

**ENHANCING DIVERSIFICATION IN RESETTLEMENT SCHEMES: A
CASE OF KASENGA RESETTLEMENT SCHEME IN CHONGWE
DISTRICT**

BY

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DECLARATION

I, **Duncan Mumba Musama**, do hereby declare that the work presented in this study for the Degree of Master of Business Administration (General), represents my own work and has not been presented either wholly or partially for any other degree at this or any other university.

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APPROVAL

This dissertation by **Duncan Mumba Musama** has been approved as a partial fulfillment of the requirements for the award of the Degree of Master of Business Administration (General).

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ABSTRACT

This study was undertaken to appreciate the state of agriculture and factors driving crop diversification at resettlement schemes under the Office of the Vice President. The study also provided an opportunity to appreciate the factors that were responsible for hindering crop diversification and consequently allowed for proposals on how to enhance crop diversification at resettlement schemes.

A mixed methods design, using a combination of questionnaires administered to 180 settler farmers and in-depth interviews involving 5 experts was utilised. Quantitative data were analysed using SPSS version 20, particularly through descriptive statistics, such as Spearman's rank-order correlation and percentages, while qualitative data were analysed using content analysis.

Dependence on rainfall for agriculture, which accounted for 94.3% of the respondents, was cited as the main driver for the current state of agriculture. Further, 58.9% and 67% of the farmers did not diversify their crops and livestock, respectively. 93.2% of the respondents cited the desire to increase their income as the main driver of diversification, while 80.1% indicated that access to subsidised inputs such as fertilizer through the Farmer Input Support Programme (FISP) and maize market promoted continued production of more maize, while hindering crop diversification. 60% of the experts interviewed through in-depth interviews cited the need to reform the agricultural subsidy under the Farmer Input Support Programme (FISP) to shift focus from maize and include other crops with a full package of inputs as a way to enhance crop diversification. Other suggestions included the need for the Food Reserve Agency (FRA) and other players to create market for other crops. Additionally, the in-depth interviews revealed a need for sharing nutrition information on other foods or crops to create a demand for them, and consequently, a shift from dependence on maize.

Most settler farmers at Kasenga Resettlement Scheme were not diversifying their crop production but were instead involved in the production of maize as a main crop, driven mainly by the type of inputs given through FISP and the availability of market for the crop. Therefore, it is clear that crop diversification at resettlement schemes can be enhanced by reforming the agricultural subsidy under FISP to include other crops, with a full package of inputs as well as market availability for all the crops. Additionally sharing nutrition information on other foods or crops can create a demand for them, and consequently, bring about a shift from focusing on maize production to other crops, which may even be more lucrative.

Key words: Settler farmers, diversification, agricultural subsidy, Farmer Input Support Programme (FISP) and nutrition information.

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DEDICATION

This dissertation is dedicated to my beloved wife, Wendy and my children Nathan, Faith, Isaac and Elijah, who stood by me throughout my studies.

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ACRONYMS AND ABBREVIATIONS

7NDP	Seventh National Development Plan
COVID-19	Corona Virus Disease 2019
e-FISP	Electronic Farmer Input Support Programme
FISP	Farmer Input Support Programme
FNDP	Fifth National Development Plan
FRA	Food Reserve Agency
FSP	Food Security Pack
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
NAP	National Agricultural Policy
SPSS	Statistical Package for Social Scientists
TOC	Theory of Constraints
UNDP	United Nations Development Programme
UNZA	University of Zambia

CHAPTER 1

INTRODUCTION

1.1 Background to the study

The Zambian Agricultural sector employs more than half of the total national labour force and accounts for 22 per cent of the country's Gross Domestic Product (UNDP, 2013). Zambia's agricultural sector is dominated by small scale mono-cropping farmers (Libanda *et al.*, 2016; Hichaambwa and Mofya-Mukuka, 2016) as 82 per cent of these farmers grow maize (UNDP, 2013). These small scale farmers largely depend on rain-fed agriculture (UNDP, 2013) and lack access to irrigation facilities, making them vulnerable to swings in the pattern of rainfall every year (Chibinga *et al.*, 2012).

The Zambian Government has over the years been pushing a crop diversification agenda among the farmers. In the year 2004, Government introduced a programme to promote crop diversification (Ministry of Agriculture and Cooperatives, 2004). The agricultural diversification programme continued during the Fifth National Development Plan (FNDP) and the National Agricultural Policy (NAP) implementation periods (Bonaglia, 2008). The diversification programme further continued during the Sixth National Development Plan (Ministry of Finance, 2014) and the Seventh National Development Plan (Ministry of National Development Planning, 2017). The Seventh National Development Plan (7NDP) focused on the development of a diversified and export-oriented agriculture sector as a means of achieving economic diversification as a long-term development objective (Ministry of National Development Planning, 2017).

In order to enhance crop diversification efforts, Government, in 2016, introduced the e-voucher programme for input provision under the Farmer Input Support Programme (FISP) which provided farmers with a choice of inputs to utilise for their specific farming needs (Chapoto and Chisanga, 2016). The e-voucher is currently being reviewed to address the challenges experienced in the pilot phase (Chapoto *et al.*, 2019).

Despite all the above efforts, crop diversification still remained low, with the agriculture sector being highly undiversified, and maize being the main crop (Mwanamwenge and Cook, 2019;

Chapoto and Chisanga, 2016). Similarly, the 2017 Annual Report for the Department of Resettlement revealed that maize production remained the most dominant activity in all the resettlement schemes in the country (Department of Resettlement, 2018a).

As observed by Zulu *et al.* (2016), there is an urgent need to shift away from maize-centric policies to those that encourage farmers to diversify to crops that have higher earnings per hectare.

This study, therefore, explored the factors driving or inhibiting the uptake of crop diversification in resettlement schemes, with a view to finding ways of enhancing it.

1.2 Dissertation structure

This dissertation is divided into five chapters. Chapter 1 gives an introduction to the study covering the background, problem statement, aim and objectives of the study, research questions and scope of the study. Chapter 2 covers Literature Review, which focuses on the state of agriculture and its drivers, reasons for lack of crop diversification and proposals on enhancing diversification. Chapter 3 presents the study methodology covering research design, population and sampling, sample size, data collection, study limitations, data analysis and ethical considerations. Chapter 4 presents the findings arranged in line with research questions and objectives, while Chapter 5 discusses the results and provides a conclusion to the study. In addition, the latter part of the dissertation presents a list of references and appendices.

1.3 Problem Statement

There is a problem in resettlement schemes under the Office of the Vice President. Despite efforts to promote crop diversification, settler farmers in resettlement schemes have continued focusing on maize production. However, the possible cause of the failure to diversify is not clearly established. The difficulty arising from this problem is that many settlers are unable to produce sustainably particularly in the face of climate induced crop and livestock failure. As a result of this, resettlement schemes have remained less productive and unable to make a significant contribution to reducing rural poverty, enhancing food security and rural development. Perhaps an exploratory study to determine why settler farmers are not engaging in crop diversification will assist in finding solutions.

1.4 Aim of the Study

The main aim of this study was to explore the factors driving the current state of agriculture, with a focus on those factors driving or inhibiting the uptake of crop diversification in resettlement schemes, with a view to finding ways of enhancing it.

1.5 Objectives

- (i) To describe the state of agriculture in resettlement schemes.
- (ii) To establish the reasons for the current state of agriculture in resettlement schemes.
- (iii) To describe, based on the Theory of Constraints, factors that affect the decision by farmers to diversify or not.
- (iv) To establish, from the point of view of key stakeholders, why settlers in resettlement schemes are not diversifying their crop production.
- (v) To propose, from the point of view of key stakeholders, how crop diversification can be enhanced or promoted in resettlement schemes.

1.6 Research Questions

- (i) What is the state of agriculture in resettlement schemes?
- (ii) Why is agriculture in its current state?
- (iii) Why are the settlers not diversifying?
- (iv) How can diversification be enhanced or promoted?

1.7 Significance of research

Despite several government efforts in promoting crop diversification through various policies and programmes such as the e-voucher under the Farmer Input Support Programme (Chapoto and Chisanga, 2016), farmers have continued to focus on maize production. Crop diversification has continued to be low, with maize being the main crop (Mwanamwenge and Cook, 2019; Chapoto and Chisanga, 2016). This picture is true for resettlement schemes under the Office of the Vice President in Zambia (Department of Resettlement, 2018a).

This status is despite several documented and known benefits of crop diversification. For instance, farming households stand to benefit from crop diversification by spreading their production and income risk over a wider range of crops, thus reducing livelihood vulnerability to

weather or market shocks. In addition, depending on the crop combination, crop diversification can produce agronomic benefits in terms of pest management and soil quality, among other things (Maggio *et al.*, 2018; Sichoongwe *et al.*, 2014). Similarly, Heumesser and Kray (2019) argue that more diversified on-farm production can lead to better nutrition outcomes and greater resilience to environmental and economic disturbances at the local level, as it makes a greater variety of foods available to households and local markets, and lowers production risks.

Further, crop diversification can be seen as one of the most cost effective ways of reducing uncertainties in farmer's incomes (Feliciano, 2018; Mango *et al.*, 2018). Crop diversification can also lead to conservation of soils and the environment (Ogundari, 2013) as well as serve as an important climate risk management strategy in many drought-prone regions of Sub Saharan Africa (Ignaciuk *et al.*, 2017).

Furthermore, diversification yields economic benefits, which include seasonal stabilisation of farm income to meet other basic needs of life like education, coverage of subsistence needs, most especially meeting family food security; and a reduction of risk of the overall farm returns (Ogundari, 2013; Khanam *et al.*, 2018).

Social benefits of diversification include seasonal employment for farm workers (Ogundari, 2013). In addition, the adoption of crop diversification in combination with minimum tillage results in greater increases in food security (Waha *et al.*, 2018; Kassie *et al.*, 2015) and reduction in downside risk (Kassie *et al.*, 2015). Further, a study by Waha *et al.* (2018) demonstrated that diversification will have an essential role to play in stabilising food production in Africa.

A review of the available literature revealed a knowledge gap on the reasons why crop diversification was not being adopted by many settler farmers in resettlement schemes. The main reason for the gap was that none of the studies which were reviewed focused crop diversification at resettlement schemes. For instance, Kay (1965) focused on the role of resettlement schemes in poverty alleviation, Buumba (2013) investigated the impact of resettlement schemes on the livelihood of Zambians with a focus on Lukanga North Resettlement Scheme in Central Province, while Hichilema (1998) focused on the role of voluntary resettlement schemes in combating rural unemployment, poverty and under-development. Further, Adams (1983)

examined the advantages and disadvantages of participation in a planned agricultural settlement from the viewpoint of the farmers.

In view of the above, this study was undertaken to establish why settlers in resettlement schemes, have not diversified their crop production despite all the benefits associated with diversification. An understanding of the major reasons for this scenario would assist in suggesting ways of enhancing crop diversification in these schemes. In addition, the study will provide an opportunity to generate additional knowledge and information on crop diversification as it relates to resettlement schemes in Zambia.

The study will also provide an opportunity for future researchers to interrogate the subject of diversification in resettlement schemes from other angles and suggest improvements to this study as well as propose other possible solutions to the problem being investigated. In this regard, future research may focus on establishing why many resettlement schemes have remained less productive in spite of possible solutions such as crop diversification. Such a study would assist in coming up with policy and other recommendations on how to enhance productivity in these areas as well as support decision making on the form and function of the Resettlement Programme and its contribution to rural development, job creation and poverty reduction.

1.8 Scope of the study

This study was conducted in Chongwe District of Lusaka Province, with a focus on Kasenga Resettlement Scheme. The choice of Kasenga Resettlement Scheme as the study area was mainly driven by the fact that it was one of the oldest and most active schemes in the country. It was also within the working area of the researcher and was cheaper to study due to its ease of access and proximity to Lusaka.

The study also involved resettlement and agricultural experts from Lusaka Provincial Administration, Chongwe District, an agricultural training institution and local resettlement staff in Chongwe District.

CHAPTER 2

LITERATURE REVIEW

2.1 State of Agriculture in Resettlement Schemes

Agriculture may be seen as a foundation upon which all regions of the world may develop a diverse and modern economy. This is true for Africa where close to 70% of the population is involved in agriculture as smallholder farmers operating on an average of less than 2 hectares of land. In this regard, agriculture is considered as a surest way for growing inclusive economies and creating decent jobs mainly for the youth (Alliance for a Green Revolution in Africa, 2017). Smallholder farms across the continent of Africa produce about 30 per cent of total agricultural output, while larger farmers operating on 4–20 hectares of land produce approximately 50 per cent (Herrero *et al.*, 2017). As in Green Revolution Asia, many of these small farms have the potential to contribute to a successful agricultural revolution in Africa, one that is employment intensive and pro-poor (Alliance for a Green Revolution in Africa, 2017).

Similarly, the agricultural sector is a major development component of Zambia's economy catering for about 95 per cent of rural households, which translates to about 45 per cent of the total population (4.6 million poor people) that is entirely dependent on agriculture (Libanda *et al.*, 2016). Zambia's agriculture agricultural sector can be disaggregated into three broad categories of farmers namely, smallholders (small scale farmers), medium and large scale (commercial farmers). The smallholder farmers are in the majority and are mainly producers of staple crops especially maize with an occasional marketable surplus. The medium and large-scale farmers constitute a small percentage of the farming community and they produce various crops for both the local and export market (Chapoto and Chisanga, 2016).

Small scale mono-cropping farmers dominate Zambia's farming sector (Libanda *et al.*, 2016; Hichaambwa and Mofya-Mukuka, 2016) as 82 per cent of the country's small scale farmers grow maize, while 72.7 per cent of these small-scale farming households cultivate less than two hectares of crops (UNDP, 2013). It is also estimated that between a quarter to a third of the total number of farming families live within 10 kilometres of the railway line which makes it convenient for produce transportation (Libanda *et al.*, 2016).

Trends have shown increases in more profitable, drought resistant food crops such as sorghum, cassava, millet and tubers that use less chemical fertilizer, although over 70 per cent of households still grow maize as the major staple crop. Small-scale farmers account for a larger share of the maize production, which is more than 60 per cent of Zambia's cultivated area, but they generally lack access to irrigation facilities and therefore, their production is largely rain-fed, making the country extremely vulnerable to swings in the pattern of rainfall every year (Libanda *et al.*, 2016; UNDP, 2013). In addition UNDP (2013) observed that farming had been concentrated in staple food crops with minimal export value.

According to Department of Resettlement (2018b), the Office of the Vice President runs a total of 90 resettlement schemes across the country. The schemes cover approximately over 820,400 hectares of land, with a total of about 46,685 farms. Kasenga Resettlement Scheme, which is the study area, is one of the oldest schemes, established in 1992.

Since their establishment, resettlement schemes in Zambia have been involved in the production of various types of crops and livestock, with maize being the main crop. Other crops include cotton, cassava, soya beans, millet, sorghum, velvet beans, mixed beans, sweet potatoes, paprika, rice, cow peas, vegetables (pumpkin leaves, tomato, rape, cucumber, okra, egg plants, onions, impwa and cabbage), sun-hemp, Bambara nuts, tobacco, Irish potatoes, oranges, lemons, pawpaw, avocado, mango, guavas and pineapples. In addition, some resettlement schemes are engaged in fish farming and beekeeping, while others are engaged in the production of livestock namely cattle, goats, sheep, broiler chickens, donkeys, sheep, pigs, free range chickens, local (village) chickens, layers and ducks at varying scales (Department of Resettlement, 2014).

The study area, Kasenga Resettlement Scheme, is one of the most active, producing various types of crops including maize, sweet potatoes, cassava, velvet beans, groundnuts and vegetables such as tomatoes, rape and pumpkin leaves. In addition, the scheme produces various types of livestock, which include free-range chickens, pigs, goats, cattle and donkeys (Department of Resettlement, 2018b). However, one information gap identified was that apart from reports by the Department of Resettlement (such as Department of Resettlement, 2018a), which provide crop and livestock production figures for some of the resettlement schemes, no single study was found which provided comprehensive production and productivity data for all the schemes.

In an effort to boost crop and livestock production, the Zambian Government has over the years been pursuing various diversification programmes (Ministry of Agriculture and Cooperatives, 2004; GRZ, 2006; Bonaglia, 2008; Ministry of Finance, 2014; Ministry of National Development Planning, 2017). Despite these and other efforts, Mwanamwenge and Cook (2019) observed that crop diversification has remained low, with maize being the main crop.

2.1.1 Dominant form of agricultural activity

Africa is dominated by family agriculture with farms dependent mainly on family farm labour. Although statistics on family agriculture are difficult to acquire, the fact that the vast majority of small farms are family-run gives an idea of the importance of this phenomenon (Blein *et al.*, 2013). Maize is a major staple food crop grown in diverse agro-ecological zones and farming systems in sub-Saharan Africa. It occupies more than 33 million hectares of sub-Saharan Africa's estimated 200 million hectares of cultivated land, with the top 20 countries, namely South Africa, Nigeria, Ethiopia, Tanzania, Malawi, Kenya, Zambia, Uganda, Ghana, Mozambique, Cameroon, Mali, Burkina Faso, Benin, DRC, Angola, Zimbabwe, Togo, and Cote d'Ivoire, accounting for 96 per cent of the total maize production in sub Saharan Africa. Sorghum is the second most important cereal after maize with 22 per cent of total cereal area, followed by pearl and finger millet, with 19 per cent of the total cereal land coverage. Other cereals of importance are rice and wheat (Macauley, 2015).

Similarly, Zambia's agriculture sector provides the main support for the rural economy based on the fact that about 49 per cent of the Zambian population depends on agriculture, primarily through smallholder production for their livelihoods and employment (Central Statistical Office, 2014). According to World Bank (2016), the agricultural sector contributed 8.5 per cent to Zambia's Gross Domestic Product (GDP) and approximately 9.6 per cent of national export earnings in 2015.

In addition, less than three million hectares of Zambia's land are regularly cultivated and this is done mainly by small scale farmers under rain-fed conditions, using extensive techniques such as hand hoeing or limited animal draft power, and operating under traditional tenure systems. Almost all smallholder farmers grow some maize and almost all maize (90 per cent) is grown by this category of farmers. Further, maize is grown in every province of Zambia, although the most suitable are the Southern, Lusaka, Central and Eastern Provinces because of their milder climate

and better rainfall (Gray and Kohl, 2016). Apart from being the major maize producing belts, agro-ecological region I and II are also the major livestock producing regions in the country (UNDP, 2013).

Overall, maize, cassava, millet, wheat, sorghum and rice are the dominant crops produced in Zambia, while groundnuts, sweet potatoes and cotton are other emerging crops that are increasingly being grown (UNDP, 2013).

Despite efforts by the Zambian Government in the production of maize, the country continues to battle with low and variable maize productivity oscillating around 2 tons per hectare, as affected by drought, in comparison with a worldwide average of 5.5 tonnes (Chamberlin *et al.*, 2014). In addition, Zambian small-scale farmers generally lack access to irrigation facilities and therefore, their production is largely rain-fed (UNDP, 2013), making them vulnerable to swings in the pattern of rainfall every year (UNDP, 2013; Chibinga *et al.*, 2012).

2.1.2. Types of Agricultural Diversification

The concept of diversification has been understood differently by different people. For instance, Waha *et al.* (2018) argue that farm diversification implies primarily activities in the agricultural sphere and is located within the farm, while diversification of activities refers to income diversification coming from activities undertaken inside and outside the farm. Mithiya *et al.* (2018) argue that crop diversification as a concept and tool is a strategy to maximise the use of land, water, and other resources for the overall agricultural development and it provides the farmers with viable options to grow different crops on their land around the year. Further, according to Hichaambwa and Mofya-Mukuka, (2016), crop diversification may be seen as the growing of two or more crops on a piece of land by a farmer.

The Ministry of Agriculture and Ministry of Fisheries and Livestock, (2016) considers crop diversification as a shift from the dominance of one crop to production of a number of crops. In the same vein, agricultural diversification will be considered as a shift from crop dominance to include livestock and fisheries production. Considering that Zambia's agriculture sector is dominated by maize (UNDP, 2013; Libanda *et al.*, 2016; Department of Resettlement, 2014; Macauley, 2015; Gray and Kohl, 2016) crop diversification may be considered as a shift from dominance by maize.

In addition, farm diversification may be considered as a spontaneous response to avoid uncertainties. The uncertainties most farmers face are mainly climatic factors, pests and diseases, price uncertainties and policies related to agricultural production, marketing and trade (Mithiya *et al.*, 2018).

Further, agricultural diversification is practiced with a view to avoiding risk and uncertainty due to climatic change (Hichaambwa and Mofya-Mukuka, 2016; Mithiya *et al.*, 2018) as well as biological changes (Mithiya *et al.*, 2018). It minimises the adverse effects of the current system of crop specialisation and monoculture for better resource use, nutrient recycling, reduction of risks and uncertainty and better soil conditions. It also provides better economic viability with value-added products and improvement of ecology (Mithiya *et al.*, 2018).

Diversification may be influenced by micro level variables which may include the form of farm organisation, technological and policy changes, geographical location, labour, experience of farmers, wealth of farmers and agricultural insurance. In addition, policy instruments designed to increase food security and to manage the environment and other resources in a sustainable manner rather than to maximize short-term farm profit may also influence diversification (Culas and Mahendrarajah, 2005).

A study by Aheibam *et al.* (2017) to identify the determinants and extent of crop diversification at household level in Ukhrul District of India, revealed that education of the household head, the farming experience of a farmer, access to farming implements like a plough and access to fertilizer and availability of irrigation facilities showed a positive effect on propensity to diversify crops. Furthermore, exposure to farming information, regular agricultural training and distance to the nearest market from the homestead also positively affected crop diversification at household level.

Further, a study conducted by Sichoongwe *et al.*, (2014) in the Southern Province of Zambia revealed that landholding size, distance to the market, quantities of fertilizer, tillage time, age of the household head, level of education of the household head, number of extension visits the farmer received, availability of tractor hiring services, returns from crop production, condition of the roads and tillage using a plough significantly affected crop diversification.

Furthermore, crop diversification is influenced by infrastructure development (Debbasis *et al.*, 2018; Goletti, 2017), technology adoption, relative income and resource endowments (on the supply side) and the size of the urban population and per capita income (on the demand-side), as well as a climatic variable, namely rainfall (Debasis *et al.*, 2018). Other factors influencing crop diversification are investments in well-trained human capital, research (Goletti, 2017) and extension work (Hichaambwa and Mofya-Mukuka, 2016; Goletti, 2017).

2.2 Reasons for Current State of Agriculture

Literature has shown that agriculture in Zambia is largely driven by the prevailing agricultural policy. As observed by Chapoto, *et al.* (2015) and Indaba Agricultural Policy Research Institute (2016), Zambia has since 2002 been spending up to as much as 50 per cent of the agricultural sector budget for input subsidies, mainly aimed at the production and marketing of maize through the Farmer Input Support Programme – FISP. Similarly, Indaba Agricultural Policy Research Institute (2016) observes that 98 per cent of the agriculture budget continued to be spent on FISP and the Food Reserve Agency (FRA) alone. As observed by Greenberg *et al.* (2015), the FRA market structure is focused on maize.

According to Indaba Agricultural Policy Research Institute (2016), the heavy spending on FISP and FRA has left few resources to invest in other well recognised drivers of agricultural growth, and stifled diversification as the country's policies have continued to be maize-centric. In addition, Mwanamwenge and Cook (2019) observe that only a mere 0.25% of the overall budget is allocated to crop diversification and that the already limited budget reserved for research and development for crop diversification in the national budget was removed in 2017 and subsequent years.

According to Zulu *et al.* (2016), the maize-centric policies that have been pursued in Zambia, under different guises of devoting most efforts and resources to input and consumer subsidies have failed. In addition, inadequacy of human and physical assets, lack of institutional and technological resources and poor policy and coordination capacities especially among small scale farmers have also contributed to Zambia's failure to transform its agricultural sector.

Further, the current agricultural policies have failed to achieve broad based poverty reduction and productivity growth as they have largely been responsible for constraining growth by under-funding investments in key agricultural growth drivers that can benefit all rural people, such as rural infrastructure (roads, rail, and telecommunication), agricultural research and development, market information, irrigation, institutions that foster the development of effective markets and complementary services such as agricultural extension and credit (Zulu *et al.*, 2016).

Furthermore, challenges in implementing the recently introduced e-FISP, which was aimed at providing a wider choice of inputs for farmers under the Farmer Input Support Programme (FISP), led to Government partially reversing its commitment to fully shift to the electronic vouchers during the 2018/2019 agricultural season. In this process, Government reverted at least 40% of recipients back to the conventional FISP, providing fertiliser and maize seed only (Kuteya, *et al.*, 2019).

2.3 Reasons for lack of crop diversification

Studies have shown a number of barriers to crop diversification (Aheibam *et al.*, 2017). For instance, Ignaciuk *et al.* (2017) identified limited development of the input and output market and insufficient extension support for non-staple food crops as some of the commonest barriers to crop diversification. The study further argued that poor households were resistant to diverting their scarce land from staple food production to other crops perceived to be risky.

In addition, changing consumer demands or changes in government policy can affect the uptake of crop diversification (Ashfaq *et al.*, 2008). For instance, subsidies on maize seeds may distort maize seed prices and inadvertently encourage smallholder farmers adopt maize mono-cropping systems (Maggio *et al.*, 2018).

Further, Dube *et al.* (2016) argued that the main constraints to crop diversification included: (i) complete dependence on rainfall for cropping; (ii) sub-optimal and over-use of resources causing a negative impact on environment and sustainability of agriculture; (iii) insufficient supply of seeds and plants of improved cultivars; (iv) highly fragmented land holdings that are less favourable to modernisation and mechanisation of agriculture; (v) lack of basic infrastructure like rural roads, power supply, transportation and communications; (vi) inadequate post-harvest technologies and infrastructure for post-harvest handling of perishable horticultural produce;

(vii) weak agro-based industry; (viii) feeble research - extension - farmer linkages; (ix) untrained human capital together with persistent and large scale illiteracy amongst farmers; (x) host of diseases and pests affecting most crop plants; (xi) poor database for horticultural crops; and (xii) decreased investments in the agricultural sector over the years.

While rainfall is a strong driver and rainfall variability is a good measure for identifying areas with high diversification potential, it is not the only factor under current and future climate. Households might still be limited in their ability to diversify because of unfavourable soils, labour, input and land constraints or because of their remote location, which may limit their access to extension services that provide support for new crops or crop management techniques (Waha *et al*, 2018).

A study conducted in Zambia, Malawi and Mozambique on cropping system diversification in Eastern and Southern Africa, revealed that land size was a critical determinant of crop diversification. For instance, farmers that lacked sufficient land often prioritised staple food production, at the expense of other crops (Maggio *et al*, (2018). Similarly, Hichaambwa and Mofya-Mukuka (2016) established that land size and farm assets at the start of the season are key determinants of crop diversification.

Access to markets has been identified as one of the drivers of crop diversification (Hichaambwa and Mofya-Mukuka, 2016; Dube and Guveya, 2016). Furthermore, a study conducted in Manicaland and Masvingo Provinces of Zimbabwe revealed that the gender of the household head, education level, number of livestock units, access to irrigation, membership to a farmers group, farming experience, flatness of the farm, farmer to farm extension, routine extension, agro ecological zone and household income were key determinants of crop diversification (Dube and Guveya, 2016).

2.4 Enhancing Diversification in Resettlement Schemes

Studies have suggested a number of interventions that may be employed to enhance crop diversification. One intervention identified by Food and Agriculture Organisation of the United Nations (2018) is climate smart agriculture, which seeks ways to help farmers adapt to a changing climate through agricultural practices that can withstand climate change. Although climate smart agriculture cannot be universally applied, its three pillars, which are: to sustainably

increase agricultural productivity and improve the incomes and livelihoods of farmers; to build resilience and adaptation to climate change; and to reduce and/or remove greenhouse gas emissions, are applicable.

Other studies (Sichoongwe *et al.*, 2014; Mesfin *et al.*, 2011), proposed a number of possible interventions to enhance crop diversification. According to these studies, diversification may be driven by: (i) increased demand for high value crops causing a shift from cereals; (ii) development of roads; and (iii) technology absorption among farmers. Therefore, for diversification to succeed, government should provide financial resources, guidance and training to attract farmers towards the cultivation of high value crops. In addition, studies by Mesfin, *et al.* (2011) and Sichoongwe *et al.* (2014) revealed that crop diversification has a positive relationship with possession of farm implements and machinery by a farmer.

Further, a study by Kumar and Chatto-padhyay (2010) revealed that policies directed towards the expansion of infrastructure like road networks, marketing and storage facilities were important preconditions for crop diversification. Similarly, Sichoongwe *et al.* (2014), observed that while farmers closer to markets will diversify for commercial purposes, farmers farther away are likely to diversify for food security purposes due to higher transport costs in accessing market incentives if they are to diversify for commercial purposes.

Further, studies have shown that access to, and control over land among small holder farmers is important in promoting crop diversification among small holder farmers (Sichoongwe *et al.*, 2014; Maggio *et al.*, 2018). In addition, land policy reforms that limit speculative land acquisitions by people outside of the farming sector and enable productive and successful smallholders to grow and consolidate land holdings are important drivers of crop diversification (Maggio *et al.*, 2018).

Further, Ignaciuk *et al.*, (2017) argue that providing extension services as well as information focusing on the benefits related crop diversification is a crucial intervention for boosting diversification efforts. In addition, targeting the poorest farmers living in the harshest climate with safety net programmes and other strategies to increase their capacity to diversify increases the effectiveness of public policies to promote welfare gains among the poor and strengthens climate resilience at the farm level and beyond. To maximise the benefits of crop diversification,

policies should aim to promote diversification among low income households, without limiting incentives to specialisation for larger, better capitalised farms.

Providing infrastructure and supporting investments in input and output markets is also necessary to stimulate crop diversification (Ignaciuk *et al.*, 2017; Maggio *et al.*, 2018). This can be done by removing barriers for small and medium sized enterprises to expand market services in poor areas and to engage in input supply and crop purchases for a wide range of farm products. This may include financing options for these firms, as well as facilitating domestic, regional, and international market access (Ignaciuk *et al.*, 2017).

Government can also enhance diversification by rethinking public intervention through reforms to parastatal market boards, including expanding the types of crops purchased and decreasing the market presence of these institutions. Input subsidy policies must also be closely examined in the context of a diversification policy agenda. For instance, subsidies on maize seeds may distort maize seed prices, and inadvertently encourage smallholder farmers adopt maize mono-cropping systems (Maggio *et al.*, 2018).

In addition, as observed by Zulu *et al.* (2016), Government should encourage the commercialisation of crops through the use of incentives and policies to stimulate the private sector to invest in high yield technologies. In Zambia, increasing yields in traditional crops, especially grains, is critical but not sufficient. Therefore, there is an urgent need to shift away from maize-centric policies to those that encourage farmers to diversify to crops that have higher earnings per hectare.

Figure 1 below shows the conceptual framework underpinning the study, derived from literature review.

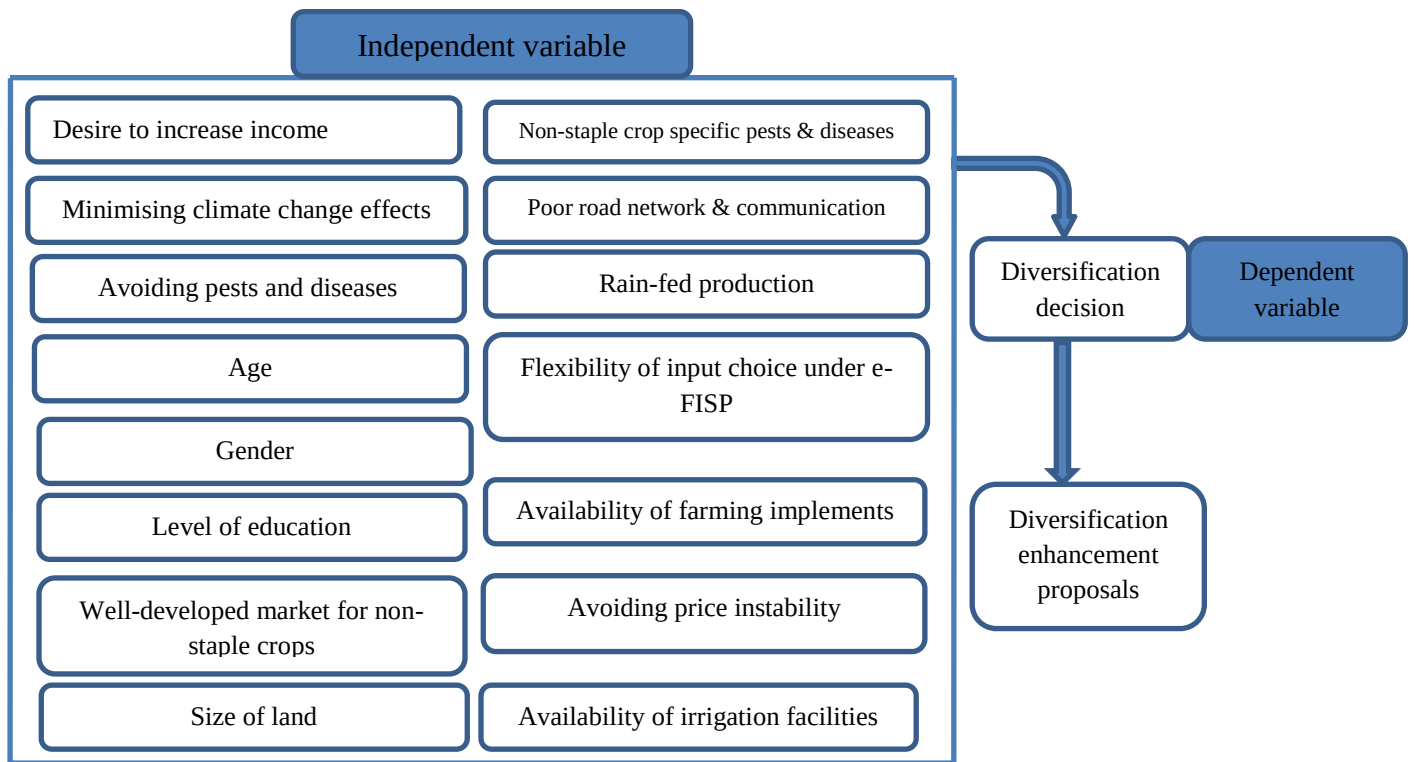


Figure 1: Conceptual framework underpinning the study

CHAPTER 3

METHODOLOGY

This chapter explains the methodology used in undertaking this study. It covers the research paradigm, research design, population and sampling, research instruments, data collection procedures, data analysis and ethical considerations.

3.1 Research design

This study was exploratory owing to the fact that the subject of crop diversification in resettlement schemes in Zambia is not well researched. As observed by Akhtar (2016), an exploratory study is driven by the fact that there are few or no earlier studies or research to which reference can be made for information. In addition, exploratory studies focus on gaining insights and familiarity with the subject area for more rigorous investigation later.

The research design for this study was predominantly qualitative, which, as argued by Cresswell (2014), emphasises on exploring and understanding the meaning which a person or group of people ascribe to a social or human problem. Further, in order to carry out any kind of research that uses either part or all qualitative methods, it is important to consider the philosophical assumptions namely ontology and epistemology, to determine the nature of objectives, population and sampling, data collection and data analysis techniques. Ontological assumptions relate to the nature of reality and its characteristics, while epistemological assumptions relate to how researchers know what they know (Cresswell, 2012). The choice of the qualitative research design for this study was, therefore, influenced by the fact that knowledge on crop diversification exists in multiple realities.

The study involved a combination of the theoretical paradigms of post-positivism and pragmatism. This was because, as argued by Cresswell (2012), post-positivism embraces the idea of multiple realities and reports on these multiple realities by exploring multiple forms of evidence from different individuals' perspectives and experiences. In practice, it involves: inquiry in logically related steps; multiple perspectives from participants as opposed to single reality; rigorous data collection and analysis; and use of computer programmes.

The theoretical framework that guided the study was constructivism in that knowledge and attitudes are socially constructed rather than biologically determined as observed by Bryant *et al.* (2013). Therefore, to obtain information on both single and multiple realities, the study utilised a combination of survey questionnaires and in-depth interviews to address research questions. While applying pragmatism, this study made use of multiple methods to answer questions and address the research problem as highlighted by Cresswell (2012). As a research paradigm, pragmatism orients itself towards solving practical problems in the real world, having emerged as a method of inquiry for more practical-minded researchers (Creswell and Clark, 2011).

The Research Design Matrix (Appendix II below) was used to summarise the research techniques, or what the researcher intended to do in the investigation, allowing for the imposition of a logic from the beginning of the planning process.

3.2 Population and Sample

To undertake this study, a sample size of 180 settler farmers was selected through simple random sampling, from a study population of 324, which constituted the list of all the farms at Kasenga Resettlement Scheme. The decision to use a questionnaire for this study was influenced by a number of reasons. Firstly, the size of the population was large and required sampling. This is in line with Rowley (2014), who argues that questionnaires are typically used in survey situations, where the purpose is to collect data from a relatively large number of people, ranging from 100 to 1,000. Therefore, as argued by Taherdoost (2016), sampling is necessary because the researcher may not be in a position to collect data from all cases to answer the research questions.

Secondly, the Kasenga Resettlement Scheme population had a finite number of elements that could be listed or mapped and each element of the population had an equal chance of being selected in the sample. In addition, each element (household or farm) was mutually exclusive, implying that it could be distinguished from others and did not have any overlapping characteristics, in line with Alvi (2016) and Sharma (2017). In addition, the decision to select a sample assisted in reducing the time and resources by avoiding the analysis of the entire population as observed by Rowley (2014).

To complement the findings from questionnaires, 5 participants selected by expert sampling, a form of purposive or judgemental sampling (Etikan *et al.*, 2016), were interviewed during the in-depth interviews to understand the multiple realities relating to the study. The five experts were drawn from the Department of Resettlement Headquarters under the Office of the Vice President, Lusaka Provincial Agricultural Office, Chongwe District Agricultural Office, the Resettlement Office at a scheme in Chongwe District and an agricultural training institution in Chongwe District. Expert sampling was adopted for selection of the five experts interviewed in this study as it involved the inclusion of experts in a particular field in a study and was a positive tool to use when investigating new areas of research, to garner whether or not further study would be worth the effort (Etikan *et al.*, 2016; Etikan and Kabiru, 2017).

The adoption of expert sampling for this study was therefore, aimed at ensuring that only participants who were able to provide particular information were selected in line with Etikan and Kabiru, (2017), who argue that purposive or judgmental sampling is a strategy, which allows particular settings, persons or events to be deliberately selected during research in order to provide important information that cannot be obtained from other choices.

3.3 Determination of sample size

The sample size for this study was selected on the basis of Yamane (1967), using the formula below:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size

N = population size

e = level of precision or error

The population size of Kasenga Resettlement Scheme is 324 farms or households (Department of Resettlement, 2014) and the margin of error or the level of precision to be used was 5%. According to Taherdoost (2017), the level of precision or margin of error is the risk the

researcher is willing to accept. In social research, a 5% [which is equivalent to $5/100 = 0.05$] margin of error is acceptable.

This implies that the sample size = $324/(1 + 324(0.05)^2) = 179.01$ households or farms. Therefore, based on the above answer, a decision was made to interview 180 settler farmers using the survey questionnaires.

The above sample size is adequate to allow for generalised conclusions about crop diversification at Kasenga Resettlement Scheme, in line with Musuku and Singh (2014), who argue that the sample size should be carefully fixed so that it will be adequate to draw valid and generalised conclusions.

3.4 Data Collection

Data collection was done using in-depth interviews of 5 experts and administration of a survey questionnaire (at Appendix III below), comprising of questions from constructs in literature review. Survey questionnaires were administered to 180 settler farmers to address the relevant objectives as outlined in the Research Design Matrix. The questionnaires were self-administered or researcher administered depending on the literacy abilities of the respondent. In-depth interviews were conducted to solicit views of experts on the subject of crop diversification in greater detail as well as to find practical solutions to the problem at hand.

In-depth interviews were utilised to collect data in this study because they allow researchers to obtain detailed information that sheds light on an individual's perspective, experiences, feelings, and the derived meaning about a particular topic or issue. (Rutledge and Hogg, 2020). In addition, in-depth interviews are generally preferable when it is possible to identify people who are in key positions to understand a situation (Rowley, 2014).

Prior to data collection, the study questionnaire was tested by being administered to ten (10) respondents. As observed by Canals (2017), many of the possible obstacles with data collection can be avoided by running a pilot on a small number of respondents with the data collection tools the researcher intends to use. The test run assists in the identification of unforeseen problems and allows changing any questions or tasks that are unproductive.

In line with this, the test run allowed for adjustment of questions that were perceived to be too personal, as well as those found to be ambiguous and redundant. It also assisted in reducing the length of the questionnaire to make it admissible within a few minutes.

3.5 Data Analysis

Data collected through the survey questionnaires were analysed through SPSS version 20 by application of descriptive statistics namely, frequencies, percentages and Spearman's rank-order correlation. Data collected through in-depth interviews were analysed using thematic content analysis.

3.6 Ethical Considerations

This research, although using anonymous questionnaires utilised personal data that may be used to identify and bind an individual to an event or transaction. In addition, the study involved in-depth interviews with identifiable individual experts. Therefore, in order to avoid hurting the respondents in the conduct of this research, guidance was first sought from the University of Zambia Ethics Committee (see Ethical Clearance Approval Letter at Appendix I).

In ensuring that the study did not infringe upon the privacy of any of the individuals interviewed, consent was obtained from them before proceeding with administering the questionnaire as well as conducting the in-depth interviews. In addition, the research instruments used were designed in such a way that they did not require the respondent to be identified. As such, all human identifiable information collected was treated with utmost care and confidentiality and participants were made to understand that the data collected from them shall be used for research purposes only.

CHAPTER 4

FINDINGS

The study established that most settlers at Kasenga Resettlement Scheme focused on maize production and rearing of local chickens and that very few farmers were diversifying their production. The main driver of this state of agriculture was that most farming at Kasenga was rain-fed, with most farmers using manual labour. In addition, the continued dominance of maize was fuelled by the prevailing agricultural policies, which favoured maize production and marketing at the expense of other crops. Further, the study showed that the desire by farmers to increase their income as well as to address effects of climate change were the main drivers of crop diversification.

Conversely, the study established that crop diversification was hindered by a number of factors including easy access to fertilizer and other inputs for maize production, poor road network as well as pests and diseases affecting non-staple crops. To address the hindrances to crop diversification, the study presents a number of proposals, which include: a review of policy to provide more focus on crop diversification; provision of diversification-focused extension services; sharing of nutrition information on other foods or crops to create a demand for them; and improvement of the road network to the schemes in order to allow for easy movement of inputs and produce to the farms and market, respectively.

In presenting the findings of this study, research questions are used as thematic areas, while their respective objectives represent sub-themes. It is worth noting that each variable in the questionnaire was independent from the other and therefore considered out of 100 percent. This implies that all the variables together would not necessarily add up to 100 percent.

4.1 State of agriculture in resettlement schemes

The first research question, “What is the state of agriculture in resettlement schemes?” was answered through the objective, “To describe the state of agriculture in resettlement schemes.” In order to answer this question, survey questionnaires were utilised and findings are detailed below.

4.1.1 Crop Production

The study revealed that crop production at Kasenga Resettlement Scheme was dominated by maize, which accounted for 97.8% of the settlers interviewed. In addition, 38.9% of those interviewed produced groundnuts, while 31.1% produced pumpkin leaves (locally known as *chibwabwa*) as main crops besides maize. A further 30 % produced sweet potatoes, 27.2 % produced mango, 21.1 % produced lemon, while 19.4 % produced cassava as main crops besides maize (See Figure 2 below for further details).

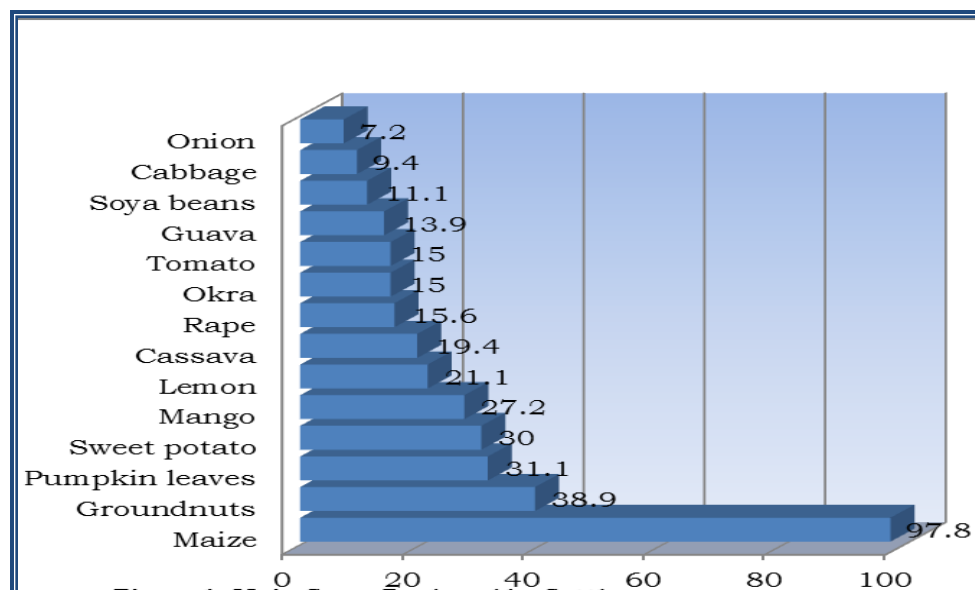


Figure 2: Main crops produced by settler farmers

While many farmers at Kasenga Resettlement Scheme produced more than one crop, the above results show clear dominance by maize as the main crop.

4.1.2 Livestock Production

With regard to livestock production, most settlers at Kasenga Resettlement Scheme (64.3%) produced local (village) chickens, while 47.1% reared goats as their main livestock. Further, 34.6% kept cattle, while 23.6 % kept ducks. Clearly, local (village) chickens are the most dominant form of livestock at the scheme (See figure 3 below).

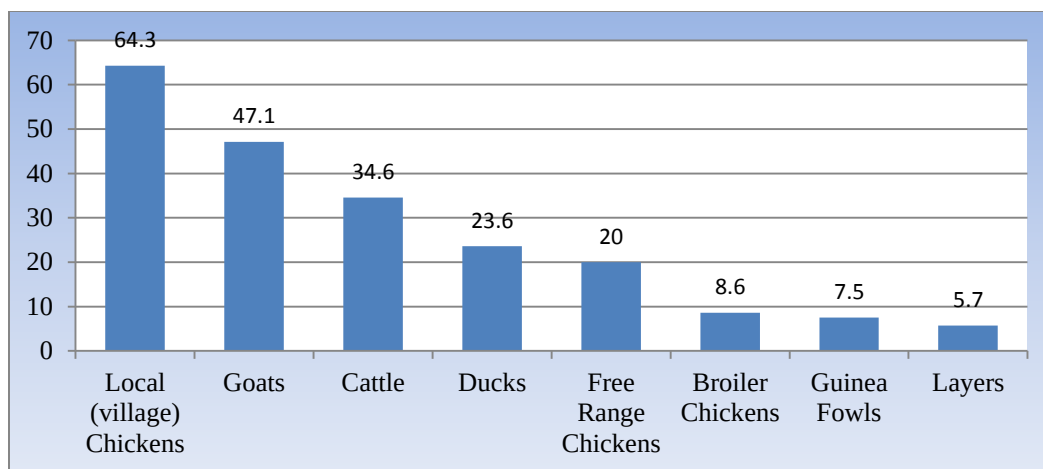


Figure 3: Main livestock kept by settler farmers

4.1.3 Status of diversification

This study revealed that 58.9% of the farmers at Kasenga Resettlement Scheme did not diversify their crops, while only 41.1% diversified. Similarly, 67% of the farmers interviewed did not diversify their livestock production, while only 33% diversified (See figures 4 and 5).

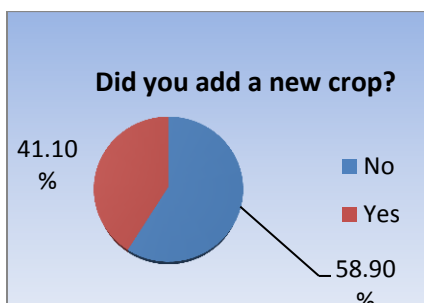


Figure4: Status of crop diversification

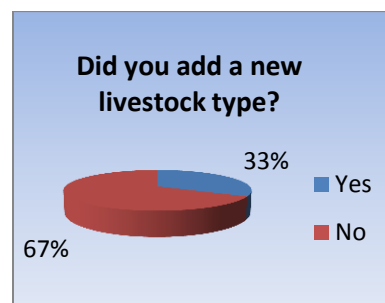


Figure5: Status of livestock diversification

Further, a Spearman's rank-order correlation, which was run to determine the relationship between 180 settler farmers' gender, age, farm size, level of education, whether the farmer had done some agricultural training or not, whether farmers had added a new crop or a new livestock type revealed the results shown in Table 1 below.

Table 1: Spearman's Rank-order Correlation Results

			Gender	Age	Farm size	Level of Education	Has the farmer done some agricultural training?	Did the farmer add new livestock?	Did the farmer add a new crop?
Spearman's rho	Gender	Correlation Coefficient	1.000	-.028	-.053	-.238**	.139	-.016	-.080
		Sig. (2-tailed)	.	.710	.478	.002	.070	.828	.288
		N	180	177	179	167	172	180	180
	Age	Correlation Coefficient	-.028	1.000	.180*	.008	-.017	-.112	.008
		Sig. (2-tailed)	.710	.	.017	.921	.827	.139	.914
		N	177	177	176	164	169	177	177
	Farm size	Correlation Coefficient	-.053	.180*	1.000	.050	-.136	.059	.024
		Sig. (2-tailed)	.478	.017	.	.525	.076	.431	.752
		N	179	176	179	166	171	179	179
	Level of Education	Correlation Coefficient	-.238**	.008	.050	1.000	-.161*	-.055	-.020
		Sig. (2-tailed)	.002	.921	.525	.	.043	.478	.794
		N	167	164	166	167	159	167	167
	Has the farmer done some agricultural training?	Correlation Coefficient	.139	-.017	-.136	-.161*	1.000	-.052	-.198**
		Sig. (2-tailed)	.070	.827	.076	.043	.	.501	.009
		N	172	169	171	159	172	172	172
	Did the farmer add new livestock?	Correlation Coefficient	-.016	-.112	.059	-.055	-.052	1.000	.403**
		Sig. (2-tailed)	.828	.139	.431	.478	.501	.	.000
		N	180	177	179	167	172	180	180
	Did the farmer add a new crop?	Correlation Coefficient	-.080	.008	.024	-.020	-.198**	.403**	1.000
		Sig. (2-tailed)	.288	.914	.752	.794	.009	.000	.
		N	180	177	179	167	172	180	180

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

The Spearman's rank-order correlation test revealed a moderate positive correlation between the farmer adding a new crop and adding a new livestock type, which was statistically significant ($r_s = .403, p = .000$). This result implies that those farmers who added a new crop were likely to add a new livestock type and vice versa. However, No relationship was found between the farmer's age, gender and addition of a new crop or livestock type. Further, the sex (or gender) of the settler farmer showed no relationship with addition of a new crop or livestock type.

The Spearman's rank-order correlation test also revealed a weak negative correlation between the farmer undertaking some agricultural training and adding a new crop type, which was statistically significant ($r_s = -.198, p = .009$).

4.2 Factors driving the current state of agriculture

The second research question, "Why is agriculture in its current state?" was addressed through the objective, "To establish reasons for the current state of agriculture in resettlement schemes." Since the research question had a realist and nominalist ontology, survey questionnaires and in-depth interviews were employed and findings are detailed below.

4.2.1 Factors affecting the current state of agriculture: study questionnaire results

The study questionnaire revealed the results summarised in Figure 6 below.

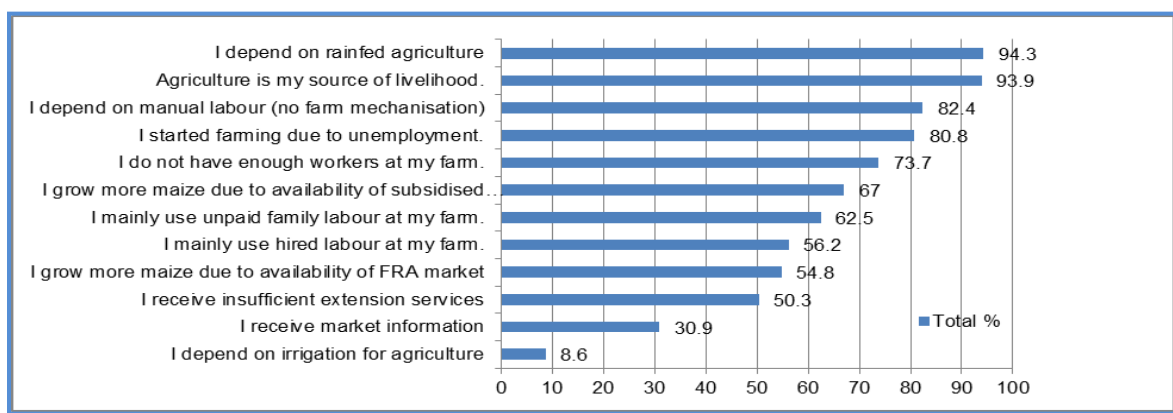


Figure 6: Factors driving the current state of agriculture

It is clear from Figure 6 above that agriculture at Kasenga Resettlement Scheme is in its current state because most settlers, accounting for 94.3% of the respondents depend on rainfall for agriculture, while 93.9% depend on agriculture as a source of livelihood. Other factors influencing the current state of agriculture include availability of subsidised inputs for maize

production, which accounted for 67% of the respondents and availability of market by the Food Reserve Agency (FRA), which accounted for 54.8%. Poor extension services accounted for 50.3% of respondents, while only 8.6% of the respondents employ irrigation for agriculture.

In addition, the lack of farm mechanisation, which accounted for 82.4% of the respondents, had an effect on the state of agriculture as it limited the type of crops a farmer could produce.

4.2.2 Factors influencing the current state of agriculture: in-depth interview results

The in-depth interviews revealed a number of factors, which were responsible for influencing the current state of agriculture. The most important factor identified was that the prevailing agricultural policies were biased towards maize production in the country. As a result, farmers on the regular Farmer Input Support Programme (FISP) were not diversifying because the input package focused on maize production. In addition, maize market is available throughout the year, a situation that has promoted maize production above other crops.

Other factors included: lack of value addition even for well-known crops, which had ready market; many settlers did not take farming as a business; poor information flow, which affected the uptake of other crops by small holder farmers; very few farmers were engaged in organic farming due to lack of knowledge; and money for buying inputs for other crops was difficult to find. The interviews also revealed that farmers on the electronic Farmer Input Support Programme (e-FISP) had a higher chance of diversifying as the programme included inputs for more crops and not just maize, as was the case with those who were receiving inputs through the Food Security Pack (FSP), which equally had a wider choice of crops with accompanying inputs. In addition, some farmers were reportedly diversifying due to programmes that were promoting climate smart agriculture. The in-depth interviews further revealed that although much had been said about crop diversification, not much had been done to promote it.

4.3 Factors hindering crop diversification

The third research question had nominalist and realist ontologies and therefore, had two objectives. Objective 3, namely, “To describe, based on the Theory of Constraints, factors that affect the decision by farmers to diversify or not,” was addressed using a survey questionnaire, while objective 4, namely, “To establish, from the point of view of key stakeholders, why settlers

in resettlement schemes are not diversifying their crop production,” was addressed through in-depth interviews.

4.3.1 Factors affecting the decision by farmers to diversify or not

This research question revealed several factors which had the potential to promote crop diversification as well as those that may hinder or constrain it.

4.3.1.1 Factors promoting crop diversification

The findings on the factors promoting crop diversification are summarised in Table 2 below.

Table 2: Factors promoting crop diversification

Factor	Strongly agree (%)	Agree (%)	Total (%)	Rank
I wanted to increase my income	25	68.2	93.2	1
I wanted to reduce suffering caused by changes in rainfall	25.3	60.1	85.4	2
I wanted to make the best use of my land	26.8	57.7	84.5	3
I wanted to avoid pests and diseases which were affecting my main crop.	25.4	51.4	76.8	4
I wanted to make the best use of water	21.7	53	74.7	5
My farm is in an area which is good for different agricultural activities.	18.3	53	71.3	6
I wanted to take advantage of a well-developed market for non-staple crops such as cassava, soya beans, groundnuts and sunflower.	21.4	46.4	67.8	7
A plough is available for me to use in growing other crops	12.6	47.3	59.9	8
I wanted to avoid the problem of not having sure prices for my produce	15.1	41.6	56.7	9
The e-FISP (e-voucher) allowed me to choose seed and chemicals to use to produce other crops and not only my main crop	16.7	33.9	50.6	10

The above results revealed that the desire by settler farmers to increase income was the most important driver of crop diversification at Kasenga Resettlement Scheme and this accounted for 93.2% of the responses. Other factors included the desire to reduce the suffering caused by changes in rainfall or climate change which accounted for 85.4% and the desire to make the best use of available land, which accounted for 84.5% of the responses. Another driver of crop diversification identified in this study was the desire to avoid pests and diseases which affected the main crop and this accounted for 76.8% of the respondents.

4.3.1.2 Factors hindering crop diversification: Questionnaire results

In understanding the factors limiting crop diversification, the Theory of Constraints (Goldratt and Cox, 1984) was applied on the findings of the questionnaire. The Theory of Constraints (TOC) is a management philosophy which is focused on the weakest ring or rings in the production chain in order to improve the performance of systems. It is an important problem structuring and solving methodology which changes the way of thinking of managers, regardless of the sector and size of enterprise (Şimşita *et al.*, 2014).

According to Şimşita *et al.* (2014), the performance of any system is limited by the rate of throughput at the constraint; therefore identifying the system's constraint as the weakest link of the chain is the first step of on-going improvement process. The second step, exploiting a constraint is getting highest possible output at itself with eliminating the limitations on that constraint. To support the decision made in the second step, the whole system is subordinated to the constraint as the third step. The fourth step is increasing the capacity of the constraint in order to get efficient throughput. Thereafter, the improvement cycle repeats itself when another operation becomes the system's constraint.

Application of the Theory of Constraints, therefore, entails answering three basic questions about change, namely: (i) What should be changed? (ii) What is it to be changed to?; and (iii) How should it be changed? To determine what to change is identifying constraints; to determine what to change to implies defining how to exploit the constraints and subordinate other operations, while to determine how to cause change is the elevation step (Goldratt, 1990).

In answering the question, “What should be changed?” five constraints or factors hindering crop diversification at Kasenga Resettlement Scheme were identified through the survey questionnaire, out of which the most significant or weakest ring was identified (See Table 3).

Table 3: Factors hindering crop diversification

Factor	Strongly agree (%)	Agree (%)	Somewhat Agree (%)	Total (%)	Rank
Access to fertilizer & other inputs promoting maize production	15.8	64.3	-	80.1	1
Poor road network	23.6	54.6	-	78.2	2
Pests & diseases attack non- staple crops	15.1	42.4	-	57.5	3
Inputs for non-staple crops difficult to find	8.8	38.8	6.5	54.1	4
Poor market for non-staple crops.	18	32.1	-	52.1	5

According to this study, the most significant constraint to crop diversification or the weakest ring, which accounted for 80.1% of the respondents, was that access to fertilizer and other inputs made it easy to focus on maize production as opposed to other crops. This was followed by difficulties in transporting farming inputs to the farms and produce to the market, which was highlighted by 78.2% of the settlers interviewed. In addition, 57.2% of the respondents cited attacks by pests and diseases on crops other than the main crop as some of the major reasons for failure to diversify. A further 54.1% of the settlers interviewed indicated that inputs like seeds and chemicals for non-staple crops were difficult to find on the market, while 52.1% indicated that the difficulty to sell non-staple crops contributed to failure to diversify.

The major constraint identified above, namely, “Access to fertilizer and other inputs made it easy to focus on maize production as opposed to other crops,” was then applied to the second question in the Theory of Constraints, namely, “What is it to be changed to?” Clearly, this constraint should be changed to create an environment where farmers have access to the full set of inputs for other crops so that they can choose whether to produce them or not. To address the third question on, “How should it be changed?” changes should be made to remove focus from maize production to other crops. Proposals on how to address this major constraint are covered under Section 5.4 below.

4.3.1.3 Why settlers in resettlement schemes are not diversifying their crop production: In-depth interview results

Eighty percent (80 %) of the experts interviewed highlighted that the prevailing agricultural policy, inputs provided under the Farmer Input Support Programme (FISP) and the crop market, favoured maize production. The other factor was that most farmers produced maize because it was a staple food crop, which was easy to grow and sell since it had guaranteed market, unlike other crops. Other factors which made it difficult for farmers to diversify included limited extension services, insufficient or lack of knowledge about other crops, lack of appreciation of the nutritional value of other crops, tendency by farmers not to work in cooperatives, poor or no record keeping among farmers, inability by farmers to study the market in order to determine which crop to produce and limited farm sizes. Further, the study identified scarcity of seed for alternative crops and limited knowledge in usage of herbicides, which affects the growth of other

crops as other hindrances to crop diversification. Furthermore, the study revealed that rainfall patterns induced by climate change may not favour certain crops, hence limiting diversification.

Clearly, the most important factor making it difficult for farmers at Kasenga Resettlement to diversify their crops as observed by both the settlers and experts is the current agricultural policy, which tends to favour maize production. The policy, particularly through the Farmer Input Support Programme (FISP) offers inputs that favour maize production as well as market, while inputs and market for other crops are not readily available.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Current state of agriculture

The study results are discussed in line with the research question and their corresponding Objectives. Therefore, the findings, in response to the first objective, “*To describe the state of agriculture in resettlement schemes,*” were interpreted as detailed below.

While many farmers at Kasenga Resettlement Scheme produced other crops besides maize, which include groundnuts (38.9% of the respondents), pumpkin leaves (31.1%), sweet potatoes (30%), mango (27.2%), lemon (21.1%) and cassava (19.4%), this study established that maize was the dominant crop, which accounted for 97.8% of the respondents. This result is consistent with UNDP (2013); Libanda *et al.* (2016); Department of Resettlement (2014); and Gray and Kohl (2016) who observe that maize is the most dominant crop among farmers in Zambia.

This study further established that livestock production at Kasenga Resettlement Scheme was dominated by local (village) chickens, accounting for 64.3% of the respondents. Side by side with this, 47.1% of the respondents reared goats, 34.6 % reared cattle, while 23.6 % kept ducks. These findings are consistent with a study by Bwalya and Kalinda (2014), which revealed dominance by local indigenous chickens among smallholder households in Lusaka and Central Provinces of Zambia, accounting for 99% of smallholder households.

The dominance of local chickens may be explained by the fact that they are easy to rear compared to other livestock types. As observed by Siakalima *et al.* (2017), village chicken production is widespread among rural farmers in Zambia because these chickens are very resistant to common diseases found in these rural settings. In addition, the chickens are a source of proteins and cash to poor rural communities. .

Further, the revelation by this study that 58.9% of the respondents did not diversify their crops, while only 41.1% diversified resonates well with other studies (Mwanamwenge and Cook, 2019; Chapoto and Chisanga, 2016; and Department of Resettlement, 2018a), which reveal that maize production continued to dominate.

Further, as opposed to Sichoongwe *et al.* (2014), who argued that the age of the household head was one of the factors which affected diversification, a Spearman's rank-order correlation test conducted for respondents in this study revealed no relationship between the farmer's age and addition of a new crop or livestock. Furthermore, the sex (or gender) of the settler farmer showed no relationship with addition of a new crop or livestock type, contrary to the findings by Dube and Guveya (2016), who identified gender as one of the major factors affecting crop diversification in their study conducted in Manicaland and Masvingo Provinces of Zimbabwe. The reasons for the above variation were not explored in this study, and may, therefore, require further investigation.

Additionally, the moderate positive correlation observed between the farmer adding a new crop and a new livestock type, which was statistically significant ($r_s = .403$, $p = .000$), implies that those farmers who added a new crop were likely to add a new livestock type and vice versa. This is probably because the farmers may wish to benefit from mixed farming involving crop cultivation and rearing of livestock. As observed by García *et al.* (2012), mixed farming may benefit farmers by spreading the risks over crops and livestock production, providing complementarities between crops and livestock and creating flexibility that allows the adjustment of crop/livestock ratios in anticipation of risks, opportunities and needs.

Further, a Spearman's rank-order correlation test revealed an insignificant but negative relationship between the level of education and diversification, which resonated well with Agnieszka, Danuta and Agnieszka (2018), who argued that the probability of diversification of production decreases as the level of education of the farmer increases. This is, however, in contrast with Aheibam *et al.* (2017); Sichoongwe *et al.*, (2014); and Dube and Guveya (2016), who argued that the level of education of the household head showed a positive effect on propensity to diversify crops. Similarly, the Spearman's rank-order correlation test revealed a weak negative correlation between the farmer undertaking some agricultural training and adding a new crop type, which was statistically significant ($r_s = -.198$, $p = .009$). These contrasting results may be explained by the presence of other factors which may be influencing the relationship between the level of education or the farmer undertaking some agricultural training and crop diversification. There is therefore, need for further study to identify these related factors.

With regard to farm size, the Spearman's rank order correlation revealed a weak positive correlation with addition of a new crop or livestock type, in agreement with a number of other studies. For instance, Sichoongwe *et al.*, (2014); Maggio *et al.*, (2018) and Hichaambwa and Mofya-Mukuka (2016), revealed that landholding size was among the factors which affected crop diversification. However, it has been observed that over-diversification may place pressure on agricultural land and may therefore reduce farm efficiency (Mzyece and Ng'ombe, 2020).

5.2 Factors driving the current state of agriculture

The factors driving the current state of agriculture were discussed in line with the second research question, "Why is agriculture in its current state?" addressed through the second objective, "To establish reasons for the current state of agriculture in resettlement schemes." Since the research question had a realist and nominalist ontology, survey questionnaires and in-depth interviews were employed. The findings were interpreted as detailed below.

5.2.1 Factors driving the current state of agriculture: study questionnaire results

The results of this study show that agriculture at Kasenga Resettlement Scheme is in its current state because most settlers, accounting for 94.3% of the respondents depend on rainfall for agriculture, while only 8.6% of the respondents use irrigation for agriculture. In addition, 93.9% of the respondents depend on agriculture as a source of livelihood. The above findings resonate well with Libanda *et al.* (2016) and UNDP (2013), who observe that small-scale farmers generally lack access to irrigation facilities and therefore, their production is largely rain-fed. This makes them vulnerable to swings in the pattern of rainfall every year (Chibinga et al, 2012).

Another factor influencing the current state of agriculture at Kasenga Resettlement Scheme is lack of farm mechanisation, which limits the type of crops a farmer can produce and, this accounted for 82.4% of the respondents. This result is in agreement with a number of studies among them, Aheibam *et al.* (2017); and Sichoongwe *et al.* (2014), who established a positive relationship between access to farming implements like a plough and crop diversification.

This study also revealed that 80.8% of the farmers at Kasenga Resettlement Scheme started farming due to lack of employment, a situation which limited their capacity and choices. The other factor driving the current state of agriculture is the availability of subsidised inputs for maize production, which accounted for 67% of the respondents, and availability of market by the

Food Reserve Agency (FRA), which accounted for 54.8%. A number of earlier studies confirm that the dominance of maize production in Zambia is driven by the subsidy under the Farmer Input Support Programme (Mwanamwenge and Cook, 2019; and Maggio *et al.*, 2018), and the market structure through which FRA buys maize from farmers (Greenberg *et al.*, 2015).

Further, 50.3% of the respondents indicated that one of the factors affecting the current state of agriculture was insufficient agricultural extension services. As observed by Mofya-Mukuka and Hichaambwa (2016), the provision of agricultural extension services is a driver of diversification. On the basis of the above, it can be concluded that insufficient extension services has contributed to failure by farmers to diversify their crop production.

5.2.2 Factors driving the current state of agriculture: in-depth interview results

A comparison of the questionnaire and in-depth interview results confirm that the current state of agriculture at Kasenga Resettlement Scheme is largely driven by availability of subsidised inputs such as fertilizer and maize seed, which makes it easy for farmers to produce more maize as opposed to other crops. Similarly, market is always available for maize, yet it tends to be difficult to find for other crops. This has therefore, continued to promote dominance of maize at the scheme.

Another feature of the state of agriculture, which was highlighted through the in-depth interviews was lack of value addition even for well-known crops that have ready market. As observed by Heumesser and Kray (2019), a well-functioning input and output market increases specialization in producing high value commodities, while also providing opportunities to diversify production and invest in value addition.

In addition, the revelation by experts that poor information flow or lack of knowledge affects the uptake of other crops by small holder farmers as well as activities such as organic farming is in tandem with what was revealed by settler farmers through the survey questionnaire. Similarly, a study by Mofya-Mukuka and Hichaambwa (2016) revealed that the provision of extension services is a driver of diversification. However, although crop diversification is addressed through the activities of agricultural extension workers, diversification was not offered as a specific topic of extension services. On the contrary, the main focus of extension services was on

the production of maize and legumes, with no mention of other crops such as millet, sorghum and cassava, or fruit and vegetables.

The in-depth interviews also revealed that most small holder farmers were unable to take farming as a business. In addition, many farmers were reported to have challenges raising money for buying inputs for the production of other crops, hence their continued reliance on the maize subsidy. As observed by Mwanamwenge and Cook (2019); and Maggio *et al* (2018), the reliance of many farmers on maize production is driven by the subsidy under the Farmer Input Support Programme (FISP).

While Kuteya *et al.* (2019), reveal that challenges in implementing the electronic Farmer Input Support Programme (e-FISP) led to Government partially reversing its commitment during the 2018/2019 agricultural season by reverting at least 40% of recipients back to the conventional FISP, the in-depth interviews reviewed that farmers on the e-FISP have a higher chance of diversifying, as the programme includes inputs for crops other than maize. Similarly, this study established that farmers who were receiving inputs through the Food Security Pack (FSP) had a wider choice of crops; while other farmers had the opportunity to diversify through programmes promoting climate smart agriculture.

5.3 Factors hindering crop diversification

Results under this section were discussed in line with the third research question, “*Why are the settlers not diversifying?*” which was addressed through objectives 3 and 4. Objective 3, which is “*To describe, based on the Theory of Constraints, factors that affect the decision by farmers to diversify or not*” addresses both the factors promoting crop diversification as well as those hindering it on the basis of study questionnaires. Objective number 4, which is “*To establish, from the point of view of key stakeholders, why settlers in resettlement schemes are not diversifying their crop production*” addresses factors hindering crop diversification on the basis of in-depth interviews.

5.3.1 Factors affecting the decision by farmers to diversify or not

5.3.1.1 Factors promoting crop diversification

The most important driver of crop diversification at Kasenga Resettlement Scheme identified in this study was the desire by settler farmers to increase income, and this accounted for 93.2% of

the respondents. This is in agreement with Feliciano (2018); Mango *et al.* (2018); and Mwanamwenge and Cook (2019), who argue that crop diversification can be seen as one of the most cost effective ways of reducing uncertainties in farmer's incomes.

Other drivers of diversification include the desire to reduce the suffering caused by changes in rainfall or climate change which accounted for 85.4% and the desire to make the best use of available land which accounted for 84.5% of the responses. Earlier studies such as Ogundari (2013) and Mithiya *et al.* (2018) confirm that farmers can be attracted to crop diversification as it leads to conservation of soils. In addition, Hichaambwa and Mofya-Mukuka (2016); Mithiya *et al.* (2018) and Ignaciuk *et al.* (2017), established that agricultural diversification can avoid the risk and uncertainty caused by climate change in line with the finding in this study that 85.4% of the respondents highlighted the desire to reduce negative effects of climate change as a driver of crop diversification.

Another driver of crop diversification, which accounted for 76.8 % of the respondents, was the desire to avoid pests and diseases which affected the main crop. This result is in agreement with a study by Mithiya *et al.* (2018), who argue that farm diversification may be considered as a response to avoid many uncertainties including pests and diseases.

It can therefore, be concluded that crop diversification is attractive if it, among other things contributes to improving the farmers income, with a focus on crops which are resistant to pests and diseases, and coupled with a well-developed market, offering sure and stable prices.

5.3.1.2 Factors hindering crop diversification: settler farmers' views

In applying the Theory of Constraints to understand the factors limiting crop diversification, questionnaire responses were utilised to answer the three basic questions put forward by Goldratt (1990).

In answering the first question, “What should be changed?” five constraints or factors hindering crop diversification at Kasenga Resettlement Scheme were identified through the survey questionnaire. The most significant constraint to crop diversification (weakest ring) which, represented 80.1 % of the respondents, was that access to fertilizer and other inputs made it easy to focus on maize production as opposed to other crops. This was followed by difficulties in transporting farming inputs to the farms and produce to the market, which was highlighted by

78.2% of the settlers interviewed. This result is in agreement with Mwanamwenge and Cook (2019), who established that accessing the agricultural inputs required for a diverse range of crops was a major challenge in diversifying agriculture. This is because farming households depend on what is available at the local agro dealer as transport to urban centres is difficult.

Additionally, 57.2% of the respondents cited attacks by pests and diseases on crops other than the main crop as some of the major reasons for failure to diversify. A further 54.1% of the settlers interviewed indicated that inputs like seeds and chemicals for non-staple crops were difficult to find on the market, while 52.1% cited the difficulty to sell non-staple crops as one of the contributing factors to failure to diversify.

In applying the Theory of Constraints, the major constraint identified above (weakest ring), namely, “Access to fertilizer and other inputs made it easy to focus on maize production as opposed to other crops,” was then applied to the second question in the Theory of Constraints, namely, “What is it to be changed to?” Clearly, this constraint should be changed to a situation where farmers have improved access to the full set of inputs for other crops so that they can choose whether to produce them or not. To address the third question on, “How should it be changed?” changes should be made to remove focus from maize production to other crops.

5.3.1.3 Why settlers in resettlement schemes are not diversifying their crop production: in-depth interview results

Eighty percent (80 %) of the experts interviewed highlighted that the prevailing agricultural policy, inputs provided under the Farmer Input Support Programme (FISP) and the crop market structure, which favoured maize production were the major hindrances to crop diversification. The above factors were also highlighted as the major hindrances to crop diversification by the settler farmers at Kasenga Resettlement Scheme through the survey questionnaire. This result is equally in agreement with a number of studies, which established that the lack of diversification from maize in Zambia was driven by the subsidy under the Farmer Input Support Programme (Mwanamwenge and Cook, 2019; and Maggio *et al.*, 2018) and the Food Reserve Agency market structure, which focused on maize (Greenberg *et al.*, 2015).

The other constraining factor was that most farmers produced maize because it was a staple food crop and was easy to grow. This result is in agreement with Greenberg *et al.* (2015), who observe

that small-scale farming households in Zambia have maize as their primary crop and produce it mainly for household consumption with surpluses sold or exchanged locally.

Other factors which made it difficult for farmers to diversify included limited extension services, insufficient or lack of knowledge about other crops, lack of appreciation of the nutritional value of other crops, tendency by farmers not to work in cooperatives, poor or no record keeping, inability by farmers to study the market in order to determine which crop to produce and limited farm sizes. Further, some experts highlighted scarcity of seed for alternative crops and limited knowledge in usage of herbicides, which affects the growth of other crops as other hindrances to crop diversification. Furthermore, rainfall patterns induced by climate change may not favour certain crops.

Clearly, both the settlers and experts have identified the current agricultural policy, which tends to favour maize production and marketing at the expense of other crops as the most important factor making it difficult for farmers to diversify their crop production. The policy, particularly through the Farmer Input Support Programme (FISP) offers inputs that favour maize production, while maize market is provided through the Food Reserve Agency (FRA), yet this is not readily available for other crops.

5.4 Proposals on how to enhance or promote crop diversification

Proposals on how to enhance or promote crop diversification were discussed in line with the fifth objective, *“To propose, from the point of view of key stakeholders, how crop diversification can be enhanced or promoted in resettlement schemes.”*

In line with the above objective, the study established that to enhance crop diversification, there is need to review the prevailing agricultural policy. One proposal is to develop and implement a specific policy on diversification, which should, among other things, allow for provision of a full package of inputs that will facilitate the production and marketing of other crops through the Food Reserve Agency (FRA) as well as other players in the value chains. As observed by Mwanamwenge and Cook (2019), while the country’s policy framework for agricultural diversification addresses the need to produce different crops and livestock, it has a limited scope. In addition, Greenberg *et al.* (2015) observe that input subsidy programmes and maize purchases through the Food Reserve Agency (FRA) have entrenched hybrid maize to the detriment of other

crops. These programmes have negative implications for production diversity and diversity of nutrients available in food.

Suggestions for policy change in this study are in agreement with previous studies. For instance, Mwanamwenge and Cook (2019) suggested that for Zambia's diversification agenda to succeed, it would require the collective efforts of key players, and a range of co-ordinated policy changes. Recommendations include supporting market actors to pull towards more diverse agricultural production; stimulating demand for healthy and nutritious diets; and redirecting investments towards more diverse production and research and development that supports agricultural diversification. Similarly, Ashfaq *et al.* (2008), suggest that diversification can be influenced by policy changes.

However, what remains unclear is why these past policy recommendations have not been fully implemented to enhance diversification. It is therefore, recommended that research be commissioned to establish why past policy recommendations and other suggested measures to enhance diversification have not been implemented in order to come up with practical strategies for implementing them. One possible way forward, as recommended by Mwanamwenge and Cook (2019), is for Government to convene a high-level policy process involving smallholders, consumers and civil society in order to bring about a change towards crop diversification.

There is also a need to develop a programme for settler farmers to engage in demonstration or exchange visits to appreciate successful diversification efforts by other farmers in other areas. The other suggestion is to enhance diversification-focused extension services to farmers to encourage them to grow other crops and not just focus on maize. As observed by Garforth (2011), fellow farmers can be a source of information and advice on new technologies, particularly at the point of decision about changing a farmer's production system. Further, Mulwafu and Krishnankutty (2012) noted that the lead farmer or exchange visit approach, among others, served as an entry point for service providers such as input suppliers, and enhances the exchange of knowledge and sharing of experiences for increasing agricultural production as well as motivating and encouraging one another in adopting technologies.

This study also established a need for sharing nutrition information on other foods or crops in order to create a demand for them and consequently, a shift from dependence on maize. A

number of authors, among them, Heumesser and Kray (2019); and Mwanamwenge and Cook (2019) have highlighted the link between crop diversification and improvement of nutrition status or diets. Therefore, it can be concluded that if consumers and farmers understand the nutritional value of other crops, demand can be created for those crops, thereby promoting diversification to meet that demand.

The study further established the need to improve the road network to the schemes in order to allow for easy movement of inputs and produce to the farms and market, respectively in an effort to promote crop diversification. This recommendation is supported by studies such as Mukherjee (2015, cited in Heshmati, *et al.*, 2015, p. 140), who argued that effectiveness of crop diversification depends, to a large extent, on the existence of good infrastructure with good linkages to the markets. Similarly, Emanu *et al.* (2015) observed that the adoption of high value crops by smallholder farmers in rural areas in Ethiopia was constrained by poor transportation facilities and links to the markets.

This study further revealed the need to connect farming areas to electricity and internet services to support activities such as irrigation and enhance communication relevant to crop diversification. This result is an affirmation of Dube *et al.* (2016), who established that crop diversification was, among other things, negatively affected by poor or lack of basic infrastructure such as feeder roads, power supply, transportation and communication services. This study is also in agreement with Asfaw *et al.* (2019), who observe that factors which drive diversification vary significantly across countries and households as they are closely linked to development of agricultural markets, infrastructure and information.

This study further established the need to move efforts beyond crop diversification to agricultural diversification or integrated agriculture, which involves other activities such as promotion of small livestock and fish farming. As observed by Sasikala *et al.*, (2015), integrated farming systems provide several benefits such as progressive economic growth, employment opportunities, family nutritional requirements, and optimal utilisation of resources of the farming enterprises. This is re-enforced by the European Initiative for Sustainable Development in Agriculture (2012), which argues that integrated farming enables the farmers to identify opportunities and threats and act accordingly, and at the same time, consider consumer interests

in their business. Further, Balbino *et al.* (2015) noted that using integrated systems whenever suitable can greatly help in recovering degraded agricultural areas.

It is further suggested that farmers should tap into traditional knowledge on production of crops other than maize. A call was also made by experts for Government to promote projects as well as activities by Non-Governmental Organisations (NGOs) which are tailored towards crop diversification.

5.5 Study limitations

The major limitation faced in undertaking this study was that most resettlement schemes in Zambia are located in distant places with poor access roads and other communication facilities. This made it difficult to consider expanding the study to include other schemes. The collection of data was also delayed because of restrictions imposed by the Minister of Health in response to the COVID-19 pandemic in Zambia, as most settlers could not be reached using other means. In this regard, contact time with respondents was kept to the barest minimum.

5.6 Conclusion

With regard to the first objective, the study established that most settlers in resettlement schemes focused on maize production and rearing of local (or village) chickens, with little effort to diversify. In view of the second objective, the study established that the main reason for this state of agriculture was that most farmers depended on rainfall for their activities and use of manual labour. In addition, the prevailing agricultural policies favoured maize production and marketing at the expense of other crops. With regard to the third objective, the study revealed that the most important driver for crop diversification was the desire by farmers to increase their income as well as to address effects of climate change. In addition to the fact that most farmers were forced to continue with maize production because of easy access to fertilizer, seed and availability of market, poor road network as well as pests and diseases affecting non-staple crops were identified as other major factors hindering crop diversification. In relation to the fourth objective, the study suggests a number of proposals to enhance crop diversification, which include the following: policy review to provide more focus on crop diversification; development of a programme for settler farmers to engage in demonstration or exchange visits in order for them to learn from each other; enhancement of diversification-focused extension services to farmers;

sharing of nutrition information on other foods or crops to create a demand for them; improvement of the road network to the schemes in order to allow for easy movement of inputs and produce to the farms and market, respectively; connecting farming areas to electricity and internet services to support activities relevant to crop diversification; shifting of efforts beyond crop diversification to agricultural diversification or integrated agriculture; and tapping into traditional knowledge on production of crops other than maize.

While this study has highlighted several factors influencing crop diversification among settler farmers at Kasenga Resettlement Scheme and suggested how diversification may be enhanced, there are still some information gaps which require further study. For instance, Mwanamwenge and Cook (2019); and Ashfaq *et al.* (2008) earlier suggested policy changes in an effort to enhance diversification. However, no study was found on why such past proposals for policy change to support diversification have not been fully implemented. It is therefore, recommended that future research focuses on establishing the possible reasons for this failure and how to overcome them. A proposal by Mwanamwenge and Cook (2019) is for Government to convene a high-level policy process involving smallholders, consumers and civil society to bring about a change towards crop diversification.

In addition, while understanding the factors affecting diversification is important as this has a bearing on the productivity of resettlement schemes, there is need for further research to understand the current levels of production and productivity in the resettlement schemes across the country. Such a study would help in appreciating the factors driving the low productivity in resettlement schemes across the country (Department of Resettlement, 2018b). The study may guide the Zambian Government in repositioning the Resettlement Programme in a manner that would make it more productive and responsive to the current trends and developments as well as enhance its contribution to job creation and rural development.

Further, it is necessary for future research to assist in explaining why this study established no relationship between the age and sex of a farmer and diversification, contrary to previous studies such as Sichoongwe *et al.* (2014) and Dube and Guveya (2016), who considered age and sex as factors affecting diversification.

There is also need to undertake a study to establish why the level of education and diversification revealed an insignificant but negative relationship in this study, in agreement with studies such as Agnieszka, Danuta and Agnieszka (2018), while being at variance with studies such as Aheibam *et al.* (2017); Sichoongwe *et al.*, (2014); and Dube and Guveya (2016), which argued that the level of education of the household head showed a positive effect on propensity to diversify crops. There is also need to establish why this study showed a weak negative correlation between the farmer undertaking some agricultural training and crop diversification, contrary to previous studies.

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Appendix I – Ethical Clearance Approval Letter



THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Great East Road | P.O. Box 32379 | Lusaka 10101 | **Tel:** +260-211 290 258/291 777 /
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RESEARCH DEPARTMENT

APPROVAL OF STUDY

23rd July, 2020.

REF NO.HSSREC-2020-JUN-032

Duncan Mumba Musama,
LUSAKA.

Dear Mr. Musama,

**RE: “ENHANCING DIVERSIFICATION IN RESETTLEMENT SCHEMES: A
CASE OF KASENGA RESETTLEMENT SCHEME IN CHONGWE”**

Reference is made to your protocol dated 1st June, 2020. HSSREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

REVIEW TYPE	ORDINARY REVIEW	APPROVAL NO. HSSREC-2020- JUN-032
Approval and Expiry Date	Approval Date: 23 rd July, 2020	Expiry Date: 22 nd July, 2021
Protocol Version and Date	Version - Nil.	22 nd July, 2021
Information Sheet, Consent Forms and Dates	• English.	To be provided
Consent form ID and Date	Version - Nil	To be provided
Recruitment Materials	Nil	Nil
Other Study Documents	Questionnaire.	
Number of Participants Approved for Study		

Excellence in Teaching, Research and Community Service

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to HSSREC within 5 days.
- All protocol modifications must be approved by HSSREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to HSSREC within 5 working days.
- All recruitment materials must be approved by HSSREC prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. HSSREC will only approve a study for a period of 12 months.
- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to HSSREC.
- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by HSSREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will be labelled “late submissions” and will incur a penalty fee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.
- Every 6 (six) months a progress report form supplied by The University of Zambia Humanities and Social Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.
- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO), both HSSREC and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.
- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.

- Filing a closing report (rather than just letting your approval lapse) is important as it assists HSSREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.
- A reprint of this letter shall be done at a fee.
- All protocol modifications must be approved by HSSREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except where noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by HSSREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of HSSREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,



Dr. J. Mwanza

Dip. Clin. Med. Sc., BA.M.Soc., PhD

CHAIRPERSON

THE UNIVERSITY OF ZAMBIA HUMANITIES AND

SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE - IRB

cc: Director, Directorate of Research and Graduate Studies

Assistant Director (Research), Directorate of Research and Graduate Studies

Assistant Registrar (Research), Directorate of Research and Graduate Studies

Appendix II – Research Design Matrix

No.	Research question	Ontologically Linked Objective	Population and Sampling	Data collection Technique	Data analysis Technique
1.	What is the state of agriculture in resettlement schemes? (Realist ontology)	To describe the state of agriculture in resettlement schemes	Simple random sampling using the list of farms at Kasenga Resettlement Scheme	Survey questionnaire	Univariate and bivariate analysis
2.	Why is agriculture in its current state? (Realist and nominalist ontology)	To establish reasons for the current state of agriculture in resettlement schemes	Expert sampling of key people Simple random sampling using the list of farms at Kasenga Resettlement Scheme	In-depth interviews Survey questionnaire	Qualitative content analysis Bivariate and multivariate analysis
3.	Why are the settlers in resettlement schemes not diversifying? (Realist and nominalist ontology)	To describe, based on the Theory of Constraints, factors that affect the decision by farmers to diversify or not	Simple random sampling of settlers	Survey questionnaire	Bivariate and multivariate analysis
		To establish, from the point of view of key stakeholders, why settlers in resettlement schemes are not diversifying their crop production.	Expert sampling of key people	In-depth interviews	Qualitative content analysis
4.	How can diversification be enhanced or promoted? (Pragmatism)	To propose, from the point of view of key stakeholders, how crop diversification can be enhanced or promoted in resettlement schemes.	Expert sampling of key people	In-depth interviews	Qualitative content analysis

Appendix III – Study questionnaire

Dear Respondent,

I am a Postgraduate student from the University of Zambia's Graduate School of Business, undertaking a study on Enhancing Diversification in Resettlement Schemes, with a focus on Kasenga Resettlement Scheme in Chongwe District. The findings of the study will assist in suggesting measures to enhance diversification in resettlement schemes in the country.

Kindly provide responses to the following questions as honestly as possible. Note that your responses will be treated with utmost confidentiality and will be used for academic purposes only.

Section 1: Personal Details (Household Heads Only)

Your gender (tick): Male ☐ Female ☐

Your age: Size of your farm (hectares):

The year you started farming on the farm:

I am a (Tick one): Settler ☐ Caretaker ☐ Farm worker ☐

Ownership Type: Allocated by GRZ ☐ Bought From a settler ☐

Settler Type: Retiree ☐ With Disability ☐ Employed ☐ Unemployed ☐ Self Employed ☐

Level of Education (Tick One): None ☐ Primary ☐ Secondary ☐ Tertiary ☐

I have done some agricultural training (tick): Yes ☐ No ☐

Section 2: State of Agriculture in Resettlement Schemes

1. The performance of agriculture at your farm in terms of quantity has been good.

Strongly agree ☐ Agree ☐ Undecided ☐ Disagree ☐ Strongly disagree ☐

2. Please tick the statements that apply to you in relation to the state of agriculture

Tick as many as are applicable to you	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
My household totally depends on agriculture.					
Agriculture is my source of livelihood.					
I started farming as a result of unemployment.					
At my farm, I depend on manual labour.					
I grow more maize than any other crop because I receive subsidised inputs.					
I mainly produce maize because I am assured of market through the Food Reserve Agency.					
The road to my farm is good.					
I receive information on people, companies or organisations that can buy my farm produce.					
My farm has irrigation facilities to promote growth of other crops.					
Agricultural officers do not help me much					
I do not have enough workers at my farm.					
I mainly use hired labour at my farm.					

I mainly use unpaid family labour at my farm.					
I depend on rain for agriculture					
I depend on irrigation for agriculture					

3. The size of land I am using for my main farming activity is _____ (Write the size and tick if it is in hectares/limas/acres)

4. The main crop grown at my farm is _____ (tick one from the options below)

Maize [] Cassava [] Millet [] Sorghum [] Wheat [] Cotton [] Avocado []
Soya beans [] Velvet beans [] Bambara nuts [] Wheat [] Rice [] Cashew nuts []
Cotton [] Mixed beans [] Groundnuts [] Coffee [] Tea [] Tobacco []
Paprika [] Soya bean [] Pumpkin leaves [] Rape [] Okra [] Cucumber []
Oranges [] Cow peas [] Irish potatoes [] Mango [] Onions [] Tomato []
Impwa [] Egg plants [] Sun-hemp [] Lemons [] Guavas [] Cabbage []
Oil crops [] Pawpaw [] Pineapples [] Sweet potatoes [] None []

5. The main livestock or farm animals kept at my farm is _____ (please tick one)

Cattle [] Goats [] Sheep [] Layers [] Donkeys []
Pigs [] Free range chickens [] Guinea fowls [] Ducks []
Local (village) chickens [] Broiler chickens [] None []

Section 3: Assessing Diversification at the Scheme

6. At my farm, I have usually or traditionally been involved in growing _____ (please tick)

Maize [] Cassava [] Millet [] Sorghum [] Wheat [] Cotton [] Avocado []
Soya beans [] Velvet beans [] Bambara nuts [] Wheat [] Rice [] Cashew nuts []
Cotton [] Mixed beans [] Groundnuts [] Coffee [] Tea [] Tobacco []
Paprika [] Soya bean [] Pumpkin leaves [] Rape [] Okra [] Cucumber []
Oranges [] Cow peas [] Irish potatoes [] Mango [] Onions [] Tomato []
Impwa [] Egg plants [] Sun-hemp [] Lemons [] Guavas [] Cabbage []
Oil crops [] Pawpaw [] Pineapples [] Sweet potatoes []

7. In addition to the crop I usually grow at my farm, I recently added _____ (please tick the crop or crops you have added only. If you have not added any crops, select, 'None')

Maize [] Cassava [] Millet [] Sorghum [] Wheat [] Cotton [] Avocado []
Soya beans [] Velvet beans [] Bambara nuts [] Wheat [] Rice [] Cashew nuts []
Cotton [] Mixed beans [] Groundnuts [] Coffee [] Tea [] Tobacco []
Paprika [] Soya bean [] Pumpkin leaves [] Rape [] Okra [] Cucumber []
Oranges [] Cow peas [] Irish potatoes [] Mango [] Onions [] Tomato []
Impwa [] Egg plants [] Sun-hemp [] Lemons [] Guavas [] Cabbage []
Oil crops [] Pawpaw [] Pineapples [] Sweet potatoes [] None []

8. At my farm, I have usually or traditionally been keeping the following animals or livestock (please tick) _____

Cattle [] Goats [] Sheep [] Layers [] Donkeys [] Pigs [] Free range chickens []
Guinea fowls [] Ducks [] Local (village) chickens [] Broiler chickens []

9. In addition to the livestock or animals I usually or traditionally keep at my farm, I recently added (please tick the livestock you have added only. If you have not added any livestock, select, 'None')

Cattle [] Goats [] Sheep [] Layers [] Donkeys [] Pigs [] Free range chickens []
Guinea fowls [] Ducks [] Local (village) chickens [] Broiler chickens [] None []

Section 4: Factors Affecting Crop Diversification

10. Some farmers may have shifted focus from their main activity, for example from growing maize to cassava or keeping livestock. Select the options below which best describe what motivated your shift.

Tick as many as apply to you	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
I wanted to increase the number of crops at my farm.					
I wanted to increase my income					
I wanted to make the best use of my land					
I wanted to make the best use of water					
I wanted to reduce suffering caused by changes in rainfall					
I wanted to avoid pests and diseases which were affecting my main crop.					
I wanted to avoid the problem of not having sure prices for my produce					
The e-FISP (e-voucher) allowed me to choose seed and chemicals to use to produce other crops and not only my main crop					
I wanted to take advantage of a well-developed market for non-staple crops such as cassava, soya beans, groundnuts and sunflower.					
My farm is in an area which is good for different agricultural activities.					
I have enough labour to help me engage in new or more than one activity					
I have enough experience in producing different crops or livestock					
Agricultural extension workers show me how to produce different crops and livestock					
A tractor is available for use in growing other crops					
A plough is available for me to use in growing other crops					
I have access to fertilizer.					
I have access to irrigation facilities.					
I do agricultural training from time to time.					
Being a woman has made it easy for me to shift focus from my main activity to other activities					
Being a man has made it easy for me to shift focus from my main activity to other activities					

Inputs like seeds and chemicals for non-staple crops are difficult to find on the market.					
It is difficult to sell non-staple crops.					
I have difficulties in doing my main activity because of old age.					
I have difficulties in growing other crops because they are attacked by pests and diseases					
It is difficult to transport things like seed and fertiliser to my farm and produce to the market because of a bad road					
Tick as many as apply to you	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
The size of my farm is only enough for one activity, for example, growing maize only.					
I cannot grow some crops or keep certain animals because my farm is not connected to electricity supply					
It is difficult for me to understand issues to do with producing and marketing of different crops or animals because I have only received little education.					
It is difficult for me to shift focus from my main activity to other activities because I do not belong to a farmers' group or cooperative					
The soils on my farm can only support the growth of a few types of crops.					

THANK YOU VERY MUCH FOR YOUR TIME