VALUE CHAIN MAPPING AND MARKETING EFFICIENCY OF COWPEA FARMERS IN CAPRICORN AND WATERBERG DISTRICTS OF LIMPOPO PROVINCE, SOUTH AFRICA

by

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DECLARATION

I, **Christina Magosea Masegela** declare that the mini-dissertation hereby submitted by me to the University of Limpopo, for the degree Master of Science in Agriculture (Agricultural Economics) has not previously been submitted by me for a degree at this or any other university. This is my own work in design and execution, and that all material contained herein has been duly acknowledged.

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Masegela C. M **Date**

DEDICATION

This study is dedicated to my parents, for their never-ending support and words of encouragement throughout my years of studying. To my siblings, my son and my husband thank you for the love you have showed me.

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ABSTRACT

Agriculture plays a significant role also serves as a critical economic sector in Limpopo province in terms of its contribution to the economy, and the number of employment opportunities it produces within local communities. The majority of people involved in agricultural practices are emerging farmers and smallholder/small scale farmers. These farmers try to earn a living from the production of livestock, broilers, fruits & vegetables, and cereals. Cowpea is a drought-tolerant legume that also serves as a staple food for the majority of Africans alongside maize and other typical staple foods consumed by most Africans. The crop is regarded as a key protein source for urban and rural poor, and plays an important role as a cash crop. Despite several nutritional benefits, economic importance and welfare enhancing potential of cowpea, farmers still do not have sufficient information on knowledge about the value that can be added to their cowpea production also the potential and competitiveness of this traditional leafy vegetable.

The aim of the study was to map the value chain and determine the marketing efficiency of smallholder cowpea farmers in Capricorn and Waterberg districts of Limpopo province. The specific objectives were to: identify and describe socioeconomic characteristics of smallholder cowpea farmers in Capricorn and Waterberg districts of Limpopo province, identify and define the participants along the cowpea value chain and identify marketing constraints among smallholder cowpea farmers. Structured questionnaire was used to collect data from 80 smallholder cowpea farmers in Ga-Molepo of Capricorn district and Bela-Bela of Waterberg district using purposive sampling technique. Value chain mapping, descriptive statistics and binary logistic regression model were used in addressing the objectives.

In identifying and defining the participants along the cowpea value chain, a value chain map was constructed to show the different stages cowpea goes through before reaching the final consumer. Two null hypotheses were formulated. The first hypothesis that stated smallholder cowpea farmers were inefficient in marketing cowpea was rejected. Marketing efficiency measure used to determine each farmer's marketing efficiency revealed that 66% of smallholder cowpea farmers were efficient. The determinants of marketing efficiency were examined using binary logistic regression model. The second hypothesis stated that socioeconomic characteristics of smallholder cowpea farmers have no effect on the marketing efficiency. The

hypothesis was also rejected based on binary logistic results that revealed that age, household size, years in schooling, years in farming cowpea, income generated from selling cowpea, quantities of cowpea sold and occupation of the farmers were found to be significant in determining marketing efficiency of smallholder cowpea farmers. Pests, lack of access to formal markets and lack of information on how to process cowpea were major constraints farmers were faced with.

It was recommended that value chain analysts, policy makers and extension workers together with other stakeholders assist in ensuring that food value chain relationships are established so that market opportunities can be created for smallholder cowpea farmers. In addition, farmer schools need to be introduced in rural areas were agricultural practices are dominant. At these schools, farmers can be taught about basic knowledge relating to agricultural production. Training should also be given to farmers on adopting technology as it can potentially assist in making production more efficient.

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DAFF : Department of Agriculture, Forestry and Fisheries

FAO : Food Agriculture Organization

GDP : Gross Domestic Product

IDP : Integrated Development Plan

IITA : International Institute of Tropical Agriculture

LIM : Limpopo

LN : Natural Logarithms

ME : Marketing Efficiency

NFP : Net Price received by Farmers

SDC : Swiss Agency for Development and Cooperation

SSA : Sub-Saharan Africa

STATSSA : Statistics South Africa

TMC : Total Marketing Costs

TMM : Total Marketing Margin

WRC : Water Research Commission

CHAPTER ONE
INTRODUCTION

1.1. Background

Cowpea is one of the most ancient crops known to humankind, with its centre of origin being Africa. The crop has the ability to provide the earliest food for millions of Africans during the hungry season before the cereals can mature for food consumption (Black, 2015). Most farmers grow cowpea intercropped with other crops such as maize and sorghum because of its ability to fix nitrogen, which is essential for maize production in particular. The nutrients not only come from the pods, but cowpea leaves can also be consumed to supplement staple food like maize meal.

The crop has various common names such as crowder pea, black eye pea, southern pea, but all these names account for one scientific name of the crop being *Vigna Unguiculata* (Mbene, 2005). Cowpea is a food and animal feed crop that originated and was domesticated in Southern Africa. It is a warm season crop that is relatively easy to grow in various types of soil, ranging from acid to alkaline and it is tolerant to low soil fertility. These agronomical attributes make it possible for the crop to be produced across a wide range of agro-ecological zones.

However, Singh *et al* (2003) argues that cultivating and storing the crop (cowpea) comes with its challenges; insect pests are the biggest constraints and a problem when it comes to cowpea production. Different obstacles such as drought and heat limit high productivity. For some time now, research and production of cowpea in South Africa has been neglected due to lack of improved varieties, knowledge of good agronomic practices, availability of good seeds and the discouraging poor marginal returns to farmers (Asiwe, 2009).

1.1.1. Cowpea production in Limpopo Province

Agriculture plays a significant role and also serves as a critical economic sector in Limpopo province in terms of its contribution to the economy, and the number of employment opportunities it produces within local communities as stated by Baloyi (2010). To this day, agriculture remains to be highly labour intensive, and a source of economic relief from poverty for the majority of people residing in rural areas in Limpopo province.

The majority of people involved in agricultural practices are emerging farmers and smallholder/small scale farmers. These farmers try to earn a living from the production of livestock, broilers, fruits & vegetables, and cereals. Maize being the most consumed staple food in Limpopo province and in South Africa as a whole more especially in rural areas; it is the most grown cereal crop among emerging farmers, smallholder/small scale and commercial farmers. The prices of both the white and yellow maize have risen significantly during the extremely serious drought conditions that fell upon the country in the year 2015/2016 (Limpopo Environmental Outlook Report, 2016). As a result, South Africa was forced to import maize from other countries. Cowpea is a drought-tolerant legume which also serves as a staple food for the majority of African alongside maize, especially the rural poor.

Many people in Limpopo province, the rural poor in particular depend on producing indigenous crops for their livelihood. Cowpea being regarded as one of the staple food needed for consumption mainly because of its inexpensive source of protein and the ability to survive in drought-prone areas, it is no wonder that it's called the "poor man's meat".

1.1.2. Access to markets and agricultural food value chains

Access to formal agricultural markets remains a challenge for smallholder farmers more especially in rural areas. Besides poor infrastructural facility, the main reason for this dilemma is that smallholder farmers do not have the most advanced technology as commercial farmers do that will enable them produce the quantity and quality of products needed to be marketable (Baloyi, 2010). For smallholder farmers to enjoy the benefits of agriculture, they need sustainable markets where they can take their produce after every harvest.

Food value chains and access to markets are interrelated in a sense that, more value will be added to the products if formal markets are realised. The study done by Swiss Agency for Development and Cooperation SDC (2013) emphasised that the efforts of poor smallholder farmers to have better market access are often hindered by factors such as insufficient information and poor linkages between different actors along the value chains. Seville *et al* (2011) highlighted that agriculture remains to be the only alternative and the best opportunity for the 1.5 to 2 billion people worldwide residing in smallholder households to work and trade their way out of poverty.

Therefore, it is important and vital for smallholder farmers to have access to sustainable markets; thereby increasing the food value chain of agricultural commodities.

Access to formal markets will not only benefit the smallholder farmers participating, but will also contribute to community development. Food value chains do not comprise only the stakeholders directly involved in the production of products in question, but smallholder farmers can also be involved in the value chains as wage labourers in production and processing and also as providers in the service markets that support value chains as further explained by Seville *et al* (2011). Thereby value chain mapping is essential to understanding of markets, their relationships, the participation of different actors and the critical constraints that limit the growth of agricultural production and consequently the competitiveness of smallholder farmers.

1.1.3. Water scarcity and food security in South Africa

With water being a scarce resource at national level (South Africa, A water-scarce country, 2011); drought-tolerant crops such as cowpea should be produced in masses to ensure food security and minimal use of water. It is further highlighted that the improvement of water conservation, water quality and water-use efficiency is of key national priority.

Water plays a crucial part in the agricultural sector mainly because most crops rely on irrigation for growth and sustainability; hence severe climatic conditions (be it floods or droughts) are famers' worst nightmare. Piesse (2016) explains that South Africa is the region's (Sub-Saharan Africa) largest food producer, therefore when severe climatic conditions; in this case being drought, hit the country agricultural production is decreased. It is further emphasised that if South Africa is to transition to a new climate pattern, the feasibility of producing alternative food crops, the ones that will require less water usage will need to be explored.

Cowpea, sorghum and millet are some of the cereal crops that are considered as staple food as much as maize, rice and wheat are for most African countries and worldwide. Unlike the latter mentioned crops; cowpea, sorghum and millet have higher heat and drought tolerance and they can be the alternative cereal crops that can be grown in this water crisis that the country is faced with.

Figures 1.1 and 1.2 below represent the comparison in production of crop cereals that are mostly consumed in Southern Africa and South Africa from 2013-2015. The years 2013-2015 are the ones taken into account because of the drought that incurred during this time period.

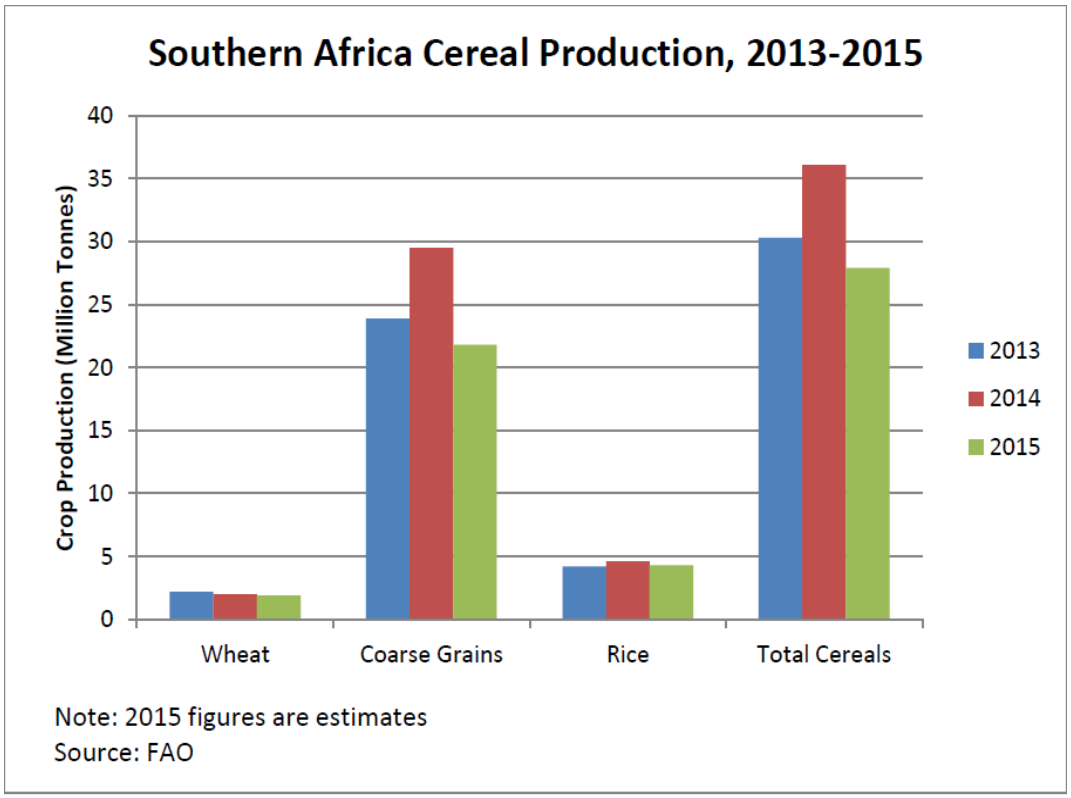


Figure 1.1: Southern Africa Cereal Production, 2013-2015.
Source: Food Agriculture Organization as cited by Piesse (2016).

Between 2013 and 2015 wheat produced was more or less the same in both parts of the continent, being about 2 million tonnes. However, drought had a great impact on the production of rice in South Africa where it is evident that there was no production during that time period. Based on the information given, it could possibly mean that between 2013 and 2015; South Africa imported a lot of rice from other Southern African countries. Coarse grain and total cereal crops were produced in much higher tonnes as compared to wheat and rice during the same period.

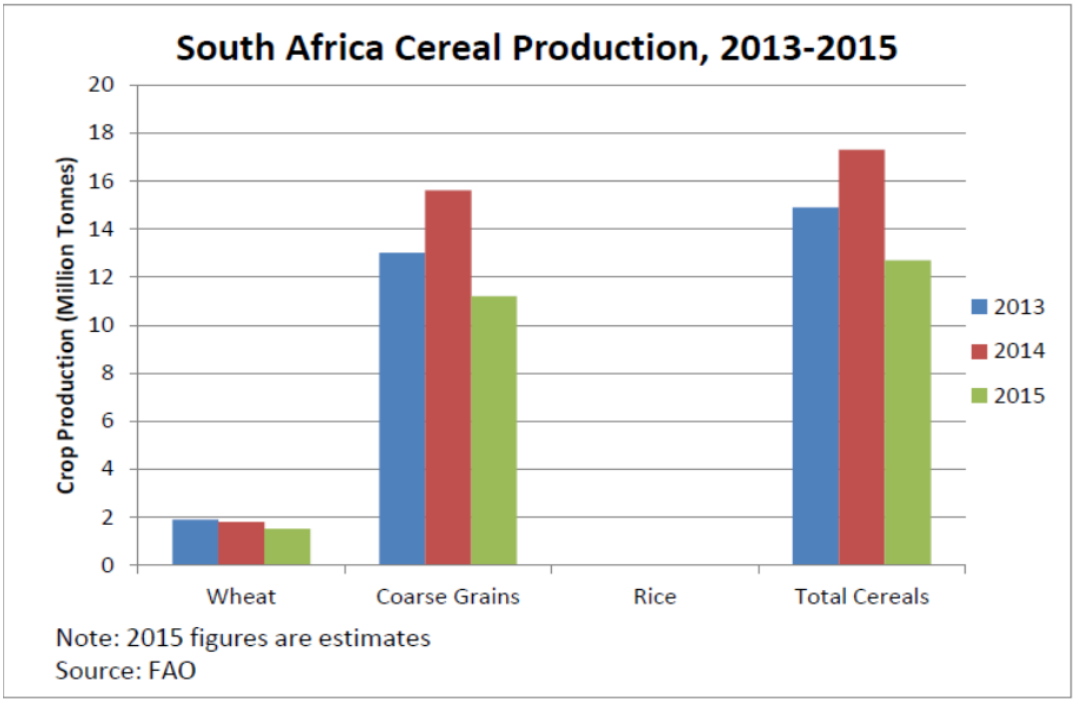


Figure 1.2: South Africa Cereal Production, 2013-2015.

Source: Food Agriculture organization as cited by Piesse (2016).

Cowpea, sorghum and millet falls under the total cereal crops classification, and that may possibly be the reason why total cereal crops yield was not too low despite the serious drought that attacked the country.

1.2. Problem statement

According to Faith *et al*. (2014), cowpea is regarded as a key protein source for urban and rural poor, and also plays an important role as a cash crop. Leafy vegetable crops such as cowpea are considered to be food legumes since they are consumed in most African countries because of its drought tolerance, inexpensive to plant as well as to harvest. Most people especially the rural poor rely on this indigenous leafy vegetable as a source of protein. A study done by Chagomoka *et al.* (2014) has shown that traditional leafy vegetables have high market potential, and contribute substantially to household incomes and nutrition. Despite several nutritional benefits and welfare enhancing potential of cowpea, farmers still do not have sufficient information on knowledge about the value that can be added to their cowpea production, and also the potential and competitiveness of this traditional leafy vegetable. There is therefore a need to understand the interaction of various actors along the value chain of cowpea in order to understand the role of these actors and improving the profitability and marketing efficiency of cowpea.

1.3. Rationale for the study

Chagomoka *et al.* (2014) states that few studies have been done on traditional leafy vegetables value chains and related subjects in Southern Africa. Scientific research previously gave less attention to research on traditional vegetables value chains. Therefore, value chain mapping is important in identifying the different role players along the chain and addressing constraints faced by these role players at different node of the chain. With the new improved cowpea variety which is high yielding, drought and pest resistant; cowpea farmers will be able to produce more. Most smallholder farmers usually sell their produce just to have an income but do not take into consideration all the costs incurred from production until the product gets to the final consumer. This results in low bargaining power on the part of these farmers because of lack of information with regard to marketing their produce.

1.4. Aim of the study

The aim of the study is to map the value chain and determine marketing efficiency of smallholder cowpea farmers in Capricorn and Waterberg districts of Limpopo province.

1.5. Objectives of the study

The specific objectives of the study are to:

i. Identify and describe socioeconomic characteristics of smallholder cowpea farmers.
ii. Identify and define role players along the cowpea value chain.
iii. Determine marketing efficiency of smallholder cowpea farmers.
iv. Examine the determinants of marketing efficiency among cowpea farmers.
v. Identify marketing constraints among smallholder cowpea farmers.

1.6. Research hypotheses

i. Smallholder cowpea farmers are inefficient in marketing cowpea.
ii. Socioeconomic characteristics of smallholder cowpea farmers have no effect on their marketing efficiency.

1.7. Justification of the study

The study was aimed at mapping the value chain of cowpea and determining the marketing efficiency of smallholder cowpea farmers in the Capricorn and Waterberg districts of Limpopo province. Smallholder farming forms part of an integral part in creating jobs in the agricultural sector; however, this type of farming it's not given enough attention in order for it to progress.

Smallholder farmers in Ga-Molepo and Bela-Bela are successful in farming various kinds of agricultural crops ranging from maize, sorghum, watermelons, butternuts, cowpea and many other traditional agricultural crops. The farmers are passionate about what they do since it is their way of surviving. Farmers in these areas are not exposed to opportunities that will enable them to be even more successful in their farming venture. Opportunities such as linking them to high-value formal markets; Baloyi (2010) claims that in accessing high-value formal markets, smallholder farmers need to be integrated into the value chain and be supported along the chain so that they become competent.

1.8. Organisation of the study

This study comprises of chapter one, which is made up of the introduction outlining a background of the study, problem statement, rationale for the study, aim, objectives directing the study and the hypotheses. Theoretical reviews of issues related to the study are presented in chapter two. Chapter three entails research methodology employed in the study, which includes the description of the study area, data collection procedures and analytical techniques used in analysis.

CHAPTER TWO
LITERATURE REVIEW

2.1. Introduction

This chapter presents an overview of cowpea production, value chain mapping and marketing efficiency of smallholder cowpea farmers in South Africa. Issues related to this study such as definitions of smallholder farmers, value chain mapping, marketing efficiency and other cowpea issues which are not only limited to South Africa will be discussed in this chapter.

2.2. Definition of concepts

2.2.1. Small scale/smallholder farmers

Smallholder farmers are defined in many ways depending on the context, country and even ecological zone; they are the drivers of many economies in Africa even though their potential is often not brought forward. According to Department of Agriculture, Forestry and Fisheries (2012), smallholder farmers are defined as those farmers that own small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost entirely on family labour. The term “smallholder” often is interchangeably used with “small-scale”. These farmers are regarded as such, because of the limited resources and the not-so advanced technologies they work with, but still produce enough for their own consumption and income generation.

On the other hand, while some literature perceives smallholder or small-scale farming as operating on small land; and not having adequate turnover Kirsten and Van Zyl (1998) argue that defining a smallholder/small-scale farmer does not entirely depend on the size of the land. However, the authors continue to highlight on the contrary, smallholder/small-scale farmers who operate on a 1 hectare of irrigated peri-urban land farming vegetables; have a higher profit potential than the 500 hectares of low quality land in the Karoo. Emphasis is not on the size of the land, but rather the capability of what that land can produce.

Kirsten and Van Zyl (1998) further highlight that, mind-set of smallholder/small-scale farmers is deep-rooted in South Africa, it is no wonder that smallholder/small-scale were always considered in a negative light; and why smallholder/small-scale farming in the country never really had a chance.

2.2.2. Value chain mapping

Kaplinsky and Morris (2001), defined value chain as a description of full range of activities which are required to bring a product or a service from conception, through the different phases of production which involves a combination of physical transformation and input of various producer services to final consumers. Value chain approach is a descriptive tool that shows the interactions between different actors, making it important in knowing the major role players in bringing a product to the final consumer. This helps in understanding the costs associated with the product.

McComick and Schmitz (2001), on the other hand define value chain mapping as creating visual representation of the connections between actors in value chain analysis as well as other stakeholders. Value chain mapping is considered a standard tool in value chain research and analysis. It helps in explaining and understanding the process by which a product goes through before and until it reaches the final consumer. One of the methods used to map a value chain is the flow chart. It is said that a flow chart is an easier tool that is used to demonstrate the several stages in the value chain by which a product goes through until it reaches the final consumer.

Figure 2.3 below is an example of a value chain map in the Cayagan Valley, which shows how a product moves from point of production to final consumption and all the stakeholders involved in the process.

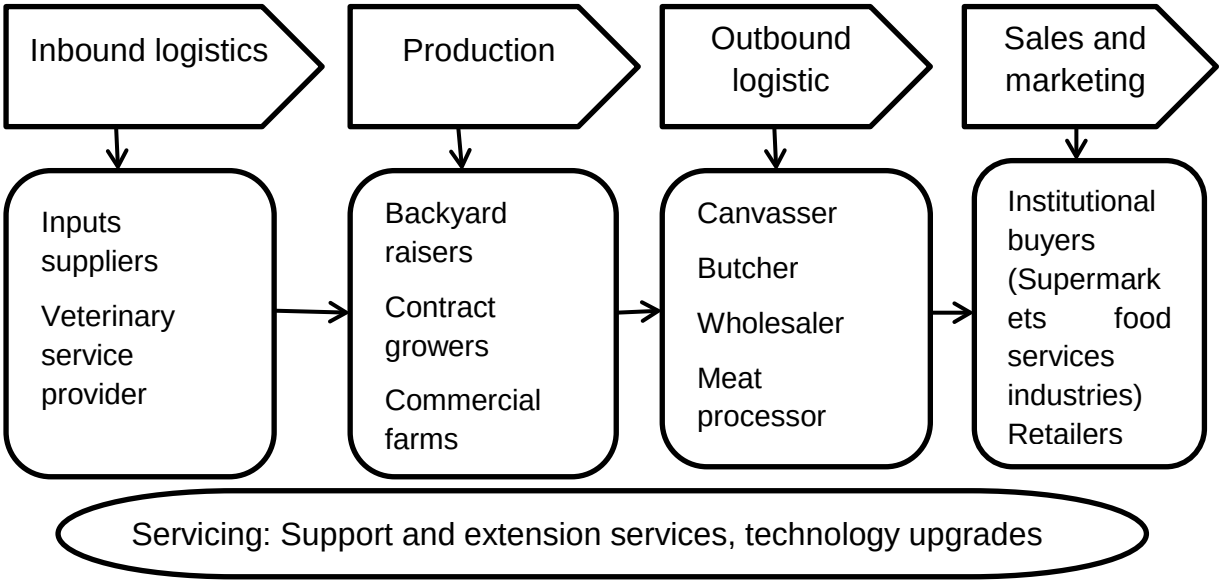


Figure 2.3: Value chain map of Hog meat in the Cayagan Valley, Philippines.
Source: Perez (2014) as cited by Sumalde and Quilloy (2015)

2.2.3. Marketing efficiency

Rit (2014) described marketing efficiency as the ratio of market output (satisfaction) to marketing input (cost of resources). An increase in this ratio represent increased efficiency, a decrease denotes low efficiency. Furthermore, Sumalde and Quilloy (2015), emphasised that efficiency is one of the most important goals in agricultural and food marketing as it directly affects food security, particularly the economic and physical access to food households. It is important that the farmers are efficient in marketing their products; this will ensure that they have a greater marketing margin. Pabuayon *et al.* (2014) as cited by Sumalde and Quilloy (2015), highlighted that efficient and effective flow of food from production point (farmers) to consumption point (consumers) can facilitate the availability, accessibility and affordability of adequate food to consumers.

Marketing efficiency can benefit all the key actors in a market chain. An efficient marketing system is achieved when the resulting marketing costs (including losses) are minimized and profits of market intermediaries are reasonable; meaning that the marketing margin is just enough to cover the costs of marketing services.

2.3. Conceptual framework on cowpea production in South Africa

Agriculture in South Africa is important in alleviating poverty through creation of jobs and income generation. Leafy vegetables farming can be crucial to the economic growth of the country in a sense that food security can be guaranteed. Hlungwani (2011) emphasises that about 90% of the population of South Africa relies on agriculture for their livelihoods. Severe climatic conditions such as drought can hamper the agricultural production especially for smallholder farmers, making it impossible for them to harvest, to sell and for own consumption. Cowpea is a drought tolerant crop that is essential for maize production. Most smallholder farmers during the planting season, they intercrop cowpea with maize and sorghum, mainly because of nitrogen fixing cowpea holds. Cowpea intercropped with sorghum in a strip cropping method, which believed to allow a better management of the crops than the broadcasting method and therefore have high yields.

South Africa being a water-scarce country as it is, there is a need to promote the utilization of traditional heat-drought-tolerant crops (Hlungwani, 2011). However, traditional leafy vegetables such as cowpea are amongst drought tolerant crops

which are least researched and given attention to. Unlike maize, in South Africa cowpea is considered a subsistence crop, whereas in other African countries it is produced in masses. Due to lack of quality seeds, farmers have no other alternative but to carry on planting cowpea seeds with low production, late maturing and prone to insects (Asiwe, 2009). This therefore limits cowpea to be produced in high quantities. As compared to Nigeria, in South Africa domestic utilization of cowpea is poor because production is still at subsistence level under smallholder farmers. Currently, in Limpopo province the leaves from cowpea are harvested fresh, and consumed as green leafy vegetable and dried for future use (Asiwe, 2009).

A study done by Van Rensburg *et al*. (2007), showed the importance of leafy vegetables as protein enriching also as a way of ensuring food security. The study focused on different leafy vegetables consumed in South Africa, cowpea included. The authors further highlighted that the leafy vegetable dishes can be prepared from a single species or from a combination of different species of leafy vegetables. It is believed that preparing the combination of different species adds more taste to these leafy vegetables than when it is prepared as a single species. However, cowpea unlike other leafy vegetables is prepared as a single species, but can be mixed with other ingredients such as tomatoes and onions to enhance its taste.

Van Rensburg *et al.* (2007) maintained that, South Africa possesses a huge diversity of indigenous food crops, which includes grains, leafy vegetables and wild fruit types. Major production areas for cowpea in South Africa are Limpopo, Mpumalanga, North West and Kwa-Zulu Natal provinces. This is mainly because these provinces are characterized by hot and dry climatic conditions and good rainy seasons making cowpea to mature well. The rural poor in these provinces rely on indigenous leafy vegetables such as cowpea (*Vigna Unguiculata L*.), young pumpkin leaves and spider flower (*Cleome gynandra L*.) for food security. In most cases, these vegetables are consumed as relish with maize meal and other staple food.

In South Africa, the preparation and consumption of cowpea is only limited to boiling the leaves (dried or fresh) and eaten as relish or cook the pods. Other African countries such as Nigeria, also the largest producer of cowpea have extensive knowledge on how to prepare different dishes from cowpea. According to IITA (2011) as cited by Coker *et al.* (2014), Nigeria is the largest producer and consumer of cowpea both in West Africa and in the world. It was noted that cowpea has a wide

role in contributing to food security, income generation and sustainable environment for millions of smallholder farmers in the region (Tarawali *et al.* 2002) as cited by (Coker *et al.* 2014). Presently, cowpea production is still at subsistence level in South Africa and the largest producer of cowpea Nigeria included. In Niger state, like in other parts of Nigeria cowpea is currently produced by smallholder farmers using basic implements (Coker *et al.* 2014).

Most studies in South Africa done on cowpea focus more on the agronomic part of the crop rather than its economic importance. A study done by Asiwe (2009), highlighted that lack of sound knowledge of effective agronomic practices, absence of good seeds for planting and discouraging marginal returns to farmers; further worsen the limitations to cowpea production in some provinces more especially Kwa-Zulu Natal, Limpopo and Mpumalanga. Although it is important to have the right seeds that will ensure maximum yield, it is important to realise the crucial part processing and profitability of cowpea can be to farmers. Cowpea seed is the most important part of the cowpea plant for human consumption. Van Rensburg *et al.* (2007), emphasised that the seeds are usually harvested and dried for storage and consumption at a later stage, either after cooking completely or after being milled into a flour product used in various recipes. Farmers can be able to generate more income from cowpea seeds also in the processed form.

Cowpea is not only important for human consumption, but also for animal ingestion. Tarawali *et al.* (1997; 2002) highlighted that cowpea also serves as an important source of high quality hay for livestock feed. Several studies can attest to the fact that cowpea also serves as an important source of protein for animals, being an essential particularly to layer chickens. This is evidenced by Hlungwani (2011), indicating that cowpea can be an excellent source of protein component in animal nutrition especially where conventional plant proteins are in short supply and highly priced. The author focused on the importance of protein intake from cowpea in layers and the quality of the egg thereafter. Hlungwani (2011) further emphasised that the conventional dietary feedstuffs fed to layer chickens consists of maize and soya beans as the main energy and protein sources. However, maize and soya beans are considered as staple foods and consumption of these two by both humans and animals, can lead to scarcity of the crops making it expensive for the smallholder farmers to purchase. Thereby identification of alternative readily available sources of

protein is of great value to producers. Cowpea, known to be drought-tolerant and an important source of protein to most rural poor and the ability to fix nitrogen seems to be a valuable solution for smallholder livestock farmers.

2.4. Cowpea production and consumption in other African countries and in the world

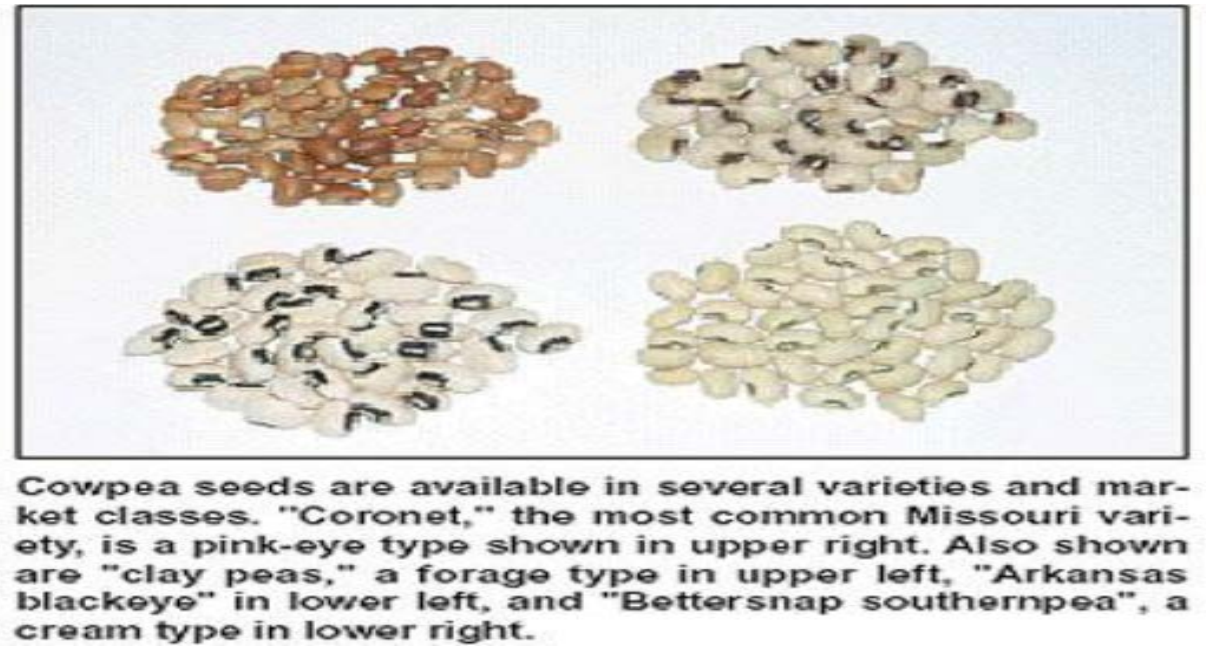
Hallensleben (2009) explains cowpea as an important food legume and its use as a leafy vegetable is vital in many African countries. Drought-tolerance, short growing period and its multipurpose use make cowpea an attractive alternative for farmers who cultivate in marginal, drought-prone areas with low rainfall and less developed irrigation systems; where infrastructure, food security and diminishing malnutrition are major challenges. Cowpea is an ancient crop, which its origin and domestication occurred in Africa. Its importance to human nutrition made it to be recognised throughout the world; however, cowpea production still dominates in Africa with 68%, Brazil 17%, rest of the world 10%, Asia at 3% and lastly the United States with 2% (Gómez, 2004). Regardless of where in the world the crop is produced, it is still consumed in the same manner. Coker *et al.* (2014), adds that cowpea is cultivated as a vegetable, which means that it can be eaten as leafy green vegetables, green pods, shelled dried peas and fresh shelled green peas; and it is significant as animal feeds as well.

As compared to other African countries that produce cowpea and the world as a whole, Nigeria remains the largest producer and consumer of cowpea (IITA, 2011). According to Faye *et al.* (2004), as cited by Faith *et al.* (2014), nearly every developing country has some chronic protein deficiency and there has been reported cases of malnutrition and deaths of infants attributed to deficiency, therefore increasing consumption of food rich proteins such as cowpea which is affordable for many of the rural poor is vital. With that being highlighted, cowpea as basis for inexpensive source of protein provides the cheapest supplement to the urban and rural poor in Nigeria (Faith *et al.* 2014). Akibode (2011), further emphasises on a vital role cowpea plays as a source of livelihood for millions of people in west and central Africa. The author further adds that cowpea contributes to the sustainability of cropping systems and soil fertility improvements in marginal lands by providing ground cover which provides moisture (important in more drier regions), fixing nitrogen and suppressing weeds.

Studies done by Sawadogo *et al.* (1985), Diehl and Sipkins (1985), Mortimore *et al.* (1997), Blade *et al.* (1997) as cited by Akibode (2011), highlighted that in most countries (African countries in particular) cowpea yields are low due to the use of low yielding traditional varieties, poor soil fertility, unfavourable weather and insect pests and diseases. However, Akibode (2011) stands to argue that over the past 14 years cowpea yields have shown a positive trend in all of the sub-region of Sub-Saharan Africa. This may have been attributed to the adoption of improved varieties of cowpea in major producing countries in Sub-Saharan Africa. Akibode (2011), further goes on to indicate that, in 2009 the adoption rate of these improved varieties in some western African countries was estimated to be as high as 82%, 70%, 60%, 38%, 27% and 10% in Ghana, Cameroon, Niger, Nigeria, Senegal and Burkina Faso respectively. This shows that improved varieties of cowpea had significant impact on production of cowpea. Chadha *et al.* (2008), as cited by Chagomoka *et al.* (2014), adds that vegetable cultivar and breeding research has significant national priority in Malawi. Major research objectives in the horticulture sector in Malawi are to address increased availability of high yielding cultivars; adaptability of improved cultivars to both pest and disease resistance and heat tolerance, improvement of soil fertility, good on-farm agricultural practices and minimization of post-harvest losses.

The green leaves of cowpea are also prepared like spinach and can be consumed with pap (maize meal) or rice. Several authors have emphasised on the importance of cowpea as a food legume for both human and animal consumption, as every component of the plant can be consumed.

Figure 2.4 below demonstrates different varieties of matured cowpea seeds, which are some of the high yielding varieties of cowpea. Coulibaly and Lowenberg-DeBoer (2014) emphasised that the reason behind varied use of cowpea technologies is the profitability of the legume. Since cowpea in most countries is being grown in subsistence farming systems, farmers are able to benefit a lot from producing on smaller areas of land. However, even though improved varieties have proven to be more profitable than the local varieties, cropping practices and management still play major role in ensuring high yields of cowpea (Coulibaly and Lowenberg-DeBoer, 2014).



Cowpea seeds are available in several varieties and market classes. "Coronet," the most common Missouri variety, is a pink-eye type shown in upper right. Also shown are "clay peas," a forage type in upper left, "Arkansas blackeye" in lower left, and "Bettersnap southernpea", a cream type in lower right.

Figure 2.4: Different improved varieties of cowpea seeds

Source: Gómez, 2014.

2.5. Value chain and marketing of cowpea

Cowpea is an important stable food, affordable and cheap protein source to rural and urban dwellers worldwide (Faith *et al*., 2011). Domestic production of cowpea is mostly done in rural areas by smallholder farmers who most of the times obtain low yields due to the subsistence level of production characterized by lack of improved technologies, inputs and agronomic practices. Although cowpea is produced by smallholder farmers at a subsistence level, they still harvest enough to be marketed.

Marketing of cowpea in countries like Nigeria remains one of the most lucrative businesses engaged in by most agricultural produce merchants, reason being that the crop has high economic value (Faith *et al*., 2011). According to Weinberger and Lumpkin (2007) as cited by Chagomoka *et al*., (2014), even though vegetable production in the Eastern and Southern Africa constitute only a small share of the arable land area, it has the potential to be highly profitable, provide employment opportunities and generate income. However, to understand this potential; farmers and other value chain actors must improve the competitiveness of their vegetable production and marketing commodities to increase market share and profits (Chagomoka *et al*., 2014).

Value addition to cowpea can improve the livelihoods of farmers and increase their income generation. Farmers will be able to sell their cowpeas also in the processed form, thereby increasing the market in which they are selling their produce. This is evidenced by Mzeyece (2010), stating that if local cowpea production increased, there was every possibility that marketers could get cowpeas at lower prices and makes more money; consequently, with increased market participation, all actors in the cowpea value chain are likely to have increased returns to their sales. However, the unequal distribution of agricultural inputs such as land, farm assets, support service, market access, infrastructure and income that persists in South Africa (Matsane and Oyekale, 2014) hampers the growth of smallholder farmers' businesses. The majority of smallholder farmers in South Africa lack the adequate marketing facilities, of which when they do exist; they are completely underdeveloped and inefficient (Adeleke *et al.,* 2010) as cited by (Matsane and Oyekale, 2014).

Matsane and Oyekale (2014), further highlights that marketing plays a critical role in meeting the overall goals of economic development, food security, poverty alleviation and sustainable agriculture, especially among smallholder farmers in developing countries. Marketing constraints are attributed to a number of factors such as knowledge and use market information, high transactional costs, distance from the markets, poor quality of products, lack of financial support (Antwi and Seahlodi, 2011) as cited by Matsane and Oyekale, 2014). These marketing constraints can constitute a paramount obstacle for smallholder farmers when it comes to marketing their products efficiently.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Introduction

This chapter is aimed at describing the study areas, to explain the methods used in data collection and research techniques used to analyse data. The aim of the study was to map the value chain of cowpea also determine the marketing efficiency of smallholder/small-scale cowpea farmers in Capricorn and Waterberg districts of Limpopo province. A value chain map was used to illustrate the different stages cowpea goes through before reaching the final consumer; and in determining the determinants of marketing efficiency, the binary logistic regression model was used. Marketing efficiency measure by Acharya and Agarwal (2001) was used to check how efficient cowpea farmers are in the two locations.

3.2. Study area

Limpopo province is the fifth largest province in South Africa in terms of population size, with 5.8 million people living in the province (Limpopo community survey, statssa 2016). There are nine provinces in South Africa; Limpopo province, Gauteng, Kwa-Zulu Natal, Mpumalanga, North-west, Northern Cape, Western Cape, Eastern Cape and the Free-state province (Limpopo community survey, statssa 2016). Limpopo province is situated at the northern part of the country and shares borders with Zimbabwe, Mozambique and Botswana. The province was formerly known as Northern Transvaal, then the Northern Province, which was in 2002 changed to Limpopo province. It was named Limpopo province after the Limpopo River, which forms the border between South Africa and Zimbabwe. The capital city of Limpopo province is Polokwane, formerly known as Pietersburg; which was changed the same time as the name change of the province.

Limpopo province covers an area of 125 755 km^2 which is about 10.3% of the country's total area (Limpopo province, an overview 2017) which explains the province being the 5^{th} largest in the country in terms of population size. The most spoken languages in the province are Sepedi, Xitsonga and Tshivenda with 52,9%, 17% and 16,7% respectively. Limpopo is comprised of five districts which are; Capricorn District, Waterberg District, Sekhukhune District, Mopani District and Vhembe District; and within these districts there are local municipalities (Limpopo Province, an overview 2017).

Figure 3.5: Limpopo province map

Source: Limpopo Department of Transport, 2015.

Capricorn District is divided into five local municipalities, which are Aganang, Blouberg, Lepelle-Nkumpi, Molemole and Polokwane. Polokwane Local municipality covers only 3% of the total of Limpopo province, however over 10% of the population resides within its boundaries (Polokwane city, history of Limpopo. 2017). Polokwane municipality serves as the economic hub of the province and has the highest population density in the Capricorn District. Polokwane in Northern Sotho means “place of safety”. Ga-Molepo village is a rural community, which falls under Polokwane local municipality. Ga-Molepo is situated South-West of Polokwane city; about 50 km from the city (Kganyago, 2008). Ga-Molepo translated in English means “place of relaxation”. Ga-Molepo is amongst the poorest areas in Polokwane municipality, which makes it practical for the majority of the population to be involved in subsistence agriculture (Chaminuka et al., 2006).

Figure 3.6: Capricorn District map (Polokwane Local Municipality)
Source: Municipalities, 2017.

Waterberg is one of the districts in Limpopo province. The district is situated in the western part of Limpopo province and is considered the largest district in the province (Phala, 2015) with more local municipalities than any other district in the province. However, Waterberg district is the least when it comes to the largest share of households in the province as compared to other districts (Limpopo Community Survey, statssa. 2016). Waterberg district is comprised of six local municipalities, namely: Bela-bela, Lephalale, Modimolle, Mogalakwena, Mookgopong, and Thabazimbi. Bela-bela is one of the local municipalities in Waterberg district formerly known as Warmbad, of which the name change happened the same time Northern Province was changed to Limpopo province in 2002. Bela-bela local municipality covers an area of 4000 km^2 of 49 504 km^2 of the entire Waterberg district (Limpopo Community Survey, statssa. 2016). It is further highlighted that the population in the local municipality is estimated at 76 296, which is reasonable considering that the municipality is the smallest in the district. The local municipality is on the Southwestern part of the Waterberg district and shares borders with Gauteng, Mpumalanga and North-West. The main economic sectors, which contribute

substantially to the district's Gross Domestic Product (GDP), are Agriculture and Tourism (Bela-Bela-local-municipality, 2017) especially given the fact that the district is predominantly rural. The temperature in Bela-Bela is generally a hot semi-arid climate, with average rainfall of 600-650 mm, the highest measurements occurring in January to December (Bela-Bela Local Municipality, IDP 2016). The climate in the area is suitable for agricultural production such as maize, sorghum and cowpea, which are produced between November and January where much of the rainfall is expected.

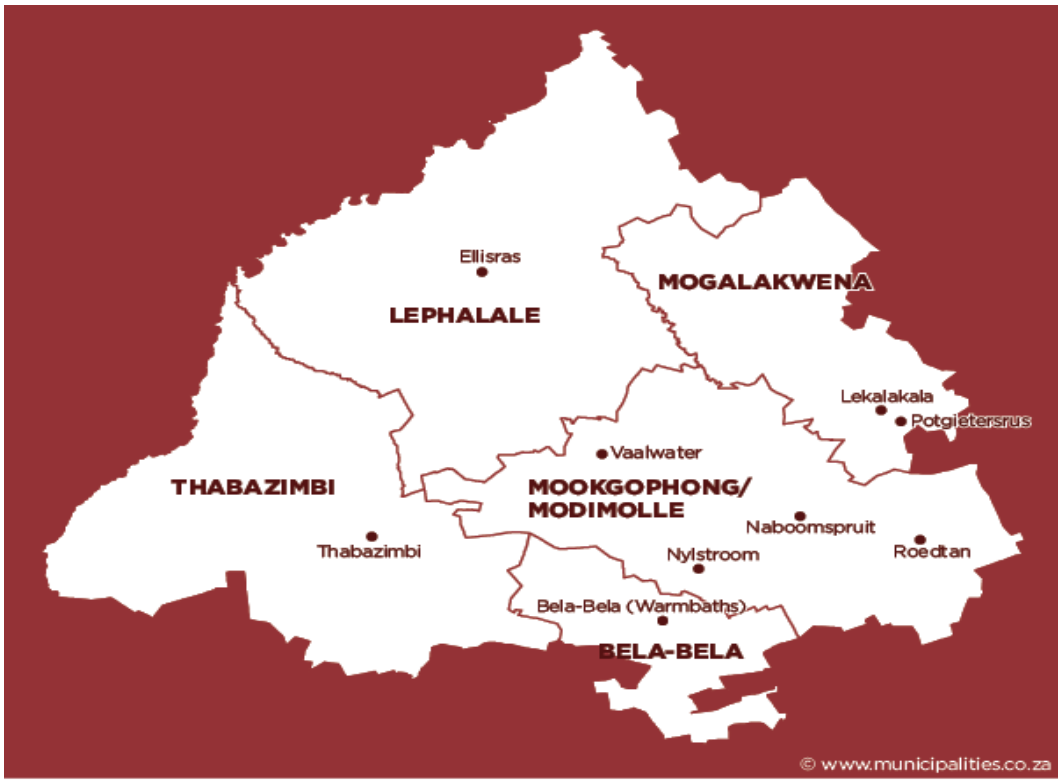


Figure 3.7: Waterberg District map (Bela-Bela Local Municipality)
Source: Municipalities, 2017.

3.3. Data collection

Primary data was collected from farmers producing cowpea. The Information was collected by means of face-to-face interviews, using a structured questionnaire. The questionnaire focused on individual farmers, and the questions were based on finding out about the socio-economic factors, cowpea production, other crops production, quantities of cowpea sold and cowpea value chain amongst other variables.

3.3.1. Sampling procedure

A sample size of 80 cowpea farmers was used in this study. A purposive sampling technique was used to identify farmers in this study. Purposive sampling is a non-probability sampling technique, which is a deliberate choice of an informant due to the qualities an informant possesses. (Tongco, 2002). Bernard 2002, Lewis and Sherpard 2006 as cited by (Tongco, 2002) further explains that with purposive sampling, the researcher decides what needs to be known, and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. Therefore, the study areas were chosen on the basis that the farmers in the area were representative of what the study was aimed at, particularly given the fact that all the farmers were producing cowpea.

3.3.2. Data analysis

Data was captured and analysed using SPSS 24.0. Binary logistic regression analysis was used for defining the determinants of marketing efficiency of cowpea farmers. In determining whether the cowpea farmers were market efficient or not, marketing efficiency measure was used for calculations. For descriptive statistics; mean, averages and frequencies were calculated, pie charts and bar charts were also used to describe the socioeconomic characteristics of smallholder cowpea farmers at Ga-Molepo and Bela-Bela areas.

3.4. Analytical methods

The study applied three methods in analysis of data as per the main objectives. In describing the socioeconomic characteristics of cowpea farmers, descriptive statistics in the form of charts, frequencies and mean/averages were used. In identifying and defining the role players along cowpea value chain, a value chain for cowpea was constructed. Marketing efficiency measure was used in determining the marketing efficiency of smallholder cowpea farmers. Lastly, binary logistic regression model was used to examine the determinants of marketing efficiency.

3.4.1. Descriptive statistics

Descriptive statistics in the form of mean, frequencies, pie charts and bar charts was used to describe the socioeconomic characteristics of cowpea farmers in Capricorn and Waterberg districts.

3.4.2. Value chain mapping

To identify and define role players along the cowpea value chain, a value chain map in the form of a flow chart was constructed. A flow chart is an easier tool to use in a sense that it can demonstrate a number of stages in the value chain by which a product goes through before it reaches the final consumer.

3.4.3. Marketing efficiency measure

According to Rit (2014), marketing efficiency is the ratio of market output (satisfaction) to marketing input (cost of resources). An increase in this ratio represents increased efficiency, and a decrease denotes low efficiency. Therefore, in analysing if the farmers are efficient or not in marketing their cowpeas, the costs of resources employed has to be less than the output produced from the limited resources.

Therefore, marketing efficiency can be measured by using the marketing efficiency measure. This method for measuring marketing efficiency was given by Acharya and Agarwal (2001). The method is known for its simplicity in calculating marketing efficiency and ease of interpretation.

The method is given by:

$$ME = \frac{NFP}{TMC+TMM}$$

Where ME = Marketing Efficiency, NFP =Net Price Received by Farmers, TMC = Total Marketing Cost, TMM = Total Marketing Margin.

For a farmer to be efficient in marketing, ME = > 1 indicates efficiency and <1 shows inefficiency (Longwe *et al.*, no date available. Date accessed: 03-02-2016).

3.4.4. Binary logistic regression model

To examine the determinants of marketing efficiency, binary logistic regression model was used. Logistic regression is a statistical method used to predict a categorical (usually dichotomous) variable from a set of predictor variables (Wuensch, 2015). With this model, there can be one or more independent variables that determine the outcome, where there are only two possibilities for the outcome.

The assumption is that P (Y=1) is the probability of the occurring event, therefore it is important that the dependent variable is coded accordingly. The factor level 1 of the dependent variable should represent the desired outcome. Another fundamental assumption is that the binary logistic regression model assumes linearity of the independent variables and the log odds.

The general Binary Logistic Regression Model is expressed as follows:

$$\text{Log (P)} = \ln\left(\frac{Pi}{1-Pi}\right) = \alpha + \beta_i X_i + \ldots + \beta_k X_k + U_i$$

Where $\ln\left(\frac{Pi}{1-Pi}\right)$ is the natural log of the odds, P_i is the probability that the farmer is market efficient, 1-P_i is the probability that the farmer is not market efficient, β_i is the estimated parameter, X_i is the explanatory variable and U_i is the disturbance term.

The model is specified as follows: $ME = \beta_0 + \beta_1 AGE + \beta_2 GNDR + \beta_3 HSLDSZ + \beta_4 EDLVL + \beta_5 OCCPT + \beta_6 LNDOWN + \beta_7 FRMEXP + \beta_8 QNTYSLD + \beta_9 INCMGNRTD + \beta_{10} MRKTACC + Ui$

Table 3.1: Description of variables

Variables	Description	Unit of measurement	Expected sign
Dependent variable			
Marketing efficiency	1 if farmer is efficient in marketing, 0 otherwise	Dummy	
Independent variables			
X_1 = AGE	Age of the farmer	Years	+
X_2 = GNDR	1 if farmer is male, 0 otherwise	Dummy	+
X_3 = HSLDSZ	Number of people in the household	Number	+
X_4 = EDLVL	Years of formal education	Years	+
X_5 = OCCPT	Occupation of the farmer	Category	+/-
X_6 = LNDOWN	1 if farmers owns land, 0 otherwise	Dummy	+/-
X_7 = FRMEXP	Years a farmer has been farming cowpea	Years	+
X_8 = QNTYSLD	Quantities of cowpea sold	Kg	-
X_9 = INCMGNRTD	Income generated from selling cowpea	Rand	+/-
X_{10} = MRKTACC	1 if farmer has formal market access, 0 otherwise	Dummy	+

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1. Introduction

The aim of this chapter was to present value chain mapping of cowpea farmers in Ga-Molepo and Bela-Bela, how the marketing efficiency was measured and also findings from descriptive analysis regarding the determinants of marketing efficiency of these cowpea farmers. In this chapter, the nature of the data used is described and also summaries of the variables that were considered and their measurements. The results were presented using tables and charts, and then interpreted individually. Binary logistic regression model was used to examine the determinants of marketing efficiency; the empirical results are also discussed in this chapter.

4.2. Value chain mapping

The main aim of the study was to map the value chain of cowpea and analyse whether particularly smallholder cowpea farmers are profitable along the chain. Kaplinsky and Morris (2001) described value chain as a description of range of activities which are required to bring a product or a service from conception, through the different phases of production which involves a combination of physical transformation of inputs of various producer services to the final consumers. A value chain enables all the participants involved to understand the activities that take place on each stage to add value to the product. From an agricultural perspective, Miller and Jones (2010) as cited by Adeoye *et al.* (2013) defined value chain as a full range of activities and participants involved in moving agricultural products from inputs suppliers to farmers' fields, and ultimately to the consumers.

Furthermore, value chain mapping on the other hand involves creating a visual representation of the connection between actors in the value chain analysis as well as other stakeholders as explained by McComick and Schmitz (2001). In mapping the value chain for cowpea in Ga-Molepo and Bela-Bela, smallholder cowpea farmers were asked questions regarding what takes place from point of cowpea production to how they get their products to the consumers. The value chain mapping showed different stakeholders' participating in cowpea value chain; the relationships and linkages are as shown in figure 4.8 below.

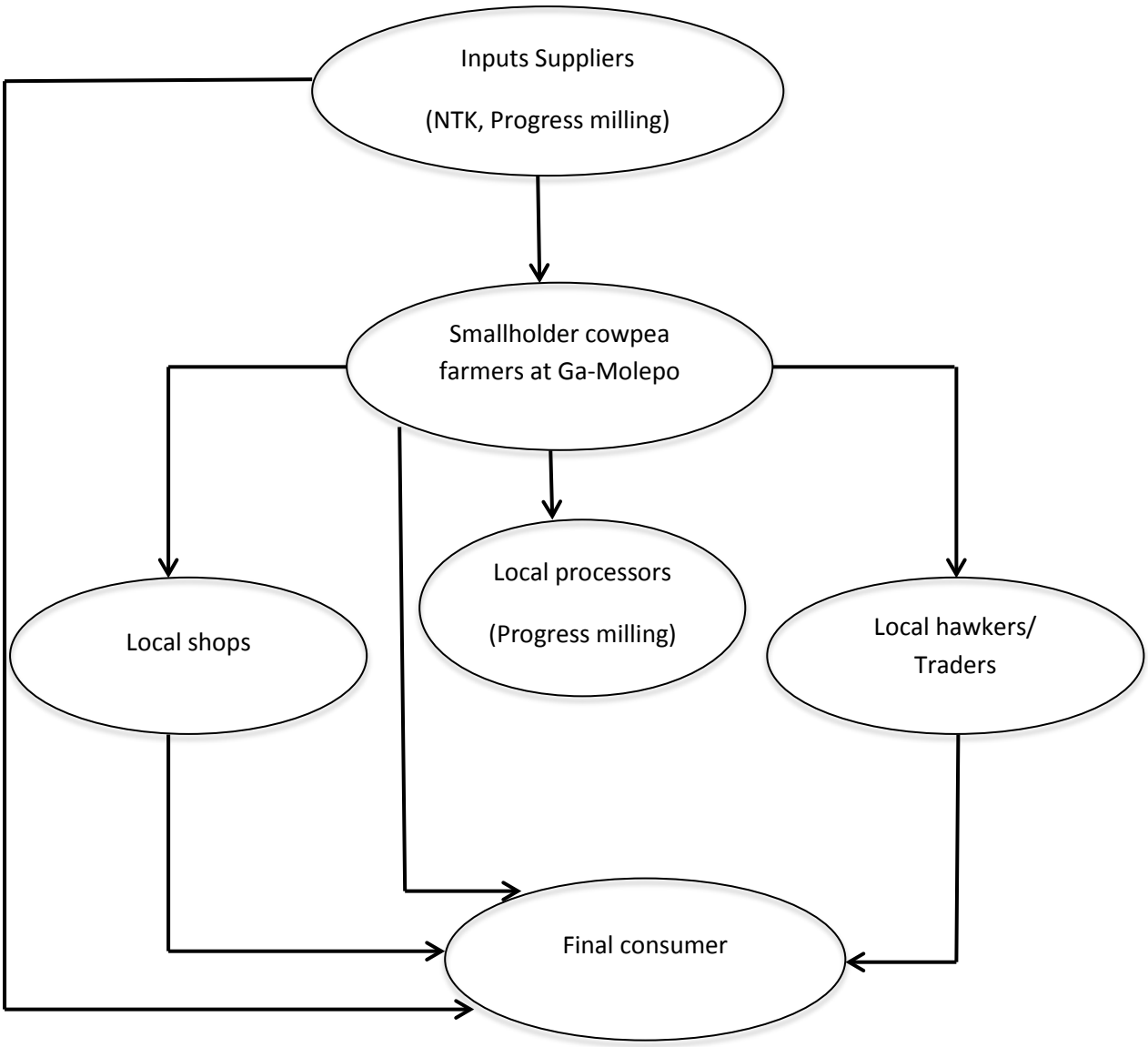


Figure 4.8: Value chain mapping of cowpea in Ga-Molepo

Source: Survey data, 2017.

Several farmers at Ga-Molepo engage in agricultural farming, particularly cowpea amongst other crops. From figure 4.8 above, it shows that the farmers purchase inputs from the suppliers. These include seeds, fertilizers and pesticides. Although growing cowpea does not need application of fertilizers as it fixes nitrogen in the soil, the fertilizers are bought so as to strengthen the soil further for planting of maize. These farmers intercrop cowpea with maize and for this reason; too much fertilizer is not applied. During the interviews, some of the farmers growing cowpea indicated that they usually take their cowpeas to local processors and these processors sold the cowpea to final consumers and other participants on the chain.

4.2.1. Participants on the cowpea value chain and their roles at Ga-Molepo

a) Inputs suppliers

The input suppliers in the study area included NTK, General Dealers, Progress Milling and Department of Agriculture. These participants are responsible for supplying inputs to the farmers, such as; fertilizers and pesticides. The farmers are able to ask for more information from these participants regarding cowpea production and other agriculture-related matters.

b) Smallholder cowpea farmers

The role smallholder cowpea farmers played on the value chain is that they served as a link between input suppliers and consumers. These farmers played the main role on the chain by adding value through production of cowpea and made it available to consumers. On the other hand, these cowpea farmers served as a market for input suppliers like NTK, General Dealers and Progress Milling. After production, farmers packaged cowpea in different sizes.

c) Local shops

These participants are able to buy cowpeas in surplus at a low price from the farmers and later sell to the consumers at higher price than initially bought. The reason behind this is that they have done value addition to the product in the form of packaging; making it attractive for the consumers to buy and also storage.

d) Local processors

Smallholder cowpea farmers take their seeds to the processing company, where local processing adds value to cowpea by cleaning, grading and storing the product. Since farmers do not have the facilities to store and grade their produce, they take their post-harvests to local processors.

e) Local traders/hawkers

The role of these participants along the value chain is that they help farmers in generating more sales from their harvest. They sell various fruits and vegetables as a way of earning a living. Cowpea is common in local communities for its importance as a relish to supplement maize. Informal traders served as a link between suppliers and consumers, also a reliable market for the farmers. The informal traders bought

cowpea seeds in larger quantities from farmers. Cowpea would be packaged in different sizes ready to be sold, however the how the product was packaged did not involve too much value addition. Generic packaging was employed to make the product more presentable.

f) Final consumers

Final consumers as participants on the cowpea value chain included people in the surrounding villages and towns. The role these participants played on the cowpea value chain is that they make farmers be aware of what kind of seeds needs to be produced. Final consumers also serve as the main market for cowpea farmers, informal traders, local wholesalers and input suppliers in Ga-Molepo in a sense that they have a choice to buy from different participants on the cowpea value chain.

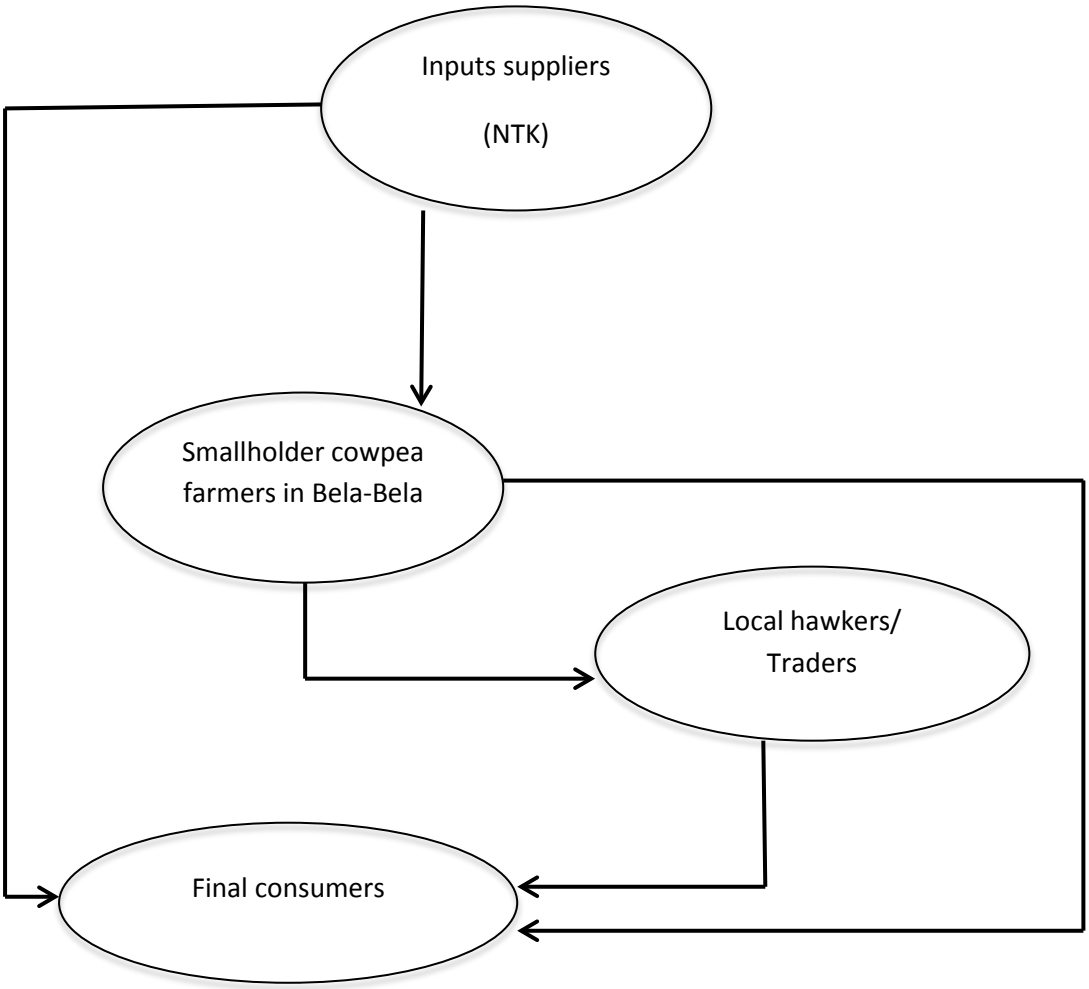


Figure 4.9: Value chain mapping of cowpea at Bela-Bela of Waterberg district

Source: Survey data, 2017.

Bela-Bela is a small area in the Waterberg district, which is a few kilometres away from Gauteng province. The farmers in this area are predominantly small-scale producing mostly for own consumption and income generation. They grow mostly sunflower, maize, sorghum, sugar beans, butternuts, sugarcane and cowpea. The smallholder farming in this area also includes livestock, which mostly involves cattle farming. Some of these farmers also produce fruits and vegetables in larger scales as compared to cowpea, because they are able to take their produce to the Johannesburg fresh produce. Cowpea production in Bela-Bela is still at a low level, where smallholder farmers grow the crop mainly for consumption. A few of the farmers interviewed, were able to produce the crop for both consumption and income generation. In mapping the value chain, farmers indicated that they bought the seeds from the suppliers in town, plant them and sell to the people.

4.2.2. Participants and their roles on the cowpea value chain in Bela-Bela

a) Input suppliers

Input suppliers in Bela-Bela comprised of NTK as the main supplier of agricultural production inputs. They are responsible for supplying inputs to the farmers, such as seeds, fertilizers and pesticides. The farmers are able to ask for more information regarding what they are producing, and the suppliers are able to help them.

b) Smallholder cowpea farmers

The role smallholder cowpea farmers play in adding value to the cowpea production; is to produce the crop in a suitable manner as much as they can, to have quality yields available to consumers. The smallholder cowpea farmers in Bela-Bela also served as a link between input suppliers and the final consumers. However, final consumers also served a market for these cowpea farmers as major part of their harvest was consumed by people from the neighbouring villages.

c) Informal traders/hawkers

The role of these participants along the value chain is that they help farmers in generating more sales from their harvest, but also making profit in the process. The local hawkers buy cowpea seeds from the farmers, and direct the sales to the final consumer.

d) Final consumers

These participants are the most important on the value chain, because without this linkage there would be no value chain as they serve as the main market for input suppliers, smallholder cowpea farmers and informal traders. They add value to cowpea in that they make farmers know what kind of seeds needs to be produced; as these consumers are always looking to get the best value for their money.

4.3. Marketing efficiency

Table 4.2: Frequency and percentage of farmers' marketing efficiency and inefficiency

	Frequency	Percentage (%)
Marketing efficiency	53	66
Marketing inefficiency	27	34
Total	80	100

Source: Survey data, 2017

Table 4.2 above shows the frequencies and percentages of smallholder cowpea farmers in being efficient and inefficient in marketing cowpea. Results from descriptive statistics revealed that 53 (66%) of 80 farmers were efficient in marketing cowpea while the remainder being 27 (34%) farmers were inefficient.

4.4. Descriptive statistics of cowpea farmers in Ga-Molepo of Capricorn district and Bela-Bela of Waterberg district.

Table 4.3: Frequencies of socio-economic characteristics of the sampled farmers

Variables	N	Minimum	Maximum	Mean/Ave	Std. Dev
Age of the farmer	80	26	83	63.93	10.459
Household size	80	1	12	5.36	2.414
Years in schooling	80	0	15	7.36	3.671
Years in growing cowpea	80	1	45	9.38	12.099
Income generated from selling cowpea	80	200	2000	680.63	542.293

Source: Survey data, 2017.

4.4.1. Age

The mean age of smallholder cowpea farmers was 63.93 years. The minimum age of cowpea farmers in Ga-Molepo and Bela-Bela is 26, and the maximum being 83.

4.4.2. Household size (Number of people in the household)

The average household size was 5.36, the minimum number of people found living in a household was 1, while maximum was 12. With the average and maximum numbers being as stated, this is likely to imply that family labour was more used than hired labour.

4.4.3. Years in schooling

Most farmers are considered to be illiterate and lack formal schooling experience. The results from descriptive statistics showed that the minimum number of years a farmer has been to school is 0, while maximum is at 15 and average years of schooling are 7.36.

4.4.4. Years in farming

The minimum number of years a farmer has in farming cowpea was 1 year, which includes those farmers that had just started farming cowpea and has less than one year. The maximum number of years being 45 and the mean/average is 9.38 years.

4.4.5. Income generated from selling cowpea

The results acquired from descriptive statistics showed that the minimum amount of money cowpea farmers got from selling their cowpea was R200. From the farmers that were interviewed, some did not have a reliable market, because they had just started planting cowpea. The maximum amount of money cowpea farmers got from their sales was R2000, while the average was R680.83.

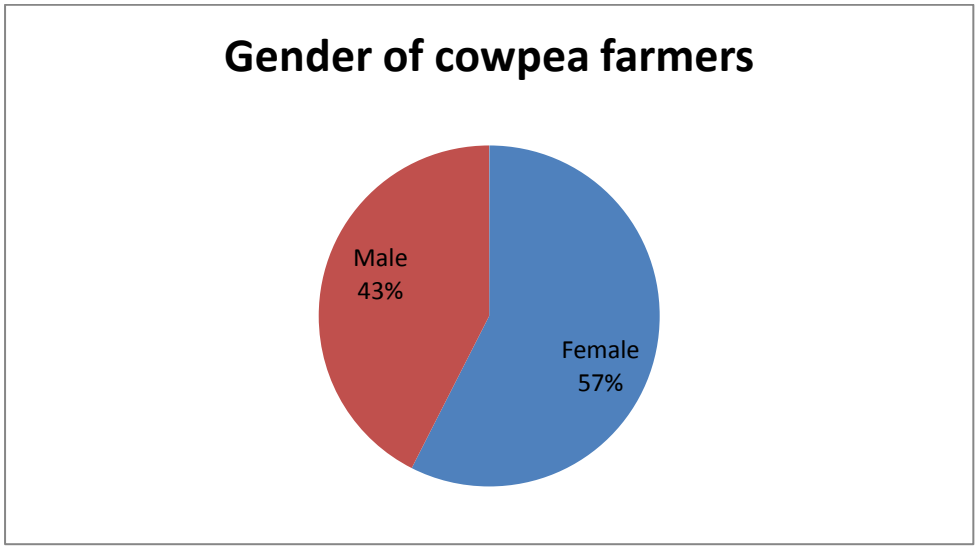


Figure 4.10: Gender of cowpea farmers

Source: Survey data, (2017)

4.4.6. Gender of cowpea farmers

Figure 4.10 shows gender of cowpea farmers, indicating which gender is more involved in cowpea farming. The results showed that more women were involved in cowpea farming with 57% and their male counterparts having just 43% . Cowpea farming has always been considered a women's job, that's probably the reason why there are more women participating in cowpea farming than men.

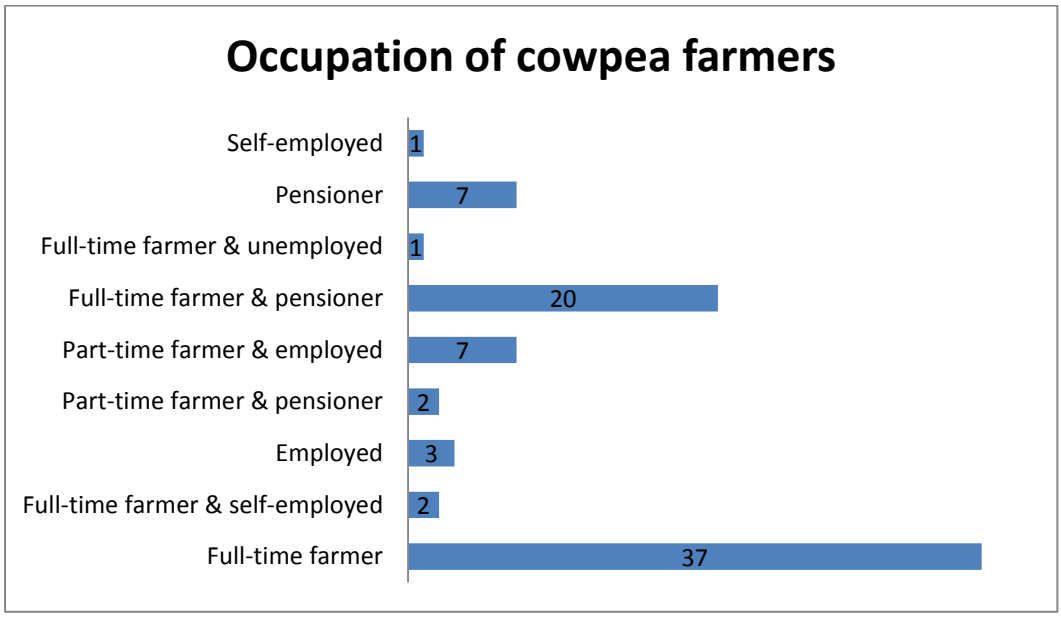


Figure 4.11: Occupation of cowpea farmers

Source: Survey data, 2017.

4.4.7. Occupation of cowpea farmers

Different activities that farmers are involved in (excluding farming) are among the major factors that affect farmers' level of production. Highlighting and discussing these activities can pinpoint on the reasons why cowpea farmers are succeeding or failing in producing cowpea. Activities like occupation of the farmer is relevant in showing us whether it leads to a farmer succeeding or failing in cowpea farming. Figure 4.11 presents results of the occupation of the farmer. The results showed that 37 out of 80 respondents were full-time cowpea farmers, followed by those who were full-time farmers and on pension at 20. Few farmers who are farming cowpea were either self-employed, pensioners and employed or unemployed.

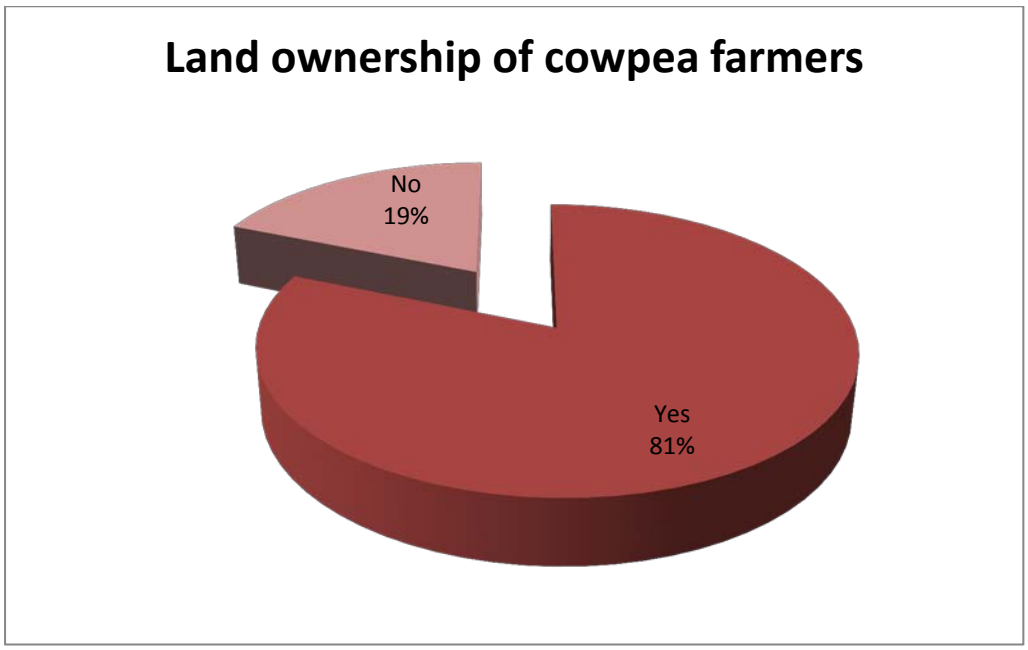


Figure 4.12: Land ownership of cowpea farmers
Source: Survey data, 2017.

4.4.8. Land ownership of cowpea farmers

Land is one of the most important factors in agricultural practices. A farmer who owns land is more likely to be productive than a farmer with inherited or leased land. Land ownership gives security in cases where a farmer needs capital to start or continue with their farming practices. Figure 4.12 showed that 81% of the farmers farming cowpea owned land, whereas 19% did not have land ownership. However, with respect to this study having no land ownership did not mean the farmers had no access to land.

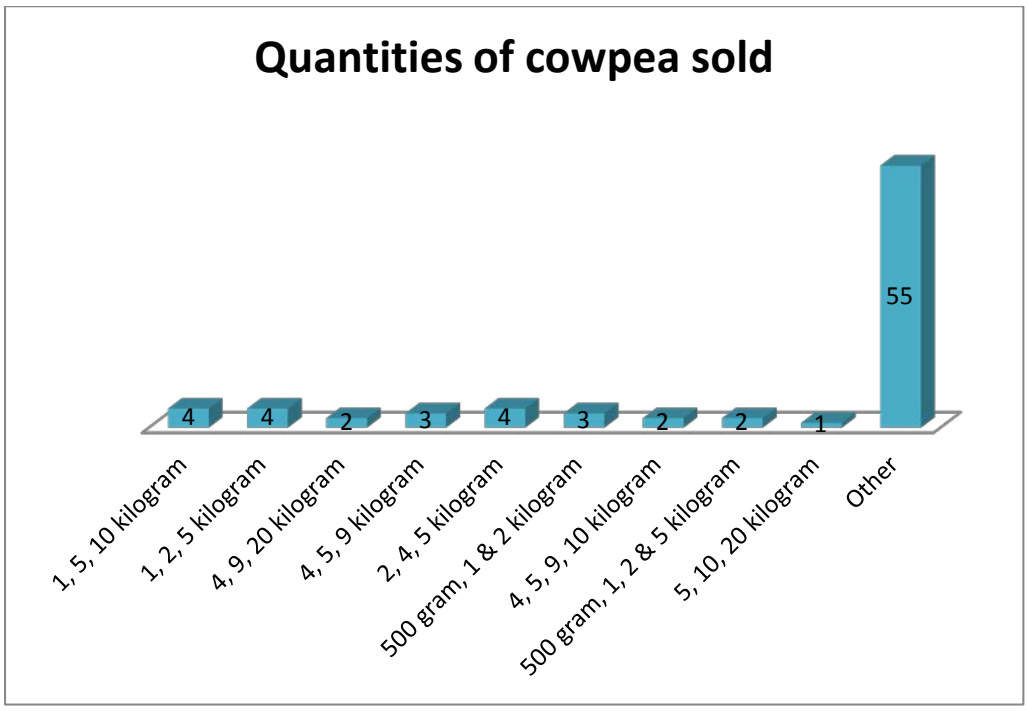


Figure 4.13: Quantities of cowpea sold

Source: Survey data, 2017.

4.4.9. Quantities of cowpea sold

One of the determinants of farmers being profitable when selling their produce is the quantities of cowpea sold. Studies have shown that farmers are more likely to make profit if they sell their products in small kilograms, that way consumers have a choice of coming back to buy more if they like the product. With regards to quantities of cowpea farmers sold their produce, figure 4.13 shows that out of the 80 respondents that were interviewed, only few farmers sold their cowpeas at 1, 5, 10 kilograms; 1,2,5 kilograms; 500 grams, 1& 2 kilograms; 500 grams, 1,2 & 5 kilograms and 5, 10, 20 kilograms. The “other” represents those cowpea farmers who were selling cowpea in different scales other than the measurements mentioned including larger kilograms such as 10 and 20 kilograms only.

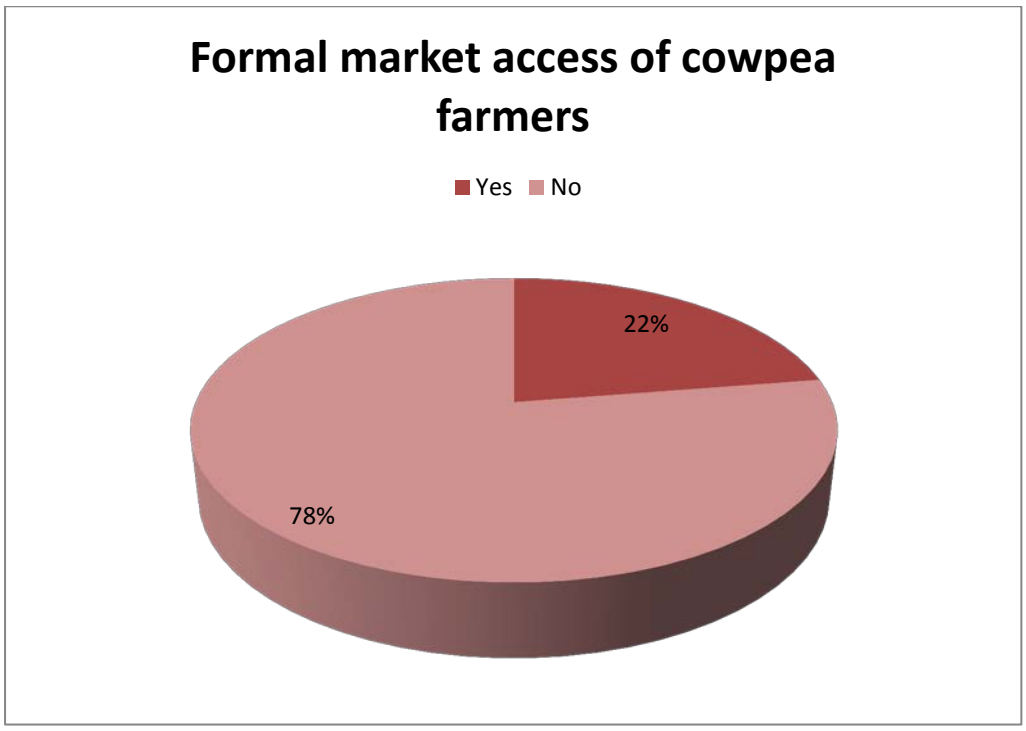


Figure 4.14: Formal market access of cowpea farmers
Source: Survey data, 2017.

4.4.10. Formal market access of cowpea farmers

Access to markets is a vital requirement for the poorly resourced farmers in rural areas, if they are to enjoy the benefits of agricultural growth. In this regard, it is important that farmers have access to formal sufficient markets, that way they will be able to realise higher returns from selling their products. Figure 4.14 depicts that only 22% of cowpea farmers had access to a formal market, whereas a greater margin of 78% had no access to formal markets. Meaning that the 78% represented those farmers had access to informal market. This could be because some of the cowpea farmers had just started selling cowpea, therefore contributing to a larger percentage of 78% of those who had access to informal market.

Table 4.4: Results from binary logistic regression model for examining the determinants of marketing efficiency of cowpea farmers in Ga-Molepo and Bela-Bela

Predictor variables	**Coefficient (B)**	**SE**	**Wald**	**Sign**	**Exp(B)**
Constant	-21.002	14.729	2.033	.154	.000
Age of the farmer	.435	.195	4.977	.026*	1.545
Gender of cowpea farmers	-2.831	1.852	2.336	.126	.059
Household size	1.710	.780	4.804	.028*	5.530
Years of schooling of cowpea farmers	1.014	.536	3.583	.058**	2.756
Occupation of cowpea farmers	-1.137	.520	4.787	.029*	.321
Land ownership of cowpea farmers	-2.614	6.097	.184	.668	.073
Years of growing cowpea	-.259	.129	4.015	.045*	.772
Quantities of cowpea sold	-.581	.301	3.724	.054**	.559
Income generated from selling cowpea	-.016	.007	5.932	.015*	.984
Access to formal market	-.332	1.592	.044	.835	.717
Model summary					
Chi-square (df=8)	.626				
-2 Log likelihood	16.565				
Cox & Snell R Square	.658				
Nagelkerke R Square	.911				
Note at * ,**, indicate significant at 0.05 and 0.10 respectively					

Source: survey data, 2017.

4.5. Results and discussion from binary logistic regression model

Table 4.4 showed results from binary logistic regression model which indicated that seven variables (age, household size, years in schooling, occupation of the farmer, years in farming cowpea, quantities at which cowpea is sold, income generated from selling cowpea) out ten variables that were regressed were significant in influencing the marketing efficiency of cowpea farmers in Ga-Molepo and Bela-Bela. The model was tested for goodness of fit using Hosmer and Lemeshow's goodness-of-fit for logistic regression models. Hosmer and Lemeshow test showed a Chi-square value of 62.6 and statistically significant at 1.000, implying that the model fit the data well.

With regard to coefficient of determination (R^2), for regression models with categorical dependent variable such as the binary logistic regression, it is not possible to compute the R^2. Therefore, approximations such as the Nagelkerke R^2 is calculated instead. Nagelkerke R^2 was used in this study as a proxy estimate to R^2 that measures the variation in the response that is explained by the model. The Nagelkerke R^2 was found to be 91.1% which indicates that 91.1% of the variation in marketing efficiency of cowpea farmers is explained by the explanatory variables. The log likelihood value was 16.565 and the Cox and Snell R square was 65.8%.

4.5.1. Age

The results showed that age had a positive coefficient of 0.435 and was statistically significant at 5% level. The positive coefficient suggests that there is a positive relationship between age and marketing efficiency of smallholder cowpea farmers. A study done by Oteh and Njoku (2014) found that age was negatively significant to marketing efficiency of farmers. The authors highlighted that it was expected that with an increase in age of the farmer, will bring about a decrease in marketing efficiency since as a farmer gets older the less likely he/she is to adopt new technologies to improve his marketing efficiency. This is however not consistent with findings from Farayola *et al*. (2013), who found that an increase in age of the farmer leads to an increase in their marketing efficiency. This also corroborated by the results from descriptive statistics of this study that showed that the maximum age of farmers producing cowpea is 83, the average being 63 and minimum is 26. Although, most of the times farmers are regarded as being illiterate, and therefore can't adopt new methods introduced; experience is an important factor in this regard. Cowpea farming can be tiring to plant and therefore needs people with patience and passion for the crop. Ovwigho and Ifie (2009) as cited by Adesina and Eforuoku (2016) mentioned that youth recently are not interested in hard labour more especially agriculture, as they perceive it as being hard and dirty.

4.5.2. Household size

Household size was found to be statistically significant at 5% level, p-value of 0.026 with a positive coefficient of 1,710 and odds ratio of 5.530. This showed that the number of people in the household had a positive influence on marketing efficiency of cowpea farmers. As a household size increases, the odds that the farmer will use family labour to increase his marketing efficiency is 5.530 more likely holding all

other independent variables constant. This is supported by Oteh and Njoku (2014) indicating that household size was established to be positively significant at 5% level. It is further stated that large household sizes are virtually seen as an advantage in terms of contributing to labour and as such, perceived as a source of cost reduction. In support of this statement, Etwire *et al.* (2013) also found that there is a positive relationship between household size and participation in agricultural practices. It has been indicated that a farmer with a large household can delegate other important activities to other household members, while he participates in agricultural projects.

4.5.3. Years of schooling

Number of years of schooling of a household head was found to be significant at 10% with a p-value of 0.058. the number of years a farmer has been to school has an impact on how a farmer responds to adopting information, or even new technology that will help them to improve their marketing efficiency. Nnadi and Akwikwu (2008) also mentioned that years in schooling affects the use of information efficiently, emphasizing that the more years a farmer has been to school the less likely he is to have difficulty with adopting modern agricultural technologies. However, Farayola *et al*. (2013) found that years in schooling of a farmer were highly significant but negatively related to marketing efficiency. The results were in contrast with former expectations as it was expected that education should enhance the level of market information, hence marketing efficiency.

4.5.4. Occupation of cowpea farmers

Occupation of cowpea farmers had a negative influence on the marketing efficiency of cowpea farmers. The variable was significant at 5% level, a p-value of 0.029, a coefficient of 1.137 and a log odds ratio of 0.321. The descriptive statistics on occupation of the farmer indicated that a farmer did not solely had farming as an occupation but had other work commitments besides farming, only 37 farmers out of 80 respondents were full-time farmers. The negative relationship means that the more jobs a farmer had, while holding all other variables constant reduced the likelihood of a farmer being market efficient. However, Adesina and Eforuoku (2016) and Nnadi and Akwikwu (2008) indicated that parent's engagement in farming as an occupation was significant as a determinant of youth participating in agriculture. This corroborates to the fact that occupation of a farmer does influence how successful a farmer will be in their agricultural production.

4.5.5. Years of growing cowpea

Years in growing cowpea was found to have a negative influence on the marketing efficiency of farmers. Years in farming cowpea had a significant level of 5% and negatively related with a coefficient of -0.259. Years in farming cowpea was expected to be positively related with marketing efficiency, as with experience comes knowledge on how to be market efficient. A study done by Adenuga *et al.* (2013) on " Marketing efficiency and determinants of marketable surplus in vegetable production" found that there was significance and positive relationship between years in farming (experience) and marketing efficiency of farmers. It was indicated that farming experience may be due to the fact that experienced farmers are more enlightened and thereby they are well familiar with the efficient marketing of their marketable surplus and were able to reduce market loss. However, Farayola *et al.* (2013) found that there was no significance and relationship between marketing experience and marketing efficiency of cocoa farmers.

4.5.6. Quantities of cowpea sold

Quantities of cowpea sold was found to be statistically significant at 10% , a p-value of 0.054 and a coefficient of -0.541 which indicates that the variable is negatively related to marketing efficiency. This means that with an increase in every quantity sold, there was a decrease in marketing efficiency of cowpea farmers. Since the descriptive statistics showed that more farmers had access to informal market (78%), this implied that consumers had freedom to buy cowpea where the quantities sold were at a reasonable price. An increase in quantities sold means that the prices were also increasing, and consumers are likely to get the best value for their money. Farayola *et al*., (2013) found that quantities sold of cocoa was not significant with marketing efficiency of farmers, but found that selling price was significant at 5% level and positively related to marketing efficiency. It was mentioned that a positive relationship between selling price and marketing efficiency could be because consumers are motivated by favourable selling price.

4.5.7. Income generated from selling cowpea

The variable income generated from selling cowpea was found to be statistically significant at 5% with a p-value of 0.015, coefficient of -0.016 and odds ratio of 0.984. Income generated by farmers from selling their cowpea was negatively related to marketing efficiency. This means that the amount of money the farmers

got from selling their products had no effect on how efficient they were in marketing. The results from the descriptive statistics showed that about only 22% of the farmers responded had access to formal market, while the remainder 78% had access to informal market. The lack of access to formal market could have had an effect on the income generated, and hence a decrease in marketing efficiency. Farmers did not have a stable and reliable market for source of income. However, these results are in contrast with findings of Oteh and Njoku (2014) who found that income generated by farmers from selling their products was highly significant and related to marketing efficiency, stating that an increase in income contributes to an increase in marketing efficiency.

4.6. Identifying marketing constraints among smallholder cowpea farmers.

The following table outlines some of the challenges farmers faced regarding production, marketing and selling cowpea.

Table 4.5: Constraints encountered in producing, marketing and selling cowpea

Challenges	Frequency	Percent (%)
Pests and access to markets	13	16.3
Lack of access to market	2	2.5
Pests and lack of access to credit	4	5.0
Lack of access to credit and market	6	7.5
Lack of information on how to process cowpea	9	11.3
Weeds and pests problems	6	7.5
pests	23	28.8
Pests and water shortages	8	10.0
Other	9	11.3
Totals	80	100

Source: Survey data, 2017.

Table 4.5 above showed a number of constraints that hinder farmers in marketing their cowpeas. The descriptive statistics indicated that amongst all the challenges/constraints farmers were facing, pests were the most problematic. This is due to the fact that cowpeas are subjected to weevils and other types of bugs, whereby they suck on pods and leave the outer part of the cowpea. This leads to farmers having nothing or less to sell, which is a big concern since they are losing

out on making bigger profits. These farmers are operating on small-scale basis and therefore do not have adequate storage facilities. However, some farmers do manage to send their cowpeas to progress milling facilities to store their produce. Farayola *et al.* (2013) highlighted that among problems facing cocoa marketers inadequate storage facilities, pests, diseases, price instability and high cost of transportation were the most problematic with pests and diseases ranking number one.

Chapter summary

This chapter presented findings of the study which was carried out in Ga-Molepo of Polokwane municipality and Towoomba of Bela-Bela municipality. The main aim of the study was to map the value chain of cowpea farmers in both areas, and also determine their marketing efficiency. The socio-economic characteristics of cowpea farmers as well as the determinants of marketing efficiency were described. Binary logistic regression model was used to measure the determinants of marketing efficiency of which seven variables (age, household size, years in schooling, occupation of the household head, years in farming cowpea, quantities sold of cowpea, and income generated from selling cowpea) were significant. However, occupation of the household head, years in farming cowpea, quantities of cowpea sold and income generated from selling cowpea were negatively significant. The constraints to marketing among smallholder farmers were also described.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter highlights the summary, conclusions and recommendations for the study. Firstly, is the summary of the findings from the study and how the research objectives were carried out. Secondly, the conclusions from the study are highlighted based on the findings; and lastly the recommendations are provided based on what the study has found.

5.2. Summary

The main aim of the study was to map the value chain and determine the marketing efficiency of smallholder cowpea farmers in Capricorn and Waterberg districts of Limpopo province. The objectives of the study were to: firstly identify and describe the socioeconomic characteristics of smallholder cowpea farmers. Secondly, identify and define the participants along the cowpea value chain. Thirdly, determine the marketing efficiency of smallholder cowpea farmers. Fourthly, to examine the determinants of marketing efficiency and lastly to identify marketing constraints among smallholder cowpea farmers.

Data was collected using structured questionnaire from 80 smallholder cowpea farmers using purposive sampling technique in Ga-Molepo of Capricorn district and Bela-Bela of Waterberg district. Data collected was analysed using descriptive statistics, binary logistic regression model and information regarding value chain was mapped to indicate the different stages cowpea goes through before reaching the final consumer. In determining the marketing efficiency of smallholder cowpea farmers, a marketing efficiency measure was used.

In addressing objective one, which was to identify and describe socioeconomic characteristics of smallholder cowpea farmers, descriptive statistics was used. Objective two being to identify and define the participants along the cowpea value chain, was addressed by a value chain map showing all the stakeholders involved before the product reaches the final consumer. Addressing objective three, which was to determine the marketing efficiency of smallholder cowpea farmers, a marketing efficiency measure was used to find out if a farmer was efficient or inefficient in marketing their product. Objective four, which was to

examine the determinants of marketing efficiency, was addressed using binary logistic regression model. In addressing the last objective, to identify marketing constraints among smallholder cowpea farmers, descriptive statistics was used.

Two null research hypotheses were formulated:

First hypothesis - smallholder cowpea farmers in Capricorn and Waterberg districts are inefficient in marketing cowpea

Second hypothesis - socioeconomic characteristics of smallholder cowpea farmers have no effect on their marketing efficiency.

Both hypotheses were rejected. For hypothesis one, which stated that smallholder cowpea farmers in Capricorn and Waterberg districts are inefficient in marketing cowpea was rejected based on the marketing efficiency measure that was used to determine each farmer's marketing efficiency. Descriptive statistics results indicated that 53 out of 80 farmers, which made it to be 66% of the farmers were efficient in marketing cowpea. This is also supported by the results from binary logistic regression model that revealed that of the variables that were considered, 7 out 10 variables were significant in determining marketing efficiency of cowpea farmers.

Second hypothesis which stated that socioeconomic characteristics of smallholder cowpea farmers have no effect on their marketing efficiency; results from binary logistic regression model revealed variables age of the farmer, household size, years in schooling, income generated from selling cowpea and occupation of the farmer had positive influence to marketing efficiency. Variables such as occupation of the farmer, years in farming cowpea, quantities of cowpea sold and income generated from selling cowpea were found to have had a negative influence on the marketing efficiency of cowpea farmers in both Ga-Molepo and Bela-Bela.

5.3. Conclusion

Value chain mapping in Ga-Molepo of Capricorn district indicated that the main participants on cowpea value chain were input suppliers, smallholder cowpea farmers, local wholesalers, local hawkers/traders, local processing companies, contractors then the final consumer. It was indicated that each participant on the

value chain added value to the product to ensure profitability, while on the other hand final consumers got value for their money.

In Bela-Bela of Waterberg district the value chain map showed that the main participants on the value chain of cowpea were inputs suppliers, smallholder cowpea farmers, local hawkers/traders and final consumers. Most farmers in Bela-Bela are engaged in farming particularly sunflower, maize and other types of beans. Cowpea is produced at a small-scale level hence; there are not many participants on the value chain. Farmers in this area have great interest in farming cowpea in masses. Lack of information on how to farm cowpea to be profitable, lack access to high yielding, pests and heat resistant seeds inhibit the farmers in succeeding.

Using the marketing efficiency measure to determine if smallholder cowpea farmers were efficient or inefficient, it was found that 66% of the farmers were efficient and 34% of the farmers were inefficient. Binary logistic regression model was used to examine the determinants of marketing efficiency. Age of the household head, household size, years in schooling were found to be positively significant; while years in farming cowpea, income generated from selling cowpea, quantities at which cowpea is sold and occupation of the household head were found to be negatively significant. The implication of these negatively significant variables is that the likelihood of smallholder cowpea farmers being market efficient decreases with years in farming, income generated from selling cowpea, quantities of cowpea sold and occupation of the farmer. Other variables that were considered were gender of the household head, access to formal market and land ownership of which they were all found to be negatively significant. This implies that these variables had no impact whatsoever in influencing the marketing efficiency of smallholder cowpea farmers.

Constraints which smallholder cowpea farmers encountered with regards to production, marketing and selling cowpea were identified. Amongst the constraints encountered which included lack of access to formal market, lack of information on how to process cowpea, weeds, water shortages etc. pests problems were ranked to be the main challenge farmers are faced with regarding cowpea production.

5.4. Recommendations

Most smallholder farmers focus mostly on producing maize and other subsistence crops, they do not have enough information on producing other staple food such as cowpea. However, most literature has not provided adequate information regarding cowpea production and marketing. Smallholder farmers do not have the resources and capacity in terms of land. Storage facility was found to be one of the challenges smallholder cowpea farmers were faced with. In ensuring that their cowpea post-harvest production was not lost due to insects, they had to make sure that they sold their harvest immediately and at a so-not competitive price.

This study revealed that with proper funding from government and other agricultural financial institutions, smallholder farmers have the potential to succeed in making food value chains beneficial. It was also revealed that farmers at Bela-Bela do not have enough information on cowpea production to make it a profitable business, only few farmers are producing cowpea. Therefore, it is recommended that government (value chain analysts, policy makers and extension workers) together with other stakeholders assist in ensuring that food value chains relationships are established so that market opportunities can be created for smallholder cowpea farmers.

Age was found to be significant and most of smallholder cowpea farmers were old people dominated by female household heads. Aged people are the ones who appreciate farming more than young people, thus it is recommended that farmer schools be introduced in rural areas. At these schools, farmers can be taught about basic knowledge relating to agricultural production. Farmers should also be trained on adopting technologies that will make production more efficient and easier. Knowledge form a crucial part in the success of smallholder agricultural production, as it has it has been observed that years of schooling was significant factor contributing to marketing efficiency of smallholder cowpea farmers. The farmers could also be taught about bookkeeping systems, whereby they are able to see costs of production and marketing; and if they are making profit in operating their operations.

Household size was also found to be significant factor in determining smallholder cowpea farmers' marketing efficiency. Therefore, if farmers can form cooperatives wherein they produce in groups, government is most likely to be quick to help such farmers in terms of funding and in providing the resources to work with. When farmers come together as a collective, they display a sense of unity and determination towards accomplishing their goals and that makes it easier for funding organisations to approach such farmers. Cooperatives also help in ensuring that farmers within those cooperatives are able to get a bigger land to enable them to produce different crops.

5.5. Areas of further research

This study was aimed at mapping the value chain and to determine the marketing efficiency of smallholder cowpea farmers in Ga- Molepo of Capricorn district and Bela-Bela of Waterberg district only. It was found that cowpea farmers in Ga-Molepo produce cowpea as much maize is produced and that different participants were involved in cowpea value chain. However, there is still limited information regarding the importance of cowpea production as a staple food in Ga-Molepo and Bela-Bela. Due to limited time constraint, it is recommended that related researches be conducted in other areas of the province to extend the knowledge of cowpea production and marketing. For future studies, perceptions on the use of improved varieties of cowpea seeds can also be assessed.

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APPENDIX A: QUESTIONNAIRE

TITLE: VALUE CHAIN MAPPING AND MARKETING EFFICIENCY OF SMALLHOLDER COWPEA FARMERS IN CAPRICORN AND WATERBERG DISTRICTS

The main aim of the study is to map the value chain of cowpea and determine marketing efficiency of smallholder cowpea farmers in Ga-Molepo of Polokwane municipality Capricorn district and Towoomba of Bela-Bela municipality in Waterberg district, Limpopo Province. This study is only for academic purposes and the respondents who will take part in this study will not be forced to participate, but will participate on voluntary basis and the information provided for, by the respondents will be treated with confidentiality and not be used for anything else other than for this study.

RESEARCHER: CHRISTINA MAGOSEA MASEGELA

ENUMERATOR'S NAME: ……

DATE OF INTERVIEW: ……

NAME OF THE RESPONDENT: ……

NAME OF MUNICIPALITY: ……

QUESTIONNAIRE No.: ……

SECTION A: SOCIOECONOMIC CHARACTERISTICS

1. Gender of cowpea farmer:

1.Male	2. Female

2. Age of cowpea farmer: ……..

3. Marital status of the farmer:

1. Married	2. Single	3. Divorced	4. Widowed

4. Number of people in the household:

……

5. How many years of schooling do you have? …….

6. Level of education of the farmer

1. Never went to school	2.Completed primary school	3.Completed secondary school	4. Completed tertiary school	5. ABET

7. What is the occupation of the farmer?

1. Full-time farmer	2. Part-time farmer	3.Government employee	4.Employed	5.Unemployed	6.Self-employed	7.Pensioner

8. Source of income of the farmer

1. Salary	2. Farming	3. Social Grant	4. Pension	5. Others

9. If others, please specify ……

10. What is the income of the farmer per month? ……..

11. What do you use the money for?

1. Household purposes	2. Farming	3. Others

12. If others, please specify ……..

SECTION B: FARMING DETAILS

13. Do you have own land?

Yes	No

14. What is the size of your land? …….

15. Land ownership description

1. Own land	2. Leased	3. Purchased	4. Inheritance	5. Others

16. If others, please specify …….

17. For how many years have you been farming cowpea? …….

18. When do you start planting cowpea? …….

19. How many hectares of land do you use to produce cowpea? …….

20. Do you apply fertilizer?

Yes	No

21. If yes, how much do you spend on fertilizer? …….

22. Do you apply pesticides?

Yes	No

23. If yes, how much do you spend on pesticides? ……..

24. Do you use labour?

Yes	No

25. If yes, what kind?

1. Hired labour	2. Family labour	3. None	4. Others

26. If others, please specify …….

27. How many people do you hire? ……..

28. On average, how much do you pay each person per day? ……..

29. Do you produce any other crops?

Yes	No

30. If yes, which crops?

1. Maize	2. Sorghum	3. Sweet potato	4. Spinach	5. Others

31.If others, please specify ……..

SECTION C: VALUE CHAIN AND MARKETING DETAILS

32. Do you sell cowpea?

Yes	No

33. If yes, how much do you get from selling cowpea? ……...

34. At what quantity and price are selling cowpeas for?

Quantity	Price

35. Who do you sell cowpeas to?

1. Hawkers	2. Contractors	3. Directly to final consumer	4. Factories	5. Wholesalers	6. Middlemen	7. Retailers	8.Local supermarkets	9. Others

36. If others, please specify ……

37. Do you have access to formal market?

Yes	No

38. If yes, what is the distance to the market? ……..

39. How do you get your produce to the market?

1. Own transport	2. Hired transport	3. Buyers come by themselves	4. Others

40.If others, please specify ……

41. What type of costs do you incur when marketing your product?

1. Transport costs	2. Packaging costs	3. Handling costs	4. Storage costs	5. Others

42. If others, please specify ……

43. How much do you spend as per above? ……..

44. How much do you spend on moving your product to the market? ……..

45. Do you receive extension services?

Yes	No

46. If yes, for how long have been receiving the services? …….

47. How often do you receive the services?

1. Everyday	2. Once a week	3. More than once a week	4. Once a month	5. More than once a month	6. Others

48. If others, please specify ……

49. Who provides extension services?

1. Government department	2. Non-governmental organization	3. Development agent	4. Others

50.If others, please specify ……

51. Do you have access to agricultural information?

Yes	No

52. If yes, how do you access it?

1. Internet	2. Television	3. Radio	4. Farmers	5. Magazines	6. Farmers' meetings	7. Farmers' information day	8. Others

53.If others, please specify ……

54. Do you have access to formal agricultural credit?

Yes	No

55. If yes, what was the main purpose of borrowing?

1. Purchase land	2. Purchase farm implements	3. Purchase farm inputs	4. Debt repayment	5. Others

56. If others, please specify ……

57. Where do you access formal agricultural credit?

1. Commercial banks	2. Agricultural banks	3. Credit facilities	4. Government	5. Friends or family	6. Cooperatives	7. Others

58. If others, please specify……

59. Do you process cowpea?

Yes	No

60. If yes, how much do you pay for processing? ……

61. What other challenges do you encounter when producing, marketing and selling cowpea?

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