So, I decided to become a seed grower to grow groundnuts. (FGD, 9/02/2022)

Inspiration from peers was another factor that motivated farmers to join the seed community seed bank initiative. They were able to observe improvement in the livelihoods of their friends as a result of participating in the seed production of legumes as the venture was profitable. This compelled them to join the Seed growers' association.

During the fieldwork, I also sought to get the perspective non-seed growers had on seed production. This was to get a general feel of the local people where the seed banks are domiciled. The study participants reveal that most of the farmers in their villages have an interest in undertaking legume seed production. This is premised on the higher prices of legume seed compared to local varieties, for example, in the case of groundnuts. Further, the promotion of agriculture as a business has equally raised the interest of the smallholder farmers in seed production.

It is interesting to note that while locals are interested in joining the community seed initiative, they face certain hurdles. For example, as expressed by one participant in the focus group discussion in Chasefu, *"many want to join but we are limited by the quantities of seed".* From interviews with key informants from the SCCI and document review, I realise that seed production has a lot of requirements for the growers. As one of the seed growers interviewed pointed out, *"Someone can have interest growing seed but the conditions of seed growing may hinder them from joining.* This calls for a lot of sensitization by those promoting community seed initiatives so that other farmers can also partake of the benefits of seed growing.

5.4 Accessibility of seed to local communities

The access to seed produced in the CBS project in the two districts has been shaped by the market-oriented approach of the project. As a measure of the impact of the project on the local communities, I asked the participants how accessible the seed produced was to the locals, the non-seed growers. The idea of making seed available locally, turned out in practice to be more inward-focused (within the SGA). The former project manager of the CBS project explained that:

> […the] project was looking at three things. The first one is to produce high-quality seed and the second one is to make that seed accessible to other farmers, especially those who are members of the association. The other one is actually to sell it because the key thing is that the project also had an element of entrepreneurship meaning that if they have excess. The key thing

> in producing that seed was to sell but as they were selling, they were also supposed to leave stock for production for the following year. (Former CBS Project Manager, 31/01/2022)

When I was in the field it came to my attention that the founding seed grower association birthed other seed clubs in the two districts. This was a confirmation that the number of seed growers has been on the rise as indicated by the former project manager in the interview conducted in Lusaka. The number of seed growers stood at 399 as of May 2022 compared to 84 in 2015[12]. With the increase in SGA membership, it means more seed is being paid back in loan recoveries and subsequently made available to other growers for multiplication.

Some study participants from government institutions felt that sometimes NGOs show ambitions to make improved varieties accessible to the local communities in their project proposals to secure funding from donors yet they do not live up to it. This failure could be attributed to challenges in implementing these initiatives by NGOs. For example, the CBS project in its proposal planned to increase local farmers' access to seed. By not doing so, it shows some departure from its proposal. Related to this, community seed system studies conducted in India and Ghana reflect on a mismatch between what development organisations promise in their proposals to what they do in practice (Reisman, 2017; Nyantakyi-Frimpong, 2019). Development organisations should always endeavour to adhere to what they promise in their proposals.

The majority of the seed growers in this study expressed that the seed produced is not made accessible to fellow community members who are not members of the SGA. The major reason advanced is that they are in business. As one of the participants expressed himself: *"we don't share with our communities since they are not seed growers. It is not profitable to sell it to the local community".* The stance of these seed growers is driven by the funding organisation which in its mandate promotes enterprise solutions. However, it is important to also encourage the SGAs to market their produce to their communities. My discussion with the Crops officer, who has calculated gross margins with the seed growers, revealed to me that profit can still be made from selling seed to the locals.

Further, the seed growers choose not to share their seed with non-members because they need to keep it for the next farming season after repaying the loan. This is because they have targets to meet in SGA in terms of quantities for the market. The seed growers mostly sell all of their produce to seed companies and agro-dealers in Lusaka, the capital city. The key informants explained that agro-dealers sell part of the seed to the government for FISP. However, it is difficult to verify that this seed from FISP comes back to communities where it was grown since most farmers in these communities grow recycled groundnut seeds. Suffice

[12] The year 2015 was the beginning of another phase of this seed initiative promoted by ADI hence I use it as baseline in analysing the increase in number of seed growers.

to say that the scenario in CBS is contrary to a study conducted by David (2004) in Uganda which shows that a seed bank initiative was selling almost all of its seeds locally. I argue that the CBS project in its operation takes away the control of the seed growers over the seed they produce. Furthermore, in these farming communities sharing the seeds is a way of life but this seed production enterprise comes to distort that. This is so since the seed growers are not allowed to share with anyone. This shows that the project takes away their right to share the planting material. This means that the seed growers do not have seed sovereignty.

However, there are other ways in which seed is being made available to local communities. Participants during interviews and FGD stated that some of the seed growers are sub-contracting others outside their association to produce seed for them. The challenge with this is that the sub-contracted farmers are not being monitored by the authorities to ensure compliance with the set standards. The project coordinator for KCO explained that:

> We would have registered with SCCI the number of hectares. Some of the lead farmers will sub-contract others to do for them. They get it from the surplus they remained with after paying the loan to the seed bank. There is no assurance that they [sub-contracted farmers] grew it as seed. (Informant local NGO, 11/02/2022)

The seed growers echoed the views of the KCO coordinator. They spoke of some of their fellow seed growers giving their family members to produce seed for them following the requirements for seed growing. The participants during the fieldwork admitted that it was not allowed. Some participants expressed their displeasure that some *"members share part of their seed with other community members who are not registered seed growers. We want to identify those who are giving out seed to others".*These threats reflect some exclusionary elements these seed growers show to others. Furthermore, the seed growers stressed that whoever grows seed should be trained and registered. I argue that the sub-contracted should be viewed as potential seed growers but who are lacking training and monitoring. This is an opportunity for SGAs to grow their membership by formalizing those being sub-contracted by registering them.

Another way seed is made available illegally to the community is when seed growers are involved in side-selling seed for various reasons. One of these is for them to attend to urgent household pressures. The participants reported that the delay in the marketing of seed in 2021 forced some of the members to side-sell it. It must be noted that seed growers according to the governance of the SGA are supposed to bulk and market the seed together and not as individuals. This is meant to give them an edge in terms of market negotiation and also seed quantities. However, illegalities by some seed producers may suggest some resistance similar to the study by Nyantakyi-Frimpong (2019) where seed growers resorted to

defaulting on seed loans as a form of rebellion. This was done to display their displeasure that the seed bank was not meeting their expectations (ibid)

5.5 Impact of seed growing on seed growers' livelihoods

In Lumezi and Chasefu like in most rural areas in Zambia agriculture is the main source of livelihood. The farmers in these two districts mainly grow Maize, groundnuts, beans, soya beans, and sunflower. Non-food crops grown include tobacco.

5.5.1 Seed growing a lucrative business

Most smallholder farmers' reason for diversifying their farming systems to legume seed production was mainly linked to its premium prices. This was compared to other cash crops like maize, the staple. The seed growers reported during interviews that in 2021 they managed to sell the groundnut variety called *Wamusanga* at K25/kg compared to the local variety sold as grain which was going at K13/kg.

> I saw the commercial crops we were growing were not fetching good prices. At least for seed, the price is very good. The market is not a problem. They usually find us, buyers, as long as we have grown it accordingly as prescribed on seed production. (Female seed grower, 1/03/2022)

The increase in income from legume seed sales has been a driving force for some seed growers increasing the hectarage of their farms for seed production. One participant who has been producing for more than ten years explained that:

> From the time I started seed production I started on a small scale but now I am able to cultivate more hectares. When we started, I produced on 1.5 Ha but now I produce on 10 ha piece of land. (Male seed grower, 10/02/2022)

It is noteworthy that this participant was a model seed grower as he seems to be grounded in seed production. His success can also be attributed to his wanting to lead by example since he chairs one of the founding SGAs in the project.

5.5.2 Improved household food security, housing, and meeting school requirements

The increased income from seed production has had an impact on seed growers meeting their household needs. Food security is one aspect that the study participants report has been enhanced. A female participant shared that *"I used to have issues with food insecurity but there is an improvement in [household] food*

security". The participants explained that they do not just have to depend on maize for their households to have sufficient food. The proceeds from legume seed have led to diversified income which I think is critical to building farmers' resilience. A related study in Tanzania also shows that seed growers had higher incomes from seed sales than cereal crops i.e maize (Kansiime et al., 2021).

The seed-growing enterprise has positively impacted some participants who have since improved their housing structures. In most villages in Zambia, the majority of people live in mud houses which are grass thatched. Two women participants in separate interviews shared how they have managed to build pan-bricked houses and roofed them with iron sheets. A male seed grower in Lumezi also gave an account of how proceeds from seed growing have improved his life and that of his household.

> Through the same business, I was able to build the house with all the necessary furniture. I have a solar panel and my family has a T.V. So those are the achievements. (Male farmer, 10/02/2022)

Most of the research participants also expressed how the income from sales of groundnut and beans seed has assisted with school requirements for their children. Some stated that before venturing into seed enterprise they had struggles with meeting the school needs of their children. A participant visibly passionate about seed production explained that:

> I failed to take my first-born child to school but, in the year, I harvested seed (beans), I managed to pay for my child at the college. I paid for three terms as I told them that money is usually a problem for me and I wanted to pay at once. It was K1800 (US$106) per term. I paid … at Chipata teacher's college. As we are talking my child completed studies last year and just waiting to be recruited. (Male seed grower, 9/02/2022)

During the engagements with the seed growers, they expressed their joy that proceeds from their seed enterprises have helped meet school requisites from primary to tertiary education levels. These findings show that seed production is an important pathway for meeting the basic needs of the poor in rural communities.

5.5.3 Income from legume seed, capital in farming

Seed production for most growers in Chasefu and Lumezi has provided a kick start to other livelihood activities. My study found out that the smallholder farmers engaged in community seed production have had increased access to inputs like fertilizer for their maize and other crops. This is because they now have incomes to purchase the farming input. The participants interviewed said that the number of bags of fertilizer received from the government-funded FISP was not sufficient. One of the participants narrated that *"I am not on FISP, so I buy my fertilizer."* This shows that the productivity of other crops being grown by the seed growers is being

sponsored by proceeds from seed. Other participants expressed that seed multiplication is helping them diversify. A seed grower from Chasefu said that *"the money from seed [production] has helped me to diversify into gardening, growing of tomatoes. Since seed gives me good income".*

Further, the participants also explained how income from seed is also used to meet labour costs for other crop fields. For others, it has helped them mechanise by procuring rippers and tractors. A woman seed grower shared that she *"also bought a hand tractor from part of the income from the sale of seed"*. This goes to show that the asset base of the project participants has been impacted positively. Some seed growers were also able to purchase livestock such as cattle and goats. One seed participant reported that she "*... also managed to buy a cow when I harvested 11 x 50 kg [bags of groundnuts]. It has two calves".* In addition, other seed growers testified that they managed to procure ox-carts. Seed growing has given farmers access to increased possibilities in livelihood activities.

5.5.4 Trickle-down of capacity building to non-seed growers

From the research, I learned that the seed grower associations have been able to share information on sustainable agricultural practices and other aspects with farmers in the community. This is despite them not being seed growers. Sharing of knowledge is critical as other effects of unsustainable farming are borne by the community at large. Most seed growers who participated in this study reported that their meetings and trainings are open to everyone.

> We share so that they know what we do in the group. So, when we have a meeting are we open for non-members to come and learn. As a club, we were seven but because we were open others came to join us. […] we share the information. We have shared knowledge of conservation farming and people have known it. ... So, we share so that they can also start growing beans so that they can make profits and take care of their children. (Male seed grower, 9/02/2022)

The seed growers have been sensitizing other farmers (non-seed growers) on issues of climate change in their meetings as well as in the farmer field schools. One participant narrated what they have been doing:

> […] we share with non-members in the community about changing our farming based on climate change. We encourage them to grow [improved] groundnut seed. In the past, people used to grow local maize which is late maturing and can take about 5 months. We encourage them to shift to early maturing varieties of maize which take about 3 months. We also share knowledge on treating farming as a business and calculating net profit. (Male seed grower, 10/02/2022)

The participants also disclosed that they promoted the use of improved varieties to the communities so *"that they should use certified seed for better yield. Our seeds are improved varieties which mature early".*

Opportunities presented by SGAs to non-seed growers in their communities for knowledge sharing are useful for improving agricultural practices amongst farmers. and not just confined to those who are fortunate to be conscripted in seed growing.

6. Conclusion

In this chapter, I focus on the key findings in relation to the research questions of my study. I also consider the analytical reflection of my theoretical and conceptual framework. Finally, the policy implications of the study are explored.

6.1 Key findings

The research findings in this paper give insights into the effectiveness of community-based seed systems in rural communities in, Lumezi and Chasefu districts, Zambia.

Concerning my first research question, on whose knowledge is included in the community seed systems, this research project demonstrates that both local and expert knowledge are included. However, only the knowledge systems that are in tandem with seed regulations are allowed in seed production in community seed systems as long as they agree with the seed regulations. For instance, practices promoted by agriculturalists like intercropping are not allowed in seed production. Conversely, mixed cropping which is a part of indigenous knowledge is also not allowed since legumes grown for seed are not supposed to be exposed to possibilities of cross-pollination.

My findings showed that there are synergies between the formal and the informal seed systems. The respondents from the government departments report that local varieties are materials for crop improvement by agriculture research stations. On the other hand, the seed regulating agency regards the presence of informal seed systems as an opportunity to make sensitise the farmers to use improved seeds.

The study shows that seed growers have some traits of seed sovereignty going by their selection of legume seed varieties of their choice in the farmer field schools. However, the availability of seed varieties in the seed bank dictates what they obtain. Respondents reported obtaining seed varieties that they did not want since their preferred varieties were in short supply.

Another key finding was that while seed bank initiatives are designed to help bridge a gap in the rural farmers' accessibility to seed for their production it was not so in this project. However, rather than achieve that objective, seed initiatives in Lumezi and Chasefu have excluded the locals by not allowing the sharing of seed and, marketing the seed outside the two districts. This has eroded the power of the

seed growers over the seed they produce. Nevertheless, there are other unorthodox ways seeds are being made available to non-seed growers such as side-selling and sub-contracting other farmers to produce seed. The rules governing the seed growers that they should not share or sell the seed to the communities is exclusionary and takes away the identity of the people of seed sharing among themselves

Participants had a positive outlook on seed production which has been reported to be due to better prices of legume seed compared to other crops. However, the participants highlighted the lack of sufficient seed as the drawback to the recruitment of many interested farmers in the SGA. This challenge is linked to public breeders' incapacity to produce enough seed to meet demand from seed growers. This is exacerbated by a lack of interest in producing open pollinated varieties by private seed companies but hybrid seeds which assure them of more profits.

My research findings also revealed that seed banks have the potential to address rural poverty going by the evidence of improved livelihoods of the seed producers. Respondents report increased income as a result of seed sales and subsequent diversification of income sources. In addition, the seed growers also boast of improved food security and also asset base.

It is also important to note that while the seed banks show potential to improve the livelihoods of the seed growers they face some challenges as shown by findings in this study. The SGAs have been depending on grants for seed procurement from the supporting NGO. They have not been able to source seed for themselves. This puts their sustainability into question.

6.2 Analytical reflection of the theoretical framework

The theoretical framework adopted in my research provides sufficient grounds for the analysis of the data.

Firstly, the political ecology approach permits us to understand how the community seed systems are controlled. The research shows how laws and policies in Zambia promote and constrain community seed banks. I note that for farmers to be considered seed growers they have to adhere to seeds laws and regulations. Using the lens of political ecology, it can be argued that the seed laws give identity to what falls in the formal and informal seed systems. In the case of the seed growers in Chasefu and Lumezi, they grow the improved legume seed varieties that are in the formal seed system. However, since they also produce the local seed varieties, they also fall in the informal seed system.

Secondly, political ecology also helped address how access to seed is negotiated by seed growers in the community seed banks. Further, the approach assisted in

comprehending how access to legume seed was hindered in local communities where SGAs are domiciled. This points out that local communities' accessibility to seeds is not just the function of proximity to seed banks and relationships with seed growers but factors like control. In this study, I argue that the NGO supporting the seed project has a strong influence on the accessibility of seeds due to the power it wields.

The concept of seed sovereignty, helps us understand the control that seed growers have in the different aspects of the legume seed value chain. It is noted that there are some aspects where seed sovereignty is evidenced by the seed growers such as the participatory variety seed selection. However, the analysis using seed sovereignty shows that it is not sufficient for the seed growers in the project to just select their preferred seed varieties but should go beyond that. While seed growers' participation in variety selection is a step in the right direction towards them having a choice in what they produce, it will be critical for them to source and procure their seed. This will give them control over the seed they produce as seed growers. However, the control of individual seed growers over the seed they produce and market is undermined by the rules and regulations of the seed grower associations they belong to.

My further reflection on the concept of seed sovereignty is that it also helps to comprehend how SGA governance affects the seed growers and how they respond to it. I note that the seed growers are supposed to sell in bulk together all the legume seeds produced and no one is allowed to side-sell or share with anyone in the communities in Chasefu and Lumezi. These rules take away the seed sovereignty of the growers. This could be an explanation for why some of them have been going against them, not openly though, in silent rebellion (Nyantakyi-Frimpong,2019).

6.3 Implications for policy and practice

This research demonstrates that inequalities can be perpetuated if laws sideline the rights of rural communities over their seed varieties. There is a need for the government through SCCI to spearhead laws and regulations that do not stifle the informal seed sector but nurture it. In particular, the government should develop an alternative certification system for landraces so that farmers can be allowed to sell them as seeds and make an income.

The low quantities of seed from the public breeders on legumes negatively affect seedbanks in terms of increasing the tonnage of the crop. There should be a deliberate policy by the government to increase funding to agriculture research stations as this is important to increasing the food security of the nation.

To ensure independence from reliance on NGO support, the design of the seed bank initiatives should include a funding mechanism that seed growers can draw

on when they need to procure seed. This fund can also be used to meet other operating costs of the SGA. This is key to the sustainability of community seed systems.

I also recommend the seedbanks if they also want to meet market objectives of profit to allocate quotas to their harvest. This implies that they should have certain percentages of their produce earmarked for the local farming community while still serving other markets elsewhere. This would help deal with the exclusion of the locals in the community seed systems

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Popular science summary

Seeds are very important to human society as they provide a foundation for the food people consume. They are also useful in the growing of other crops and plants needed for different purposes. Most of them are small in size but carry great potential.

In many countries where most people depend on agriculture for a living availability of good seeds is a challenge. For example, in Zambia, most small-scale farmers face difficulties in accessing quality seeds for crops other than maize and other crops produced by seed companies. This situation has compelled NGOs to set up farmer organisations to grow seeds for crops that are not favoured by private seed companies. These farmer groups are supposed to work independently and make their own decisions on the affairs of their organisations.

I got interested to understand how these farmer organisations are working and if they are being effective. I, therefore, decided to carry out research on seed growers in two districts in the Eastern Province of Zambia, Lumezi, and Chasefu. To do this I interacted with farmers, NGOs, and government officials with provided me with useful data.

What I discovered from this study is that the knowledge used in seed farming comes mostly from agriculturalists with little from the local people. This is because seed growing has got a lot of rules which seed producers have to follow otherwise they will not be allowed to continue by the government. I also found out that farmers have opportunities to choose the seed of their choice but the challenge is the lack of sufficient seeds. One of the problems farmers have is not being able to buy seeds for themselves as they look up to the NGO. Furthermore, the local people cannot access seeds produced by farmers because their market is outside the villages and beyond the districts.

In sum, these farmer organisations have the potential to improve the lives of the people in rural areas. Therefore, NGOs when developing proposals must ensure that the seed producers should be able to stand on their two feet. The seed growers should also not forget their kith and kin now that the light of seed growing has set on them.

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7. Appendix: A list of interview participants

Position	Organisation	Amount of time taken	In-person/Phone	Gender
Acting Director General	SCCI-HQ	42 minutes	In-person	Male
Seeds Officer	SCCI-HQ	49 minutes	In-person	Female
Seeds Officer	SCCI-Eastern Province	32 minutes	On phone	Male
Scientist/Groundnuts breeder	ZARI-Msekera Research station	55 minutes	On Phone	Male
Crops Officer	Ministry of Agriculture	30 minutes	In-person	Male
Country Director	NGO	39 minutes	In-person	Male
Former Project manager	NGO	1 hr 20 minutes	In-person	Male
Project Coordinator	Local NGO	1 hour	In-person	Male
SGA Chairman/Seed grower	SGA	1 hr 15 minutes	In-person	Male
Seed grower	SGA	40 minutes	In-person	Male
Seed grower	SGA	40 minutes	In-person	Female
Seed grower	SGA	1 hr 10 minutes	In-person	Male
Seed grower	SGA	48 minutes	In-person	Male
Seed grower	SGA	1 hr 9 minutes	In-person	Male
Seed grower	SGA	30 minutes	In-person	Male

Seed grower	SGA	32 minutes	In-person	Female
Seed grower	SGA	39 minutes	On phone	Female
Seed grower	SGA	1 hr 20 minutes	In-person	Female
Non-seed grower		20 minutes	On phone	Male
Non-seed grower		11 minutes	On phone	Female

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