Social Grant Dependence, Irrigation Water Use and On-farm Entrepreneurial Spirit: A Behavioural Explanation for Smallholders in KwaZulu-Natal

By

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DEDICATION

This thesis is dedicated to God Almighty and my adorable family.

DECLARATION

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2. This thesis has not been submitted for any degree or examination at any other university.

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   Professor E.W. Zegeye (Supervisor)

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ABSTRACT

Unemployment, poverty, hunger and inequality still remain the key rural development challenges in South Africa. Since the demise of apartheid, one of the key objectives of the South African government has been to decrease the level of poverty and improve the quality of life for all South Africans. The government, in its efforts to alleviate poverty to the disadvantaged and vulnerable segments of communities, introduced several poverty reduction strategies such as the social grants. With social grants becoming the main source of income for most rural households in South Africa, there is a concern that poor rural households are turning away from small-scale agriculture as a result of their dependence on social grants. However, there is insufficient empirical research examining the possible effects of social grants on on-farm entrepreneurial spirit of smallholders. Therefore, this study ought to fill this knowledge gap by explaining the behaviour of smallholder farmers using a revealed preference (RP) method. While other previous studies have constructed entrepreneurship and psychological capital (PsyCap) indices following the stated preference (SP) method, this study adopted the RP method to construct entrepreneurial spirit and PsyCap indices using a behavioural approach. The study was also unique compared to other studies evaluating the impact of unearned income on utilising agricultural resources at their full capacity by farmers. Most studies in the past analyse the impact of social grants and remittances on agriculture separately. Thus, pooling social grants and remittances to analyse the impact of unearned income on the proportion of land operated makes this study different compared to other studies in the past.

The study was conducted in two irrigation schemes (Tugela Ferry and Bululwane) in the KwaZulu-Natal province, South Africa. Both purposive and stratified random sampling techniques were applied to select the respondents in this study. The study purposively selected small-scale farmers who were involved in food crop farming to allow for comparison between different farmer typologies. A stratified random sampling method was then used to select the respondents. Smallholder farmers were categorised into four types of farmers, namely, scheme irrigators (104), homestead food gardeners (32), community food gardeners (23) and non-irrigators (16). The reason for stratification according to the farmer type was to capture the developmental paths and challenges or constraints of progressing to the next level in each farmer type. A total sample of 175 farmers, comprising of different farmer typologies, was obtained in the selected irrigation schemes.

The data were analysed using descriptive statistics, Principal Component Analysis (PCA), a two-limit Tobit regression model and Fractional Logit model. The analysis of descriptive statistics was used to summarize the data set and to compare differences between farmer typologies including the household demographics and socio-economic characteristics. The Tukey's HSD post hoc test was conducted to indicate which of the specific farmer typologies differed from each other. The study used the PCA technique to create positive PsyCap indices (mainly capturing hope, resilience, self-efficacy and optimism) and on-farm entrepreneurial spirit indices (proactive, innovative, competitive and risk taking). The Keiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests were applied to test the assumptions underlying the use of PCA. A two-limit Tobit regression model was applied to estimate the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders. The Fractional Logit model was adopted in this study to analyse the impact of unearned income on smallholders' ability to utilize their resources at their full capacity.

The study found a positive relationship between social grants and on-farm entrepreneurial spirit. Though the level of packaging and processing fresh produce is generally low among small-scale farmers, it improves as the proportion of income from social grants increases. This implies that the lack of entrepreneurship among smallholders is caused by other factors. For example, results indicated low levels of education among smallholders making it difficult for them to search for information. Scheme irrigators were also found to be less entrepreneurial compared to other farmer typologies which can be attributed to failure of irrigation schemes. It is recommended that the policy makers revisit the idea of rehabilitation of schemes in the rural areas to revive entrepreneurial spirit among smallholders.

The findings also show that, while the proportion of unearned income has a negative impact on the proportion of land operated, the use of social grants as an investment in agricultural activities is positive. This implies that when social grants are used as an investment in agricultural activities, they indirectly meet the object of poverty reduction. More operated land means more agricultural production, more income, which in turn, reduces poverty or food insecurity among beneficiary households, *ceteris paribus*. However, when the grants are not invested in agriculture, this policy acts as a disincentive to agricultural production. In their design, social grants were never meant for use in agricultural production but they were expected to provide temporary relief to overburdened individuals or households so that they can meet their immediate needs. Thus, the policy itself as it stands, before considering the practice by rural households to invest the money in agriculture, does not encourage households to work for

themselves. The government and its strategic partners should review the policy and ensure that the unintended negative consequences on labour productivity in agriculture are minimized.

Male farmers put more land under cultivation compared to females. This indicated partial absence of women empowerment in the rural areas which is caused by current customary laws. It is recommended that strategies and interventions for empowering women farmers should be developed and implemented not only in irrigation schemes but in the broader smallholder agricultural sector. Women are the majority of smallholder farmers in irrigation and hence the future of smallholder agriculture cannot be certain without empowered women. Areas for empowerment include access to and control over resources, especially those that are critical in agricultural production such as equipment, education and training and entrepreneurial skills. Given the positive impact of social grants on rural households' farming activities, this study recommends that the social cash transfers policy should continue. However, the fact that smallholder farmers are using social grants for agricultural purposes implies that there is a gap in terms of agricultural support. This means there are other farming and institutional factors which hinder smallholder farmers' entrepreneurial spirit. Addressing these farming constraints (e.g. limited access to credit, inadequate farming assets, water insecurity, lack of farming inputs, etc.) and improving institutional support (e.g., access to credit, training, other extension services) will positively contribute to enhanced on-farm entrepreneurial spirit and utilisation of farm resources.

Future research should also seek further investigation into the use of social grants as an investment in agriculture. This study did not go deeper to understand how exactly the social grants are used in agriculture and to what extent. Furthermore, it would be useful to investigate the impact of CSG on youth's willingness to participate in small-scale farming. Such an analysis is required to broaden the understanding of the role of social grants in the smallholder agricultural sector.

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LIST OF ACRONYMS

ABCD	Asset-Based Community Development
ANC	African National Congress
BE	Behavioural Economics
CDG	Care Dependency Grants
CSG	Child Support Grants
DARD	Department of Agriculture and Rural Development
DG	Disability Grants
FBM	Fogg Behavior Model
FCG	Foster Care Grants
GEM	Global Entrepreneurship Monitor
GHS	General Household Survey
GIA	Grants-in-Aid
HSRC	Human Sciences Research Council
PCA	Principal Component Analysis
PsyCap	Psychological Capital
RP	Revealed Preference
SCT	Social Cash Transfer
SIS	Smallholder Irrigation Schemes
SL	Sustainable Livelihood
SLF	Sustainable Livelihoods Framework
SMG	State Maintenance Grant
SOAP	State Old Age Pensions
SP	Stated Preference
SRD	Social Relief of Distress
SSA	Sub-Saharan Africa
TEA	Total Entrepreneurial Activity
WEF	World Economic Forum
WVG	War Veteran's Grant
ZIS	Zanyokwe Irrigation Scheme

CHAPTER 1.   INTRODUCTION

1.1   Background to the study

Unemployment, poverty, hunger and inequality still remain the key rural challenges in South Africa. Since the demise of apartheid, one of the key objectives of the South African government has been to decrease the level of poverty and improve the quality of life for all South Africans (Statistics South Africa, 2013). Compared to other developing countries, based on per capita income, infrastructure and the structure of the economy, South Africa's level and rate of poverty is high. Since 1994 poverty reduction and improvements in living standards of the poor have been among the priorities of the government (Mensah & Benedict, 2010). In the rural areas, the importance of small-scale farming is such that on-farm entrepreneurship should be prioritized (Sinyolo *et al*., 2017a). Government has determined that the fundamental purpose of small-scale farming is to maximise the creation of livelihoods. Moreover, with well-developed support, it is possible that this sector could possibly contribute more to household food security and livelihoods (Aliber & Hart, 2009). Efficiency of small-scale agriculture and its role to poverty reduction can be improved if rural households become more entrepreneurial in their agricultural activities. However, the future is not promising for smallholders unless they become more entrepreneurial in terms of how they manage their farms through developing a business mind-set (Kahan, 2013).

Entrepreneurship is considered to be a significant instrument for economic development through job creation, innovation and its welfare effect, which has led to an increasing policy interest in national level entrepreneurial activity (Herrington *et al*., 2010). Policy makers, researchers, institutions, individuals promoting rural development, farmers' unions and advisory services are all working on the development of entrepreneurship in the agricultural sector that could accelerate the rural development process (Chandramouli *et al*., 2007; de Wolf & Schoorlemmer, 2007; Díaz-Pichardo *et al*., 2012). Entrepreneurship relates to discovering ways and means to create and develop a profitable farm business. The government in its efforts to alleviate poverty to the disadvantaged and vulnerable segments of communities, introduced several poverty reduction strategies such as the social grants. South Africa's social grant plays an important role in reducing poverty and promoting social development. Most social assistance programmes were obtainable in the first half of the twentieth century to support poor white people, and they increasingly extended in scope and coverage, but with racially discriminatory amounts paid and procedures applied to the four official 'race groups' (African,

Indian, Coloured and White) designated by the South Africa government. From the early 1980s, the apartheid government moved towards equalising the level of the benefit, harmonising administrative measures, and improving delivery systems. Uniformity of most aspects of the system was reached by 1993, as part of the transition to democracy (Posel *et al.*, 2006). Therefore, both agricultural interventions and social grant interventions are required for fighting poverty and hunger among poor rural households that farm (Tirivayi *et al.*, 2016). The forms of social grants include 'State Old Age Pensions' (SOAP), 'Disability Grants' (DG), 'Child Support Grants' (CSG), 'Care Dependency Grants' (CDG), 'Foster Care Grants' (FCG), 'Grants-in-Aid' (GIA) and 'War Veteran's Grant' (WVG). Each of these grants have criteria and the maximum value for eligible beneficiaries. For detailed explanation of each grant see section 2.6.2.

Past studies of social security in South Africa have focused on the SOAP, recognizing important positive impacts in terms of broadly reducing poverty at the household level and improving health and nutrition (Samson *et al.*, 2004). The CSG is the largest of the grants by number, totalling just below 12 million, which constitutes approximately 21% of the SA population (Stats SA, 2017). The grants recorded an average of 55% growth in value since 2006; for example, the SOAP grew from R820.00 to R1 500.00 per month in 2016. South Africa now spends approximately 3% of GDP on social assistance to the value of R128 billion in the 2015/16 financial year (South Africa Social Security Agency, 2016). About 12 % of the government budget goes to social grants with children being the biggest beneficiaries. It has been observed and documented that the Rand value of the social grants is increasing, and the number of grant beneficiaries is also increasing nationally. In the Budget Speech 2018, it was announced that government will spend R528 billion on social grants in the 2018/19 financial year. That is, approximately R44 billion per month making South Africa to have the highest expenditure on social grants in the world, which further highlights the enormous scale of the country's social welfare system. With such an increasing number of social assistance beneficiaries, and the grants accounting for such a substantial proportion of government budget, it is important to evaluate the system and ask, "is South Africa's social security programme perpetuating dependency on the government/state or is it achieving its main objectives - to reduce poverty and income inequality, and raise investment in health care, education and nutrition?" (Potts, 2012).

Social grants can be designed to target rural areas and smallholders, especially resource-poor farmers. It is expected that such grants are likely to be invested in farming and benefit the local

economy (Jacobs *et al*., 2010). However, there is a growing belief that these social grants have a negative impact on smallholder farming because they create a dependency syndrome. According to Aliber & Hart (2009), the current subsistence agriculture support system (e.g. community garden projects and irrigation schemes) is relatively unproductive. Improving agriculture and enhancing agricultural productivity through irrigation is identified as a key strategy for rural poverty reduction in most of the low-income countries, where most of the rural poor households depend directly or indirectly on agriculture.

In South Africa total area under irrigation is estimated at approximately 1.3 million hectares of which about 0.1 million hectares are food plots and Smallholder Irrigation Schemes (SIS) (Backeberg, 2006; Fanadzo, 2012). According to Hussain *et al*. (2004), there are five key interrelated dimensions of the relationship between agricultural water and poverty reduction: production, income/consumption, employment, vulnerability/food security, and overall welfare. Based on the literature reviewed, there is limited empirical evidence assessing the impact of social grant-dependency on on-farm entrepreneurial spirit and utilisation of resources in KwaZulu-Natal irrigation schemes, particularly Tugela Ferry and Bululwane irrigation schemes. Thus, it is important to examine the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders and how this dependence affects their resource utilisation.

1.2   Research problem

Despite the positive impact of social grants, the literature shows that they also promulgate some negative consequences which threatens the achievement of intended objectives. The negative impacts include high levels of unemployment (South African Social Security Agency, 2016), dependency syndrome (Isenman & Singer, 1977) and teenage pregnancy (Udjo, 2014). Social Cash Transfer (SCT) interventions might have the potential to promote income gains across smallholder farmers whose livelihoods depend on farming and livestock activities. However, programs do not always work out that way in spite of the best aims but can frequently form unintended disincentives such as path dependence. The unintended consequences of social grants are commonly taken under the catch-all label "dependency". According to Lentz *et al.,* (2005), an individual, household or community exhibits dependency when it cannot meet its immediate basic needs without external aid. The undesirable and unintended aspect, 'dependency", arises when meeting current needs comes at the cost of reducing recipients' willingness and mental capacity to meet their own basic needs in the future without external assistance. These grants always have unintended negative effects such as developing dependency syndrome amongst beneficiaries (Isenman & Singer, 1977; Bertrand *et al.,* 2003;

Lentz *et al.*, 2005; Abel, 2013; Sinyolo, 2017a), even among the non-beneficiaries as the grant money is sometimes used together by all members of the household. Those unintended effects are usually associated with labour and production disincentives (Barrett, 2006).

However, with grants becoming the utmost source of income for most farm households, numerous anecdotal and empirical evidences show that poor rural households are turning away from small-scale agriculture among other things as a result of their dependence on social grants (e.g., Tshuma, 2012; Sinyolo *et al*., 2017a). That is, the role of these grants has certainly surpassed that of small-scale agriculture (Van Averbeke & Hebinck, 2007).

Although the literature exploring multidimensionality of the effect of social grants (such as their direct impact on school attendance, number of kids women want to have, food production incentives, poverty and food insecurity, labour supply, incentive to farm, utilization of inorganic fertilizer, and on-farm entrepreneurship) is available (Devereux, 2001; Abdulai *et al*., 2005; Barrett & Maxwell, 2005; Ardington *et al*., 2009; Abel 2013; Sinyolo *et al*., 2017a), there is insufficient empirical research examining the possible effects of social grants on on-farm entrepreneurial spirit of smallholders. Therefore, this study seeks to fill this knowledge gap by explaining the behaviour of smallholder farmers. Give this motivation, the first research question is: What is the nature and the extent of the relationship between social grant-dependence on on-farm entrepreneurial spirit of smallholders? Since social grants are expected to have a negative relationship with on-farm entrepreneurship, the conceptual framework of this study hypothesised that smallholder farmers who live in social grants beneficiary households and have been receiving social grants for longer have lower entrepreneurial spirit, *ceteris paribus*.

The issue of smallholders' dependency on social grants is questionable because the previous studies do not indicate whether the farmers are the ones receiving these grants. For example, CSG may be received by the mother of the child who does not stay at home for reasons such as work. Given that, they may not send money home to the care giver who happens to be the interviewed small-scale farmer. Moreover, there is no evidence from the literature whether grant recipients reside with these farmers and whether they do send money home if they stay away. This study, thus, also ought to address this knowledge gap about the main recipients of grants to empirically prove whether social grants contribute a high proportion to household income. The grant money that is not sent back home was not included in household total income from social grants for analysis purposes.

Several studies have examined the impact of social transfers or food aids (e.g. Sinyolo *et al*., 2016b; Sharaunga & Wale 2013) and remittances (e.g., Iheke & Chikezie, 2016) on land utilisation by farmers. However, none of these studies have pooled household income from social grants and remittances to examine the impact of unearned income on smallholders. It is important to combine social grants and remittances because some households have access to social grants but not to remittances, and *vice versa*. Focusing on one unearned income source may give biased results when evaluating the level of incentive to farm among smallholders. Thus, the combination of the two gives the contribution of overall unearned income on total household income. According to the author's knowledge, the link between the smallholder farmers' ability to utilize their resources (e.g. land) at their full capacity and pooled unearned income (social grants and remittances) has not been empirically studied. Given this motivation, the first research question is: what is the nature and the extent of the relationship between unearned income and smallholders' ability to utilize their resources at their full capacity? The hypothesised relationship between the two is that, those individuals who are getting most of their income through earned means are better at utilizing their resources at their full capacity.

Moreover, the questionnaires that have been used by previous studies include statements which describe how smallholders may think about themselves 'right now'. Although research on positive organizational behaviour has already been done (e.g. Podsakoff *et al.*, 1990; Williams & Anderson, 1991; Podsakoff & MacKenzie, 1997; Luthans & Church, 2002; Nafei, 2015; Luthans & Youssef-Morgan, 2017), particularly in firms, none of these studies examined the behaviour of smallholder farmers. Previous studies have constructed an entrepreneurship index following stated preference (SP) method rather than revealed preference (RP) method (Luthans & Youssef, 2004; Luthans *et al*., 2007; Sinyolo *et al*., 2017a). SP is based on what individuals say rather than what they do. It is different from RP analysis which is based on observed behaviour of people when faced with real circumstances (Bateman *et al*., 2002). The major disadvantage is that individuals' SP may not correspond closely to their definite preferences (Wardman, 1988). The preferences may diverge due to systematic bias in SP responses (Bonsall, 1983 cited by Wardman, 1988; Tahai & Meyer, 1999). Therefore, this study will adopt the RP method to construct PsyCap and entrepreneurial spirit indices using a behavioural approach. By doing so, the study will be able to address the problem of strategic bias and the hypothetical nature of the market created to examine the link between social grants dependence and the smallholder farmer entrepreneurial spirit.

1.3   Research objectives

The general objective of the study is to evaluate the impact of social grant-dependence on smallholder agriculture in and around two irrigation schemes in KwaZulu-Natal. The specific objectives include:

1. To investigate the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders; and

2. To evaluate the impact of unearned income on smallholders' ability to utilize their resources at their full capacity.

1.4   Organisation of the thesis

The remainder of the thesis is outlined as follows: Chapter 2 presents an overview of the relevant literature on the role of social grants on on-farm entrepreneurial spirit and utilisation of resources by smallholders. Chapter 3 deals with the research methodology adopted in this study. This chapter includes description of the selected study area, the justification of selected irrigation schemes, data collection tools of this study, conceptual framework, and empirical methods of data analysis used. Chapter 4 presents the descriptive analysis on socio-demographic characteristics and capital endowments of farmers, and highpoints the challenges and opportunities faced by small-scale farmers. Chapter 5 presents empirical results and discussions of the impact of social grant dependence on on-farm entrepreneurial spirit. Moreover, it presents empirical results and discussion of the impact of unearned income proportion on the proportion of operated land. Chapter 6 presents the conclusion and policy recommendations drawn from the empirical results of this study. The appendices are presented after the references at the end.

CHAPTER 2.   LITERATURE REVIEW

2.1   Introduction

Social grants can be an important complement to the smallholders' commercialisation agenda, as the extra income (although not enough) may relieve the credit and liquidity constraints of farm households, enabling them to overcome the transaction costs they face (Sinyolo *et al*., 2017b). The social grants have resulted in a rise in agricultural activities in beneficiary households, including greater use of agricultural inputs, more land area in crop cultivation, higher crop yield and increased livestock and agricultural tools ownership (FAO, 2014). Contrary, economic theory indicates that social grants may induce undesirable behavioural change and establish a culture of dependency and entitlement, creating dis-incentives to farm amongst smallholders (Sinyolo *et al*., 2017b). That is, social grants are negatively associated with smallholders' on-farm entrepreneurial spirit. This chapter outlines a synthesis of the relevant literature on the study.

2.2   Defining the key concepts

2.2.1   Small-holder farming in South Africa

The farming sector in South Africa comprises of three different groups: small-scale, emerging farmers and large-scale farming. Smallholders are situated in rural homelands where farming plays a significant role in poverty reduction and they face farming constraints (Kirsten & Van Zyl, 1998). In the South African context, smallholder farmers are defined as a majority of black farmers most of whom reside in the former homelands. It is also noted that not every black farmer is a smallholder farmer and smallholder farmers are not a homogenous group (Machethe *et al*., 2004). Regardless of the recognition that smallholder farmers in South Africa are heterogeneous, there are no clear criteria for assigning farmers to the various categories of smallholder farmers (Fanadzo *et al*., 2010b).

Smallholder farmers are also defined as farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops depending practically solely on family labour. In general, smallholder only refers to their inadequate resource endowment compared to other farmers in the sector. Small-scale farmers vary in individual characteristics, farm size, resource distribution between food and cash crops, livestock and off-farm activities, their use of external inputs and hired labour, the proportion of food crops sold and household

expenditure patterns (Department of Agriculture, Forestry and Fisheries, 2012). Most of these farmers struggle to access credit and markets in which to sell their produce (Fanadzo *et al*., 2010b; Von Loeper *et al*., 2016). This differentiates smallholders from commercial enterprises, both large scale and family farms, which have access to fully formed external markets (Ellis, 1998).

2.2.2 Entrepreneurship and entrepreneurial spirit

Entrepreneurship is a multidimensional term that is difficult to define, thus complicates the possibility of measuring the level of entrepreneurial activities (Rusu *et al*., 2012). Schumpeter (1934) put more emphasis on innovation, calling it creative destruction. Creative destruction refers to the process of change (Schumpeter, 1942). Table 2.1 presents the list of definitions of entrepreneurship and entrepreneur concepts by different authors. The definitions seem to be closely related to ideas such as innovation, opportunity recognition, profit, economic growth, venture creation and change. Furthermore, entrepreneurship has been variously conceptualised as a characteristic, a behaviour, an activity and a social role, each reflecting the content-domain of a specific discipline (Misra & Kumar, 2000). Whereas entrepreneurs are conceptualized as individuals who picture the world in a different way and imagine the future better than others do. They seize opportunities that otherwise would be unobserved, perceive and accept risks (Abu-Saifan, 2012; Rusu *et al.*, 2012). The risks faced by small-scale farmers can be economic, physical, environmental and social. Smallholder entrepreneurs take risks based on the uncertainties in farming such as unpredictable seasonal climate changes, unpredictable market availability and hostile pests. That is, where other farmers see challenges, entrepreneurial farmers see opportunities (Dees, 1998). Smallholders need to be introduced to the current technologies of production with the provision of improved seedling varieties, fertiliser and approved pesticides, simple processing technologies, well organised marketing systems, and need to practice diversification of their production system by planting other crops to reduce the risks they face (Babalola *et al*., 2017).

Table 2.1 Definitions of entrepreneurship

Author(s)	Definitions
Hisrich & Peters (1989) cited by Misra & Kumar (2000)	is the process of creating something dissimilar, with value, by dedicating the necessary time and effort, assuming the associated financial, physical and social risks, and receiving monetary rewards and personal satisfaction.
Venkataraman (1997); Shane & Venkataraman (2000)	an activity that involves the processes of discovery, evaluation and exploitation of opportunities and the set of individuals who discover, evaluate, and exploit them.
Gedik *et al*. (2015:1088)	"is the process of starting a business by taking all risks".
Chandramouli *et al*. (2007:320)	"a creative and innovative response to the environment".
de Wolf & Schoorlemmer (2007)	is associated with discovery of ways to create and develop a profitable farm business.
Coulter (2001)	is the process whereby an individual utilizes organized efforts and means to pursue opportunities to create value and grow by fulfilling desires through innovation and uniqueness, regardless of the resources currently available.
Commission of the European Communities (2003:7)	"A mindset and process to create and develop activity by blending risk-taking, creativity, and/or innovation with sound management, within a new or existing organization".
Schaper & Volery (2004)	is a process of identifying new opportunities and converting them into marketable products.
Gray (2002:6)	"an individual who manages a business with the intention of expanding that business and with the leadership and managerial capabilities for achieving their goals".
Drucker (1985)	is associated with searching for change, responding to it, and exploiting it as an opportunity.
Schumpeter (1934)	An entrepreneur is an individual who innovates and implements entrepreneurial change in markets.
Schumpeter (1965)	An entrepreneur is an individual who exploits market opportunities through technical or organizational innovation.

Farmers, agricultural businesses, researchers and governments have recognized the importance for a more entrepreneurial culture in the farming business (McElwee, 2006). Beedel & Rehman (2000) suggest that to understand farm entrepreneurship requires understanding farmers' attitudes or spirit and motivation in an environmental/conservation awareness context. Although a farmer requires professional and management skills, strategic, opportunity and co-operation or networking skills to prosper, attitudes or motivations are also important for a successful farming corporate. An entrepreneurial farmer needs to be able to embrace change, i.e. to have an open mindset or attitude and be prepared for change and innovation (de Wolf & Schoorlemmer, 2007). For example, entrepreneurial small-scale farmers need to adopt new technology and not rely on their endogenous farming equipment, and also need to shift from producing traditional horticultural crops (cabbage, spinach, onions, etc.) and diversify into high-value or perennial crops (lettuce, strawberries, apples, etc.).

An entrepreneur should have the ability to plan; good communication and marketing skills; interpersonal skills; leadership and basic management skills; take lessons from other's failures to become successful; solve problems easily; be passionate to start new business; be independent; and network with successful entrepreneurs (Gedik *et al*., 2015). Given this, the primary role of entrepreneurs is to obtain knowledge and create social capital through innovation, risk-taking, pro-activeness, network expansion, team building, organization building, and formation of knowledge communities. Thus, an entrepreneurial smallholder farmer has to identify problems and be able to rationally solve them, create and maintain individual cognitive requirements for problem-solving and decision-making, and allocate suitable time to management and operational farm duties. Entrepreneurs are also innovators because they tend to look for better and more efficient and profitable ways to do business. Being innovative is a significant quality for a farmer-entrepreneur, especially when the business faces strong competition or operates in a rapidly varying environment (Kahan, 2012). Therefore, smallholders as entrepreneurs recognize and exploit non-agricultural or high-value farming opportunities based on the farm's resources in flexible and innovative behaviours (Díaz-Pichardo *et al*., 2012).

There are two parts to entrepreneurship, namely managerial skills required to start and run a profitable farm business, and entrepreneurial spirit. Managerial skills can be taught, whereas an entrepreneurial spirit cannot be taught (Kahan, 2013). The term entrepreneurial spirit is fundamental to humanity itself. For farmers to cope with the risks they will face in the complex world in which they compete, they need to develop an entrepreneurial spirit. Abdnor (1988:2)

defines entrepreneurial spirit as "the spirit of adventure, the spirit of enterprise; the spirit that creates jobs and innovation in countries across the world; the spirit that breaks down social barriers and creates the opportunity for upward mobility". The research into the area of farm entrepreneurial spirit is a relatively new phenomenon (Kahan, 2013). Entrepreneurial spirit in individuals and entities has been presented in other literature (e.g., Abdnor, 1988; Weiss, 1995; Karlsson & Larsson, 1993; Rae, 2000; Cooney, 2005; Muljaningsih *et al*., 2014). This study will focus on entrepreneurial spirit of individual smallholder farmers.

2.2.3 Psychological capital and behavioural economics

In addition to the assets commonly considered in the sustainable livelihoods framework literature, households have what is known as psychological capital (PsyCap). Concentrating and accumulating more of the traditional resources such as economic and financial capital, advanced technology, and proprietary information once considered vital for organizational success have proven insufficient for attaining sustainable sources of competitive advantage. Luthans *et al*. (2007) proposed that such an advantage can be gained through investing, leveraging, developing, and managing PsyCap. This new PsyCap approach to gaining competitive advantage is based on the generally accepted fact that most organizations are currently not understanding the full potential of their human resources (Avolio & Gardner, 2005). Luthans *et al*. (2007) call for the investment and development of PsyCap. According to Luthans *et al*. (2007:3), PsyCap is an "individual's positive psychological state of development and is characterized by: (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success".

Just as the other forms of capital have certain components, positive PsyCap also includes some basic capacities. Those that best meet the positive organizational behaviour criteria of being positive, unique, measurable, developable, and performance-related are self-efficacy/confidence, hope, optimism, and resiliency (Luthans & Youssef, 2004).

2.2.3.1 *Self-efficacy*

PsyCap efficacy, or confidence, can be defined as "one's belief about his or her ability to mobilize the motivation, cognitive resources, and courses of action necessary to execute a

specific action within a given context" (Stajkovic & Luthans, 1998:66). People who are self-efficacious (self-confident) take challenging tasks and endeavours, extend motivation and effort to fruitfully accomplish their goals, persist when faced with difficulties, and recover quickly from failure (Luthans & Youssef, 2004; Hmieleski & Carr, 2008). Self-efficacious people are notable by five important characteristics such as setting high goals for themselves and selecting difficult tasks, welcome and thrive on challenge, being highly self-motivated, investing the necessary effort to accomplish their goals, and persevering when faced with obstacles (Luthans *et al*., 2007). These five characteristics prepare high-efficacy individuals with the capacity to independently develop and effectively perform, even with little external inputs.

2.2.3.2 *Hope*

Hope is defined as motivation which depends on goal-directed energy (agency) and planning to attain those goals (pathways) (Yousaf *et al.*, 2015). Agency refers to the willingness or motivation to strive for an anticipated goal, while pathway reflects the ability to proactively design alternative paths or possible plans for goals when facing challenges and blockages (Zou *et al*., 2016). Individuals with high hope are motivated by their sense of having the ability to develop ways to obtain what they want, which provides them with the ability to generate different pathways towards the achievement of their goals if the original ones have been blocked (Luthans & Youssef, 2004).

2.2.3.3 *Optimism*

"Optimism is considered as an attribution approach which deems positive events as internal and persistent whereas negative episodes as situation-specific, external and non-persistent (Yousaf *et al.*, 2015:41). Therefore, optimistic individuals have the positive expectations about the future despite current adverse circumstances whereas pessimists expect adverse expectations about the future. Optimism includes a positive explanatory style that features positive events to internal, permanent, and pervasive causes, and negative events to external, temporary, and situation specific ones. This allows individuals to take credit for favourable events in their lives, increasing their self-esteem and self-confidence (Luthans & Youssef, 2004).

2.2.3.4 Resilience

Resilience refers to the capacity to bounce back from adversity, uncertainty, failure, or even positive but challenging changes such as increased responsibility, which could lead to positive results despite considerable risks and difficulties (Luthans & Youssef, 2004; Yousaf *et al.*, 2015). Resiliency enables individual and environmental protective mechanisms to operate through enhancing the assets and/or reducing the risk factors within individuals and/or their environment. These four fundamentals (self-efficacy, optimism, hope, and resiliency) combine to form the higher-level concept of PsyCap.

The concept of behavioural economics (BE) in relation to agricultural entrepreneurship has not received the attention that much in the literature. However, some studies (e.g. Duflo *et al.*, 2008; Shaba *et al.*, 2017) demonstrate the rising importance of the BE concept in agricultural research and development, particularly in explaining small-scale farmers decision making behaviour. According to Robbins (1996), individual's behaviour is motivated by the expected outcome. Innovative behaviour is not necessarily expected to produce an outstanding product, but to provide additional economic value since the notion of product innovation is the characteristic of entrepreneurial spirit (Schumpeter, 1959; Audretsch & Link, 2012). Mullainathan & Thaler (2000:2) define BE as "the combination of psychology and economics that investigate what happens in markets in which some of the agents display human limitations and complications". Economics is meant to be about the behaviour of economic agents such as firms or consumers, sellers or buyers, banker or farmers (Mullainathan & Thaler, 2000). BE is the study of cognitive, social, and emotional impacts on people's visible economic behaviour (Samson, 2014). BE research focuses on the usage of psychological experimentation to develop theories about human decision making and has identified a variety of biases. According to BE, people are not at all times self-interested, cost-benefit-calculating individuals with stable preferences, and many of individual choices are not the result of careful deliberation. Instead, individuals' thinking tends to be subject to insufficient knowledge, feedback, and processing capability, which frequently includes uncertainty and is influenced by the context in which people make decisions (Samson, 2015).

The BE concept has also been applied to the field of entrepreneurship. The interpretations of entrepreneurial entry often apply to behavioural explanations, such as those including the high levels of risk taking among entrepreneurs, over-confidence which may account for behaviour among developing entrepreneurs, optimism, or entrepreneurs who make long term decisions/investments (Astebro *et al.*, 2014). Besides entrepreneurial ability and financing

constraints, the individual's preferences over risk can play a critical role in determining entrepreneurship involvement. Those who possess greater risk tolerance (i.e. risk loving) have the potential to be entrepreneurs given that they are optimistic. For farmers risk results from uncertain weather that affects their crop production and market outcomes, hence may affect entrepreneurial spirit. For example, farmers do not know at the beginning of the planting season if they will receive sufficient rainfall or whether some of the produce will be sold in the market.

Alma (2009), cited by Muljaningsih *et al.* (2014:263), found that "there are 24 indicators affecting the behaviour, including: self-confidence, optimistic, leadership, finance management, imagination, ability to make a plan, patient, firm, spirit, responsible, hard-working, encouragement for achievement, realistic, organizational, precision, calmness, risk calculation, physical health, good communication, freedom, sociable, and able to make a decision". Entrepreneurial behaviour of farmers is influenced by six elements namely, innovativeness, economic motivation, decision making ability, risk orientation, information seeking behaviour, and leadership (Balasaravanan & Vijayadurai, 2012). Thus, Wankhade *et al.* (2013:86) operationally defined entrepreneurial behaviour of vegetable growers as "cumulative outcome of ten components/attributes namely risk taking, hope of success, persusability, manageability, self-confidence, knowledgeability, persistence, feedback usage, innovativeness, and achievement motivation".

2.3   South African entrepreneurial performance

Global Entrepreneurship Monitor (GEM) used the World Economic Forum's (WEF) classifications to categorise South Africa among the efficient-driven economies (Herrington *et al.*, 2010;2014). Nevertheless, South Africa's second economy characterised by resource-poor households, especially in the rural areas, can be classified among the factor-driven economies. The factor-driven economy is characterized by mainly subsistence agriculture and extraction businesses with a heavy reliance on unskilled labour and natural resources. To improve on the entrepreneurial environment, the government has developed policies that emphasize promotion of entrepreneurial activity particularly in the informal sector. This has been applied through distribution of financial resources to catalyse the formation of self-owned or joint venture businesses (Herrington *et al.*, 2010). Although South Africa's Total Entrepreneurial Activity (TEA) index has improved from 5.9% to 8.9% between 2009 and 2010, respectively, the country is still lagging compared to other economies such as Brazil and Mexico (Fal *et al.*, 2011).

Factors and educational processes that could contribute to the development of the entrepreneurial capacities of farmers, mainly to experience successful growth in agricultural business, have been examined in some European countries as well as in South Africa. Entrepreneurial attitudes, such as innovation, orientation to growth, and risk taking, have been identified to be equally important. Additionally, the entrepreneurial spirit that transforms challenges into opportunities is also required. This spirit is one of creativity and innovation, ambition and goal driven action, value creation, willingness to take risks and learn from failure and, most of all, a sense of play that includes both freedom and responsibility. To build this spirit could result to a more entrepreneurial culture. The literature confirms the support provided by the South African government to improve on the entrepreneurial activities among small-scale agriculture. The support involved establishment of small-scale irrigation schemes, farm inputs subsidies, providing credit services and recommending several land reform policies (Ramaila *et al*., 2011). However, South Africa's level of entrepreneurial spirit is reported to be lower than that of many countries globally (Herrington *et al*., 2010). This lack of entrepreneurial spirit is also identified as a barrier to the development of agribusiness (McElwee, 2006). Low entrepreneurial spirit also indicates a challenge for small-scale farmers to contribute towards meaningful job creation, and growth in rural development.

2.4   Small-scale irrigation schemes in South Africa

South African smallholder irrigation schemes (SIS) can be defined as multi-farmer irrigation projects greater than 5 hectares in size that were established by black people or agencies assisting their development in the former homelands or in resource-poor areas (Van Averbeke, 2008). These schemes are under local accountability, controlled and operated by the local individuals in response to their felt needs, and by means of technology level which they can operate and maintain effectively (Underhill, 1984 cited by Fanadzo, 2012). South African smallholder irrigators have been categorised in terms of their water supply into four groups, namely, farmers on irrigation schemes, independent irrigation farmers, community gardeners and home gardeners (Crosby *et al*., 2000; Du Plessis *et al*., 2002; Van Averbeke, 2008; Fanadzo, 2012). According to Backeberg (2006), there are 200 000 to 250 000 smallholder irrigators in these four groups but indicated that the majority were black women irrigating very small plots, mainly to provide food for household consumption. Van Averbeke *et al*. (2011) indicate that in 2010 there were 302 SIS with a combined command area of 47 667 hectares in

South Africa, but not all 302 SIS were operational in 2010. Most of the schemes have collapsed or are underutilised.

2.5   Factors determining the success of smallholder irrigation schemes in South Africa

Most of the SIS that were established in South Africa have performed poorly. Weak institutional and organisational arrangements and poor crop management practices by farmers seem to be the main reasons for the underperformance of many SIS in South Africa (Crosby *et al*., 2000; Mnkeni *et al*., 2010; Fanadzo *et al*., 2010a, b; Fanadzo, 2012). Furthermore, the unsatisfactory performance of many SIS in terms of productivity and economic impact has been largely attributed to socio-economic, political, climatic, edaphic and design factors, and lack of farmer participation (Fanadzo *et al*., 2010b). In the rural areas, where the majority of SIS are located, several SIS were planned and established following a centralised estate design whereby central management strictly enforced control over farming activities and decision making with little or no input from farmers. This created a high level of dependency among farmers in the schemes and poor performance when farmers were left to manage the schemes independently (Fanadzo, 2012). Isaac (2016) emphasised the importance of farmers' participation in decision-making regarding issues that influence their well-being in order to enhance collective responsibility for outcomes achieved and recommended the involvement of farmers in the program planning cycle for sustained adoption of innovation and technologies. Gomo *et al.* (2014) recommended expanding smallholders' participation in policy formulation and derivation of best management practices.

2.6   The South African social grants programme

2.6.1   The historical background of the programme

South Africa's social grant (SOAP) program was initially implemented in the 1920s to support poverty reduction amongst the white minority. In 1944 the Smuts government extended SOAP to Africans, although benefits were less than those of the whites (Woolard & Leibbrandt, 2010). Other forms of social assistance such as social transfers for the blind (1936) and the disabled (1937) were introduced for whites and coloureds and only prolonged to other groups in 1946. War veterans and family allowances grants were introduced in 1941 and 1947, respectively, but excluded blacks (Van der Berg, 1997). During the 1970s there were attempts to offer the homeland system political legitimacy to reduce inequality in social security. This led to a rise in the funds flowing to the homelands for social assistance, especially for SOAPs. The coverage of the African elderly population improved markedly, and by 1993 there were nearly twice as

many African pensioners inside the homelands as outside (Van der Berg, 1997). Thus, South Africa has a remarkably well-developed social security system for a middle-income country (Woolard & Leibbrandt, 2010).

During the political transition in 1994 three grants were received by children, namely FCG, CDG, and State Maintenance Grant (SMG) with racially unequal distribution. CSG was instituted in April 1998 for an eligible child below seven years old at a value per month. In his January 2002 State-of-the-Nation-Address, President Mbeki announced a government led campaign to "register all who are eligible for CSG". As from 2010, all (income eligible) children received this grant until they turn eighteen years old (Woolard & Leibbrandt, 2010). These could be some of the reasons that has led to the further expansion of this grant over the years. The number of CSG beneficiaries has increased rapidly from 21 997 in 1999 to approximately 12 million in 2016 (Woolard & Leibbrandt, 2010; SASSA, 2016). Over the post-apartheid era the social grants policy changed in a way that continued some grants (e.g. SOAP, DG and the FCG), and replaced SMG with the CSG.

2.6.2 Types and statistics of social grants in South Africa and their relative importance

Applicants for social grants are required to be South African citizens, permanent resident or refugees and residing in South Africa at present. Apart from the FCG and the GIA, all other social grants involve the "means test" which is the process of evaluating the value of an individual's assets and income to work out the amount to be received by each beneficiary. To be eligible for a grant, an applicant's assets and income must fall below a certain threshold that is variant for all the grants and depends on the marital status.

Each of these grants have criteria for eligible beneficiaries. SOAP is received by individuals who are 60 years or older. The maximum value per beneficiary is R1 700 (or R1 720 if older than 75 years) per month. DG is eligible for individuals with a physical or mental disability that hinders them from generating income or being employed and amounts to R1 700 per month. CSG is given to somebody who is a primary care-giver of a child under the age of 18 and amounts to R410 per month. FCG is received by somebody who takes care of a child under the age of 18 that has been placed in their care by a court. The maximum value of the grant is R960 per month. However, this grant is not provided to a child receiving a certain amount of money (e.g. from an inheritance). The difference between CSG and FCG is that the former is received by a care-giver, whereas the latter is only received by a foster parent who is usually

unrelated to the child. CDG is received by a care-giver of a child who is medically disabled or ill. The maximum value of the grant is R1 700 per month. CSG, FCG and CDG are available for the support of children, as well as children who are HIV/AIDS infected. Beneficiaries of these grants must not be under care of a state institution (e.g. a prison, a psychiatric hospital, an old age home, a care and treatment centre, or a rehabilitation centre) (Liebenberg, 2001).

All the maximum values per beneficiary per month for the above grants are as at October 2018. GIA is an extra grant received by an individual who is already a beneficiary for one of the grants but unable to take care of themselves due to mental or physical disabilities, and therefore need to pay a full-time care-giver. The value of the grant is R410 per month. WVG is received by individuals who fought in World War I, World War II or the Korean War and 60 years older or disabled. The maximum value per beneficiary is R1 720 per month. Additionally, there is another temporary assistance received from government for not more than three months called 'Social Relief of Distress' (SRD). However, an extension beyond three months may be granted in special cases. This grant is normally given to people who do not qualify for or have not yet received another grant or have been affected by a disaster or medically unfit to work. It is generally given as coupons that can be bartered at some supermarkets. Most of the past studies of social security in South Africa have focused on the SOAP (Bertrand *et al.,* 2003; Abel 2013; Ardington & Hofmeyr, 2014; Ardington *et al*., 2016). Therefore, it is important to focus on all forms of social grants. Table 2.2 shows the number of social grant beneficiaries by grant type in South Africa since the 2006/07 financial year. Between April 2006 and March 2016, the total number of social grants rose from approximately 12 million to 16 million, and the growth of grants during this time was 41% (SASSA, 2016). This increase was primarily driven by significant upward trends in SOAP, CSG and GIA over the years as a result of policy changes. Furthermore, WVG and DG declined gradually. During this period social grant expenditure per grant type increased from approximately R57 billion to R128 billion (SASSA, 2016).

Table 2.2 Number of social grant beneficiaries by grant type in South Africa

Grant type	Years									
	2006/07	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
SOAP	2 195 018	2 229 550	2 390 543	2 546 657	2 678 554	2 750 857	2 873 197	2 969 933	3 086 851	3 194 087
CSG	7 863 841	8 189 975	8 765 354	9 570 287	10 371 950	10 927 731	11 341 988	11 125 946	11 703 165	11 972 900
DG	1 422 808	1 408 456	1 286 883	1 264 477	1 200 898	1 198 131	1 164 192	1 120 419	1 112 663	1 085 541
FCG	400 503	454 199	474 759	510 760	512 874	536 747	532 159	512 055	499 774	470 015
CDG	98 631	102 292	107 065	110 731	112 185	114 993	120 268	120 632	126 777	131 040
GIA	31 918	37 343	46 069	53 237	58 413	66 493	73 719	83 059	113 087	137 806
WVG	2 340	1 924	1 500	1 216	958	753	587	429	326	245
Total	**12 015 059**	**12 423 739**	**13 072 173**	**14 057 365**	**14 935 832**	**15 595 705**	**16 106 110**	**15 932 473**	**16 642 643**	**16 991 634**

Source: SASSA (2016)

2.6.3   The objectives of the programme

The White Paper for Social Welfare of 1997 (RSA, 1997) states several primary aims of social transfers in South Africa. Firstly, the primary aim of social grants is associated with poverty reduction, especially among such as the disabled, the old and children who are unable to work in low-income households (RSA, 1997; Woolard & Leibbrandt, 2010). Secondly, these grants aim to raise investment in health care, education and nutrition, to increase economic growth and development (RSA, 1997). Therefore , these grants were targeted at the poor people and were implemented with the intention of pushing those living in poverty over the poverty line. A study by Woolard & Leibbrandt (2010) indicated that social grants can improve the health status of beneficiaries and their household members by improving their nutrition and access to health care. The social security system is also a mechanism for active redistribution and aimed to play a stabilizing role in communities characterised by inequality (RSA, 1997). The system attempts to accomplish these objectives through non-contributory and means-tested grants that aim to offer the poor with opportunities they would not have access to without social aid.

The White Paper provides principles, guidelines, recommendations, probable policies, and programs for developing social welfare in South Africa. Social welfare policies and agendas in South Africa can be divided into two main types. The first form of social support offers cash transfers, social relief, and developmental services, to ensure the availability of adequate economic and social protection for citizens during periods of unemployment, ill-health, maternity, child-rearing, widowhood, disability, old age, etc. The second type can be viewed as the country's commitment to human and social rights and affords assistance intended to be protective as well as offers development services for individuals with special needs (Lund Committee 1997 cited by Potts, 2012).

2.6.4   The impact of social grants programme

The effect of social grants, both intended and unintended, on various outcomes have been widely examined in South Africa. Some studies have evaluated many dimensions of the effect of social grants, such as their intended direct impacts on poverty and income inequality (Potts, 2012; Ulriksen, 2012); nutritional or anthropometric (i.e. weight for height and height for age) status (Duflo, 2003; Bassett, 2008; Leroy *et al*., 2009) and development outcomes for children such as school attendance (Case *et al*., 2005; Edmonds, 2006).

The literature has also investigated the unintended impacts of social grants on outcomes such as household formation (Klasen & Woolard, 2009; Whitworth & Wilkinson, 2013); gender and dignity issues (Goldblatt, 2005; Patel *et al.*, 2013; Wright *et al.*, 2015); of-farm labour supply (Bertrand *et al.*, 2003; Posel *et al.*, 2006; Ardington *et al.*, 2009; Abel, 2013; Ardington & Hofmeyr, 2014; Ardington *et al.*, 2016); teenage pregnancy (Udjo, 2014) and attitude towards work (Surender *et al.*, 2010).

2.6.4.1 *The intended impacts*

Ulriksen (2012) examined the impact of social security policies on poverty and inequality and concluded that, while the social grants targeted at the poor and vulnerable individuals had reduced poverty in South Africa following the end of apartheid, there has been no reduction on income inequality. This suggested that to successfully achieve poverty and income inequality reduction, social security policies need to be complemented by economic policies that inspire economic transformation and creation of decent employment opportunities. These results are consistent with those of Armstrong & Burger (2009) who found that social grants had a significant effect on poverty. Nevertheless, they found that social grants had negligible effect on income inequality, with the reason being that inequality was mainly driven by high and rising incomes of individuals at the top end of the income distribution – a group not receiving social grants. Although social grants were found effective in pushing poor people nearer to, or above the poverty line, they were unable to guarantee sustainable access to higher income levels (Armstrong & Burger, 2009). As a result, Armstrong & Burger (2009) suggested that, in order to accomplish poverty and inequality reduction in the long-run, those living in poverty need a means to access higher income levels on a sustainable basis.

In their paper Woolard & Leibbrandt (2010) showed that social grants have had a positive effect on poverty and income inequality reduction over the post-apartheid era, which is associated with an increase in the number of social grants beneficiaries. Case *et al.* (2005) found a positive and significant relationship between grant receipt and school enrolment. Children who received the grant were significantly more likely to attend school in the years following grant receipt than are equally poor children of the same age. Case *et al.* (2005) thus concluded that social grant seems to help overcome the impact of poverty on school enrolment. Some grant-receiving households use the grant to buy uniforms and to pay school fees for their children, therefore enabling them to be enrolled in school, since schooling expenses may keep children out of school in poor households. Edmonds (2006) also found that a child's school

enrolment increases when black families become eligible for fully anticipatable social grant income.

Duflo (2003) evaluated the impact of the social grants programme on children's nutritional status and investigated whether the gender of the recipient influenced that effect in South Africa. The results indicated that social grants had a favourable impact on child nutritional status. However, the estimates suggested that grants received by women had a large effect on the anthropometric status of girls compared to that of boys. There is little evidence that the gender of the recipient affects the impact of social grants; as a result, according to Duflo (2003), this suggestive evidence could be misleading. Leroy *et al.* (2009) concluded that cash transfer programmes significantly improve nutrition and anthropometry status. The authors found a knowledge gap about the mechanisms by which programmes improve nutrition and recommended that, to reach their full potential, the programmes require a better-defined set of nutrition actions grounded in programme theory. This is in line with Bassett (2008) who found that although the social grants had improved the nutritional status of beneficiaries, there has been little observation on the potential for social grants to make a greater contribution to improving nutritional status.

2.6.4.2   *The unintended impacts*

Patel *et al*. (2013) discussed the association between social protection, women's empowerment and the well-being of children in South Africa and concluded that the CSG may give female grant beneficiaries a sense of empowerment and that it, therefore, has some positive transformative impacts. Furthermore, the data indicated that women were frequently bearing the greatest burden than men for child-care in the household and that these responsibilities significantly intensify gender inequalities. The reason for this is that men are usually involved in the migrant labour system on family life. According to Patel *et al*. (2013), CSG cannot by itself transform unequal and unjust social relations of power, thus needs to work in concert with other public policies and social programmes to promote social transformation.

The results from study by Wright *et al*. (2015) raised contradictory arguments. It is argued that whilst the experience of using the CSG does protect dignity in certain important respects, other parts such as the application process, the small amount of the grant and negative discourses associated with the status of being a CSG recipient were described as adverse in terms of social grants' effect on recipients' dignity. Goldblatt (2005) concluded that there may be positive

consequences of the grant for mothers themselves. For example, the status of young women may be changing in communities as they are able to access cash and use it for the household.

Evidence about the impact of social grants on labour supply of beneficiaries and their household members is mixed. While grants appear to promote migration in employment search, they also appear to provide some disincentive for resident, working age household members to search for jobs. Basic economic theory suggests that social grants are an injection of unearned income into the household and, therefore, should have an income impact on both direct and indirect beneficiaries in the family. As a result, these grants may have the impact of reducing desires to work (Woolard & Leibbrandt, 2010). Abel (2013) looked at unintended labour supply consequences of South Africa's old age pension. The results suggest how that having old age pension recipients in the household negatively affects employment outcomes of prime-aged adults both by decreasing the likelihood that the unemployed find work and by increasing the likelihood that the previously employed lose their job. These results are different from those of Ardington *et al.* (2009) who found a positive relationship between cash transfers to the elderly and employment among prime-aged adults, which occurs mostly through labour migration. Abel (2013) argued that while he analysed nationally representative data, Ardington *et al.* (2009) used a sample from a rural district in KwaZulu-Natal, an area that has traditionally provided labour migrants. Therefore, it may be that in these regions social grants are indeed utilised to finance labour migration.

Bertrand *et al.* (2003) used the rise in household income caused by pension to identify the effects of old age pension. Both hours worked, and the work or not-work margin are affected. The working hours question relates to all types of employment, namely, regular wage employment (self-employed professionals or entrepreneurs); casual wage employment; self-employment in agriculture; and other types of employment and self-employment. The results suggest that pension reduces the labour supply of the prime-age members of the household. The pathway impact from these results is that the household members who are unintended beneficiaries of social grants are also indirectly benefiting. According to Lentz *et al.* (2005), this theoretical reduction in labour supply, and the resulting harm to future production, is called "dependency syndrome".

The relationship between social grants and teenage pregnancies has been examined in post-apartheid South Africa. There is a belief that some women abuse the CSG by leaving their kids with grandmothers or other household members, while they take the CSG and spend it on

alcohol, lottery tickets and other forms of gambling, shopping personal luxuries, etc (Goldblatt, 2005; Richter, 2009; Potts, 2012). However, the Human Sciences Research Council (HSRC) offer evidence counter to this "falling pregnant intentionally" claim (Richter, 2009). According to Richter (2009), HSRC concluded that there was no relationship between teenage pregnancy and receiving the CSG based on three primary results: Firstly, while teenage pregnancy increased fast during the 1980s, it had steadied and started to decrease by the time the CSG was introduced in 1998; secondly, only 20 percent of teenagers that bear children are CSG recipients, which is low compared to their contribution to fertility; and lastly, observed rises in youthful pregnancy happened across all social sectors, including amongst young individuals who would not qualify for the CSG on the means-test. The studies that examined the effect of CSG on teenage pregnancy (Makiwane, 2010; Udjo, 2014) also indicated no significant positive relationship between the grant and teenage pregnancy. Surender *et al.* (2010) explored attitudes about the association between grant receipt and paid employment in South Africa and found that unemployed people and social grant beneficiaries had a positive attitude towards work. Nevertheless, no studies have explored the attitudes of these unemployed poor individuals to participate in small-scale farming activities.

2.6.5   Evidence of dependency on the government from South Africa

Most rural areas in South Africa are characterised by high levels of unemployment with most of the people being social grants recipients. Therefore, these grants (unearned income) end up contributing a higher proportion on the household income. There is a concern that social grants might be creating a "dependency culture" among beneficiaries and other household members. Some of these individuals do not value paid work (i.e. little or no labour market participation) because they are content to derive their income from social grants. Debates about whether social grants create dependency on government are not unique to South Africa. The ANC, the country's governing party, has also expressed concerns with the social security system and the threat of dependency it poses. A resolution from the 52nd National Conference of the ANC suggested that, "Beyond poverty alleviation, interventions must seek to develop exit programs that capacitate households and communities to empower themselves. Grants must not create dependency and thus must be linked to economic activity. Many of the households and communities that remain trapped in poverty…are dependent on the state" (Surender *et al.*, 2010:204). Among the numerous reasons for the rising concern of dependency are high unemployment levels and increasing expenditure on social grants. In August 2017, South

Africa's official unemployment rate was 27.0%, and if using the expanded definition which includes 'discouraged workers' (those who want to work but are not actively searching for jobs), the unemployment rate increases to 36.6% (Stats SA, 2017). This is one of the highest unemployment rates in the world. Thus, there is an increasing concern that the current social grant system might act as a disincentive to the unemployed grant beneficiaries in seeking jobs (Surender et al., 2010).

Potts (2012) questioned the validity of social grants in South Africa by asking whether they are perpetuating dependency on the government. Potts (2012) argued that CSG is serving its purpose and eliminating societal barriers for children, such as access to education (i.e. positively effecting poor children). On the contrary, he argued that the DG and SOAP create a dependency syndrome which disincentivises people from looking for employment and pursuing their own means of income. The findings showed that DG beneficiaries were uneducated, illiterate, and unwilling to work. DG appears to provide people with a hand-out rather than a hand-up (Potts, 2012). The General Household Survey (GHS) was used to come up with these conclusions without conducting empirical investigations. Therefore, this study aims to empirically test how the dependency on social grants impacts the farming activities of beneficiary households.

2.7 The impact of social grants on smallholder farming activities

Studies on the impact of social grants on small-scale farmers' activities have been conducted in South Africa (Sinyolo et al., 2016a; Sinyolo et al., 2016b; Sinyolo et al., 2017a; Sinyolo et al., 2017b, Sinyolo et al., 2017c). These empirical studies are based on: The impact of social grants on inorganic fertiliser usage propensity; proportion of land area cultivated by rural households; smallholders' agricultural entrepreneurship development; and small-scale maize producers' market participation. The empirical results of social grants on farming activities have been mixed. While other studies have found a negative impact (e.g., Sinyolo et al., 2016a, Sinyolo et al., 2016b), others have found a positive impact (e.g., Samson et al., 2004; Todd et al., 2010). The contrary impact of social grants on smallholder farming was also indicated by Sinyolo et al. (2017c) who found that, while grants had an adverse impact on the households' farming participation levels when income contribution of social grants is 20–60%, they had a positive impact at less than 20% and more than 60% dependency levels. However, the possible reasons for the positive link between social grants and small-scale farming activities have not been addressed using econometric analysis. Therefore, this study further empirically

investigated whether using grant income for farming activities as form of investment is the reason for positive impact. This will be done by linking the proportion of grant income used for farming activities and proportion of land operated.

2.8   Summary

This chapter motivated the importance of this study using the research gaps in past studies. For example, the on-farm entrepreneurship literature has excluded the impact of social grant dependence on on-farm entrepreneurial spirit. The literature review revealed that previous studies have constructed an entrepreneurship index following the SP method rather than the RP method. The SP approach has major weaknesses, namely the hypothetical nature of the question and the fact that the approach does not observe actual behaviour. Thus, this study will use the RP approach to address the problem of strategic bias and the hypothetical nature of the market created to examine the link between social grants dependence and smallholder farmer entrepreneurial spirit. Other than social grants, the poor performance of SIS has been identified to lower level of entrepreneurship among smallholders. The main reasons for the underperformance of many SIS in South Africa are water shortages, weak institutional and organisational arrangements and poor crop management practices by farmers. The chapter also identifies the intended and unintended effects of social grants within the beneficiary households. The next chapter presents the research methodology used to achieve the objectives of this study.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology. Section 3.2 describes the study area, namely, Tugela Ferry and Bululwane Irrigation Schemes. Section 3.3 explains the justification of the selected study areas. Section 3.4 discusses the data collection procedures and methods that were employed. Section 3.5 gives a description of the conceptual framework of the study. Section 3.6 explains the empirical data analysis approaches applied in this study.

3.2 Study area description

Figure 3.1 below shows the location of the two selected study areas in KwaZulu-Natal province.
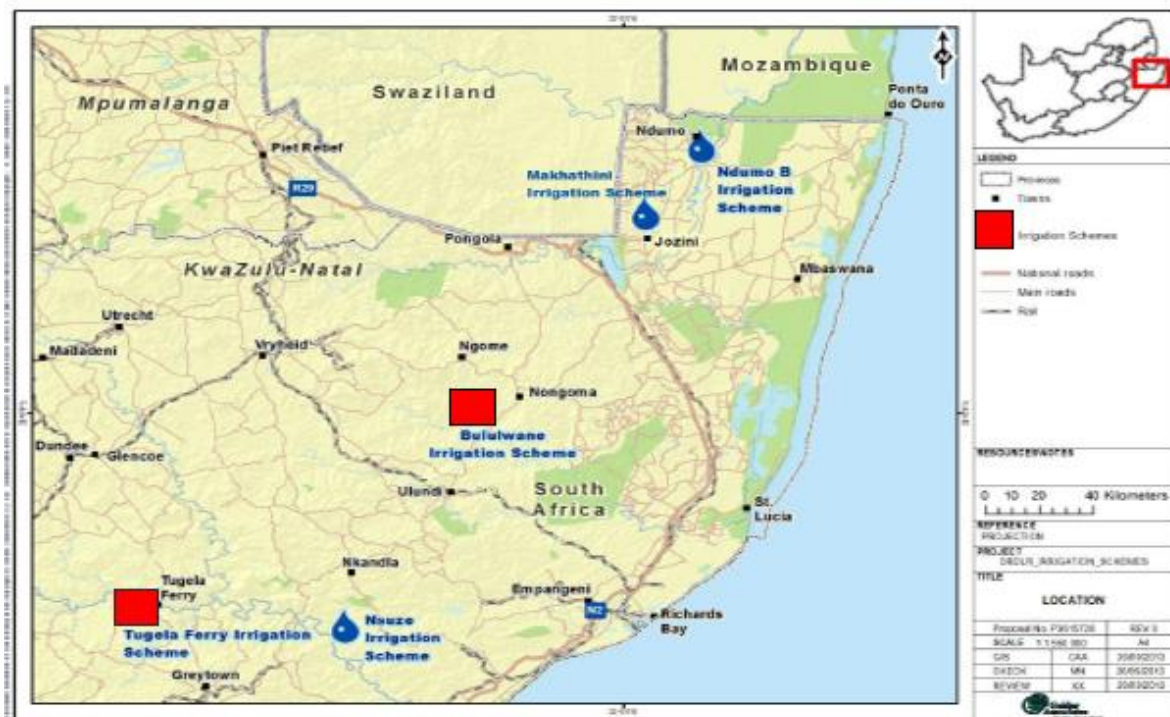
Figure 3.1 Map of study areas

Source: Golder Associates (2014)

3.2.1 Tugela Ferry Irrigation Scheme

Tugela Ferry Irrigation Scheme is located in the Midlands region of KwaZulu-Natal Province of South Africa. It falls within Msinga Local Municipality which is under the UMzinyathi District Municipality and is close to the small town of Tugela Ferry. The municipality is one

of four local municipalities within the Umkhanyakude District. Msinga Municipality covers 2 501 km^2 of the total area of 8 589 km^2 of UMkhanyakude District Municipality, with the population of approximately 189 578 people and 38 372 households. Msinga is located in a dry to semi-arid zone, with a mean rainfall of 600-700 mm per annum, very high summer temperatures and frequent droughts. Msinga is a poverty-stricken area with few economic resources and little economic activity. In Msinga the livelihood sources comprise cropping and livestock production, wage labour on large-scale commercial farms, arts and craft, migrant labour in cities such as Johannesburg and Durban, and remittances. Child support grants and old age pensions are an important source of income for most households (Cousins, 2013). Since there are relatively low socio-economic levels there is dependency on social grants and remittances.

According to Cousins (2013), the scheme was built by the Natal Native Trust between 1898 and 1902 and has been operational ever since. The objective was to support crop production by rural households for both domestic consumption and sale. The main crops grown on the scheme are green maize, tomatoes, sweet potatoes, cabbages, spinach, with much smaller quantities of beans, butternut, green peppers, potatoes, onions, beetroot, pumpkins and peas. Irrigation water is drawn from the Thukela River and distributed via a main canal, holding dams and smaller distribution canals. The irrigation scheme is one of the largest in the province and consists of nine blocks (Block 1, 2, 3, 4A, 4B, 5, 6, 7A and 7B) covering an area of about 840 hectares of high potential soils. The nine blocks of the irrigation scheme are owned by five municipal Wards and three traditional authorities namely Mthembu, Mabaso and Mbovu. Land is accessed mainly through the traditional authorities who allocate land to households in consultation with block committees. Most farmers have inherited their plots (Cousins, 2013). Smallholders in the scheme do not hold standard plots of around a hectare, but cultivate variable numbers of small individual 'beds', or plots which are 0.1 hectares in size. However, some smallholder farmers have obtained more plots through borrowing from neighbours and relatives or negotiating with the traditional authorities. Farmers who borrow plots may have to compensate the plot holders with some produce or pay approximately R200 per plot when they have harvested their produce. Some of plot holders borrow or rent out plots so that the land may not be returned to the traditional authority for re-allocation. Additionally, the current traditional land tenure system in the scheme does not allow selling plots.

3.2.2 Bululwane Irrigation Scheme

Bululwane Irrigation Scheme is located in Nongoma Local Municipality, situated within the Zululand District Municipality. The Zululand District is situated on the northern regions of the KwaZulu-Natal Province and covers an area of approximately 14 810 km². Zululand remains one of the poorest districts in the country partly due to its history as a marginalized homeland area (Zululand District Municipality, 2016). Agriculture is a main sector within the district and has the potential to employment opportunities and addressing food security challenges (Zululand District Municipality, 2014). The high agricultural potential of the land is the key to the future development of the region. Agricultural development in the district will be achieved through improved market access, increased irrigation and land reform and transformation in the sector (Zululand District Municipality, 2006). Nongoma is one of the five local municipalities that form the Zululand District and is situated in the east of the district. Nongoma Municipality covers an area of about 2 184 km² and is second largest in terms of area in the Zululand District. The municipality population is approximately 194 348 individuals and 34 341 households. Land ownership in the Nongoma municipality is divided into four groups, namely, state land, private freehold properties, commonage area and Ingonyama Trust land. Less than 20% of Nongoma is considered high potential agricultural land and, therefore, smallholders usually farm on poor marginal lands with limited water supplies.

The irrigation scheme was built around 1962 with the objective of increasing food production and generating employment opportunities in the area. The scheme is approximately 30 km away from Nongoma town where the district Department of Agriculture and Rural Development (DARD) offices are located. In total the Bululwane irrigation scheme comprises of 550 hectares which are owned by the Isilo; King Goodwill Zwelithini who also has a plot on the scheme. The scheme has four blocks and 128 farmers who are the beneficiaries of the land. The four blocks are, namely, Block 9A, Block 9B, Block 10 and Blocks 3 and 4 each with 31, 35, 21, and 41 beneficiaries, respectively. The land is allocated by the scheme committee members as permitted by the King Zulu. Unlike in Tugela Ferry Scheme where farmers are allocated small individual 'beds', in Bululwane each smallholder is allocated one hectare of land on average.

3.3 Justification of the two irrigation schemes selected

The choice of the two schemes was done as part of the Water Research Commission's (WRC) project (Project Number K5/2278//4) of which this study is a part of. The irrigation schemes chosen are meant to study the relationships between social grant-dependency, on-farm entrepreneurial spirit and utilising resources at their full capacity using behavioural explanation. The selected schemes were meant to study entrepreneurial development paths where there is substantial farming activity.

Selection of the schemes was based on the following criteria:

➢ The schemes that are currently functional and have access to small-scale irrigation water;

➢ The schemes that are big enough in terms of their maximum capacity, land size irrigated, type of irrigation system, form of farming practiced and number of irrigators benefiting from the scheme;

➢ The schemes that are located in areas that have homestead food gardening and cooperative or community food gardening;

➢ The schemes that are located in areas that have rain-fed farming outside the schemes; and

➢ The schemes that have other non-farm and off-farm economic activities.

The significant factor that was used to select the two irrigation schemes is the diversity amongst them and their potential to enable smallholder farmers to become commercial farmers. These schemes and surrounding areas are engaged in farming activities that serve as demonstrative case studies in the move from homestead food gardening to small-scale farming and then to commercial farming in the future. Homestead food gardening appeared to be crucial to food security in the surrounding areas of Tugela Ferry and Bululwane irrigation schemes.

3.4 Data collection methods

This section introduces and describes the sampling strategy and the data collection instruments, the approach taken to fieldwork and explains how data were analysed for this study.

3.4.1 Sampling procedure

Both purposive and stratified random sampling techniques were applied to select the respondents in this study. The study purposively selected small-scale farmers who were

involved in food crop farming to allow for comparison between different farmer typologies. A stratified random sampling method was then used to select the respondents. Smallholder farmers were categorised into four types of farmers, namely, scheme irrigators, homestead food gardeners, community food gardeners and non-irrigators. The reason for stratification according to the farmer type was to capture the developmental paths and challenges or constraints of progressing to the next level in each farmer type. Therefore, a simple random selection was done to obtain a total sample size of 175 small-scale farmers in the selected irrigation schemes.

Primary data were collected over a period of one week in March 2018 at Tugela Ferry and one week in April 2018 at Nongoma using structured questionnaires. Data were collected by four enumerators in each study area who speak isiZulu (the local language) and English, including the researcher of the study. All the enumerators had FET and/or University qualifications in both study areas. The enumerators were trained in data collection procedures and the contents of the questionnaire before conducting the survey. The training included going through all the questions in the questionnaire and asking the enumerators to share how they would ask the questions in isiZulu since most smallholders cannot understand English. This was done to establish a common understanding of the type of data required by each question and to ensure that the enumerators will be collecting the correct data. The questionnaires were checked at the end of each day to ensure that all the information was captured comprehensively and correctly.

The questionnaires were pre-tested before being administered to all the interviewed smallholders. A sample of five farmers was interviewed in each study area during questionnaire pre-testing. Questionnaires were pre-tested for two reasons: to improve the validity and consistency or reliability of the questionnaire; and to improve the translation of some of the critical questions to the local language. Questions that were unclear during questionnaire pre-testing were edited to make them forward straight following the pre-test. Moreover, possible responses that were not captured in the closed-ended questions were added to decrease the number of responses getting to 'other'. SPSS 25, STATA IC15 and Excel were used to analyse the data.

3.4.2 Data collection instrument

Data were collected using a pre-tested and structured questionnaire. Information on basic farmer characteristics such as relationship to household head, age, gender, marital status, main occupation, education level and number of days working on farm per week was collected using

the questionnaire. The questionnaire also included the measures of household wealth such as household assets, livestock, agricultural production activities, income sources and income amounts. Moreover, the questionnaire captured capital assets (human, natural, financial, physical, social and psychological), farmers' entrepreneurial characteristics, social grants main recipients, famers' perceptions on child support grant and on access to credit. Information on farmers' entrepreneurial characteristics was used to create an on-farm entrepreneurial spirit index. The same questionnaire was used for scheme irrigators, homestead food gardeners, community food gardeners and non-irrigators, though, a portion of the questions related to the irrigation activities or issues was specific to irrigating farmers, excluding non-irrigators. This was done to ensure that the collected information is consistent across all different types of farmers for comparison purposes.

3.5   Conceptual framework

This section introduces a basic framework for examining the impact of social grants by focusing on the connections existing between social grant-dependency, on-farm entrepreneurial spirit, and efficient use of resources at the household level. Numerous approaches are available to develop the conceptual framework (Barrientos, 2012). One approach models the behavioural responses of beneficiary households, whereas the other one models the welfare impacts of social grants. As noted in section 1.2, this study applied the behavioural or RP approach to examine social grant-dependence effects on entrepreneurial spirit and utilisation of farm resources. This approach is preferred for various reasons. The RP approach is based on respondents' actual choices, which is the major strength of this approach. The method involves the investigation of individuals' preference as revealed through their actions in markets which are specifically related to the value of interest. When people, for example smallholders, consider the internal costs and benefits based on their actions, they will make more actual approximations of willingness to pay (Haipeng & Xuxuan, 2012). RP can be contrasted with the SP approach which is has the major weaknesses, namely, the hypothetical nature of the question and the fact that the approach does not observe actual behaviour. Therefore, the results of the latter approach can be misleading. Over the past years, several authors have utilised the SP approach to develop questionnaires. Therefore, the overall purpose of this study is to exhibit a new approach that can be used to evaluate smallholder farmers' actual behaviour rather than what they say they do.

Entrepreneurship is the process of creating something dissimilar, with value, by dedicating the necessary time and effort, assuming the associated financial, physical and social risks, and receiving monetary rewards and personal satisfaction (Hisrich & Peters, 1989). There are two parts to entrepreneurship (Kahan, 2013). The first category consists of the managerial skills that are essential to effectively start and run a profitable business. The second category speaks of the inner drive or desire to start and run a profitable business. It can be generally defined as the entrepreneurial spirit which cannot be taught (Kahan, 2013). Even though it cannot be taught, it can improve or deteriorate over time depending on the circumstances faced by the entrepreneur.

Farming entrepreneurs form a heterogeneous group, each one being different from others in terms of activities, products, and farming methods. Despite these differences, the success of these entrepreneurs in farming business is attributed to an entrepreneurial spirit (Beltrán & Miguel, 2014). Entrepreneurial spirit has become the special issue in the business world in the 21st century (Kuratko, 2007). Nandram & Samson (2006) define entrepreneurial spirit as human activities, spirits, and enthusiasm as shown by entrepreneur attitudes towards available opportunities. "The word of spirit in entrepreneur is a soul, an energy that activates human potentials to create, innovate, find, work, with desires to pursue vision although has to face challenges, obstacles, and risks" (Strongs, 2009 cited by Ahsan *et al*., 2016:48). According to Fernald *et al*. (2005), characteristics that are common to both entrepreneurs and leaders are visionary, risk-taking, achievement-orientated, motivation, creative, flexible, persistent, and patient. Farmers as entrepreneurs perceive their farms as a business and as a means of generating profits; they are passionate about farming, are willing to take calculated risks to make their business grow and profitable and are always looking for opportunities to improve and expand business.

According to the sustainable livelihoods framework (SLF), households control a bundle of assets or endowments. These include physical capital (agricultural tools, livestock), natural capital (owned land, access to common property resources), human capital (in the form of knowledge, experience, skills and health), financial capital (cash-in-hand, bank accounts, net loans outstanding), and social capital (networks, norms and social trust that facilitates coordination and cooperation) (Devereux 2001, Barrett 2006). "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living; and is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not

undermining the natural resource base." (DFID, 1999:3). According to Ashley & Carney (1999), livelihoods are sustainable when individuals are resilient in the face of external shocks and stress, independent upon external support (or can only be dependent if this support is economically and institutionally sustainable), maintain the long-term productivity of natural resources and do not destabilize the livelihoods of, or compromise the livelihood options open to, others. The concept of Sustainable Livelihood (SL) is an attempt to go beyond the conventional meanings and approaches to poverty abolition. The SLF recognizes that a livelihood encompasses income, social institutions (family and village), gender relations, access to government social and public services (education, health facilities, roads and water supplies), powerlessness feelings, illiteracy, state of vulnerability, property rights essential to support and to sustain a given standard of living (Ellis, 1998; Krantz, 2001).

Smallholders rely on a variety of forms of capital to attain their livelihood outcomes such as higher household income, which can be analysed utilizing the SLF (Ahmed *et al*., 2008). The SLF is a way of thinking about the objectives, scope and priorities for development, and to improve progress in poverty elimination (Ashley & Carney, 1999). The framework seeks to improve rural development policy and practice by identifying the seasonal and cyclical complexity of livelihood strategies, helping to eliminate access constraints to assets and activities that complement present patterns, and by recognizing ways of making livelihoods more able to cope with adverse trends and shocks (Norton & Foster 2001). Small-scale farmers can be said to be ''livelihood secure'' when they have adequate and sustainable access through farming activities, to income and resources to meet basic needs such as food, drinking water, housing, education, health facilities, and financial security (Ahmed *et al*., 2008). Ellis (2000) addressed the SLF as a widespread and enduring characteristic of rural survival, reflecting the continuing vulnerability of rural livelihoods (i.e. phenomenon that characterises rural household survival strategies). However, the framework does not attempt to capture everything that is important to eliminate poverty (Ashley & Carney 1999). Fogg (2009) presented a new model referred to as Fogg Behavior Model (FBM) for understanding human behaviour. This psychological model identifies and defines three factors (motivation, ability, and triggers) that control whether a behaviour is performed. The model emphasizes that for a positive behaviour to occur, an individual requires sufficient motivation, sufficient ability, and an effective trigger. This study, therefore, integrates the FBM and SLF to conceptually explain the behaviours of smallholder farmers.

Figure 3.2 shows the integrated SLF/FBM framework and its several factors, which enhance livelihood opportunities and show how they relate to each other. It shows how, in different contexts, sustainable livelihoods are achieved through access to a range of livelihood assets that are combined in the pursuit of different livelihood strategies (Ahmed *et al.*, 2008). Thus, the fundamental assumption of the SLF is that individuals pursue a wide range of livelihood strategies such as crops, vegetables, and livestock production. To achieve these positive livelihood outcomes, people need a range of capital endowments or assets including human, social, natural, physical, and financial capital. Each asset is necessary, yet not on its own sufficient, to achieve positive livelihood outcomes. Therefore, to make livelihoods more secure and sustainable one needs an understanding of the assets that people own, and how they are utilised.
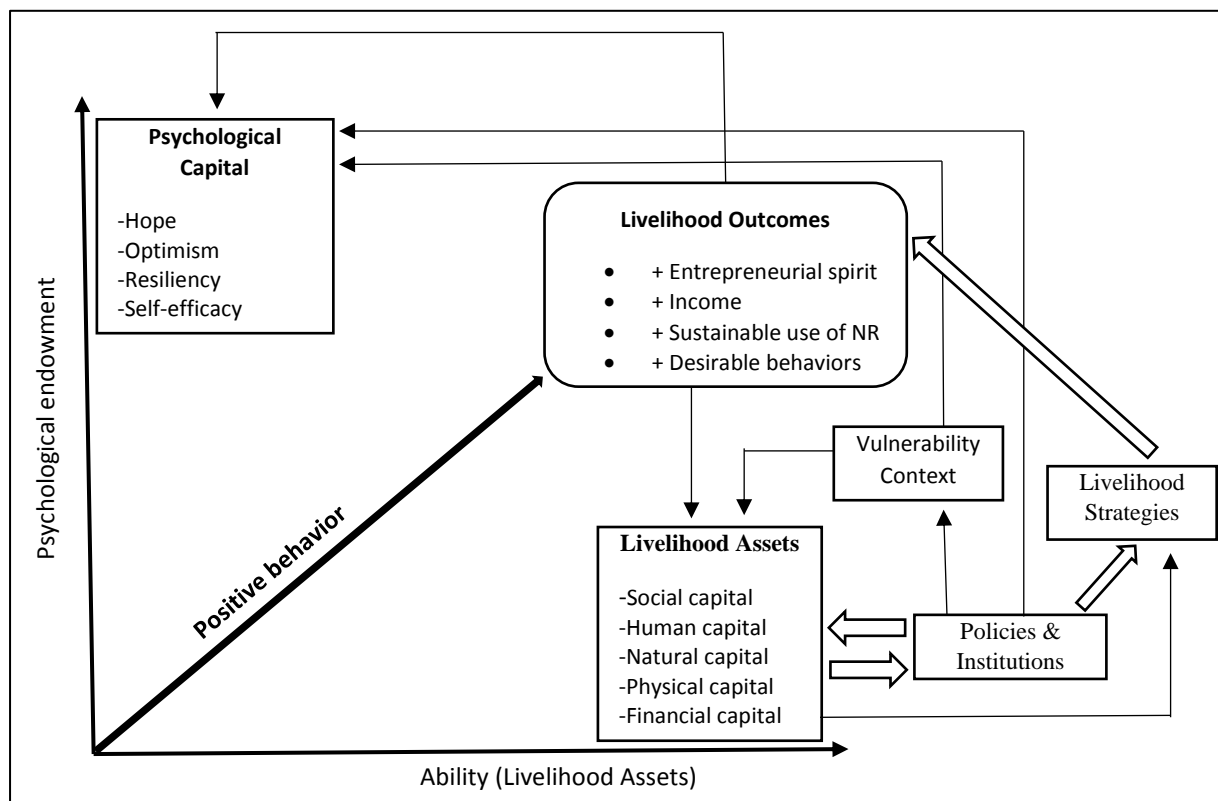
Figure 3.2 The integrated FBM and SLF framework

Source: Adapted from DFID (1999) and Fogg (2009)

Human capital includes the skills, knowledge, experience, ability to labour and good health that together enable individuals to pursue varied livelihood strategies and achieve their livelihood objectives. Smallholder farmers have built up skills through the indigenous knowledge they obtained from their forefathers and extension services. The illiteracy rate is

usually relatively high among smallholders. In the SLF context social capital means the social resources upon which individuals draw in pursuit of their livelihood objectives. The social resources that form social capital are developed through networks and connectedness, membership of groups and relationships of trust, reciprocity and exchange (DFID, 1999). This capital takes the form of networks, cultural norms, and other social attributes that have significantly helped exchanges of experience, knowledge sharing, and cooperation among rural households (Stirrat, 2004). Low social capital levels consequently cause the vulnerability of the poor. For example, the results of Ahmed *et al.* (2008) indicated that rich prawn farmers and wealthy people forced poor farmers to sell their farming fields.

Natural capital encompasses the natural resource stocks from which resource flows useful for livelihoods are derived (e.g. land, water and environmental resources) and enables smallholders to expand production in terms of cultivated area and also enables them to produce throughout the year. Physical capital includes the basic infrastructure and production equipment required to support livelihoods and help individuals to function more productively. The components of infrastructure usually essential for sustainable livelihoods include road, transport, adequate water supply and sanitation, secure shelter, markets, electricity, health facilities, access to information (communications), and clean and affordable energy (DFID, 1999; Ahmed *et al.*, 2008). However, smallholders are often disadvantaged because of the limited physical capital (e.g. lack of access to markets), and as a result, struggle to pursue their livelihood strategies. Financial capital includes the financial resources which are available to people (incomes, savings and credit) and which provide them with different livelihood options. Smallholders lack the potential to generate considerable amounts of financial capital from their farming activities due to market constraints. Their major incomes come from unearned income sources, namely, social grants and remittances. Farmers from low-income households also face credit constraints because they do not meet the requirements to receive loans from banks and are left with the option of informal money lenders (loan sharks and stokvels) who charge relatively high interest rates.

In addition to the types of capital that are part of the original SLF there is positive PsyCap which goes beyond "what you know" (human capital) and "who you know" (social capital). Explicitly, PsyCap is concerned with "who you are" now and, in the developmental sense, "who you are capable of becoming" in the future. Therefore, PsyCap does impact and encompass knowledge, experience, education, skills, and technical abilities because these are also "who you are." Positive PsyCap capabilities encompass self-efficacy or confidence, hope,

optimism, and resiliency (Luthans & Youssef, 2004; Luthans *et al.,* 2007; Luthans *et al.,* 2015). The goals and objectives of smallholders are closely intertwined with a person's PsyCap. However, each farmer has unique goals, for example, one farmer might be more interested in obtaining ownership of the largest farm in the area whereas another may aim to own the best set of farm machinery and another one may be interested in minimizing debt (Debertin, 2012). Therefore, small-scale farmers with positive PsyCap are expected to set goals that enable them to attain relatively higher household income, *ceteris paribus*.

The asset-based community development (ABCD) approach complements and provides a richer description to the SLF while providing new and vital insights into the development process (Emmett, 2000; Nel, 2015). The ABCD approach encourages an awareness and mobilisation of the assets and strengths in communities – a component not emphasised in the SLF. As a result, it gives considerable support to the importance of popular participation and the requirement for interventions on small-scale farming. (Emmett, 2000). However, the SLF is still complemented for highlighting policies and the institutional contexts within which the capitals or assets exist, and the responsibility in terms of development. Integrated SLF/ABCD forms a useful framework to understand the strengths of a vulnerable community to plan and implement sustainable community development strategies. The SLF and ABCD approaches focus on how individuals cope and survive, despite constraints, lacks and shocks, instead of what they lack. The integrated approaches further emphasise that community members are central to the development process and need to be involved from the beginning (Nel, 2015). In this study, it is assumed that if smallholder farmers are involved from the beginning of irrigation schemes development process (infrastructure installation process) they would use the resources at farmer's full capacity provided crop production may be vulnerable to certain shocks (e.g. floods, drought, pesticides). Additionally, they would be responsible to act and limit any damage in, rather than being dependent on government or scheme management for the maintenance of, the irrigation schemes.

The framework has PsyCap endowment (motivation) and livelihood assets (ability) on the vertical and horizontal axis, respectively. A smallholder farmer who has both high PsyCap and livelihoods assets will have high positive behaviour levels to attaining their goals. The diagonal arrow from the bottom left corner to the upper right indicates that as the smallholder's PsyCap and assets increase, the more likely it is that they will have a positive behaviour, thus, achieve positive livelihood outcomes. A central challenge in smallholder farming is centred on PsyCap endowment and what behavioural economists call 'present-biased preferences', in that some

farmers value immediate rewards more highly than future pay-offs. That is, they are not willing to forgo a profit opportunity in the short-run to benefit from potential profits in the long-run (Samson, 2015). In this study, the four capacities of positive PsyCap (hope, resiliency, self-efficacy and optimism) are classified as the core motivators that increase motivation within the smallholder farmer and are associated with positive behaviour. These capacities are both long-term, unique, cumulative, interconnected and renewable (Luthans & Youssef, 2004). If PsyCap is high enough, individuals might do extraordinary things, even difficult things, to attain their goals. Therefore, the FBM makes clear that for positive behaviour to occur, individuals require some non-zero level of all capitals (Fogg, 2009).

Social grants may inhibit the management ability farming spirit as smallholders become dependent on the contribution of grants on their household income. As a result, farmers may decrease crop production, especially when farming for consumption rather than selling. Therefore, the variables linking to the research objectives are social grant-dependency, unearned income (social grants and remittances), PsyCap endowment, on-farm entrepreneurial spirit, and efficient utilisation of resources.

3.6 Empirical methods of data analysis

Different econometric models were used to achieve the specific objectives of this study. Table 3.1 shows the specific objectives and the corresponding analytical tools that were employed. Descriptive statistics were used to supplement the other quantitative methods and show the small-scale farmers' access to livelihood assets in selected study areas.

Table 3.1 Specific objectives and data analysis methods

Specific objective	Data analysis method
To investigate the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders	Principal Component Analysis Two-limit Tobit regression model
To evaluate the impact of unearned income on smallholders' ability to utilize their resources at their full capacity	Fractional Logit model

3.6.1 Descriptive statistics

Descriptive analysis for all the variables was performed as a first step in the data analysis. The descriptive analysis involved looking at frequencies, means, standard deviations and

percentages of the variables. The analysis was also performed using different statistical tests [F-test, Chi-square (χ^2) test, t-test and P-values] for comparison purposes. The t-test and P-values were used to make comparisons across the two selected irrigation schemes. The F-test was used to make comparisons across scheme irrigators, homestead food gardeners, community food gardeners and non-irrigators with respect to relevant continuous variables, while the χ^2-test was used to test the degree of association between the relevant categorical variables. Some of these variables were then later used as dependent and independent variables in the econometric models.

3.6.2 Principal Component Analysis

Principal Component Aalysis (PCA) is a multivariate data analysis technique to reduce the dimensionality of many interrelated variables, while retaining as much as possible of the variation present in the data set and therefore simplify the analysis and interpretation of data (Jolliffe, 2002; Armeanu & Lache, 2008; Gujarati & Porter, 2009). In mathematical terms, from an initial set of n correlated variable, PCA creates orthogonal components, where each component is a linear weighted combination of the initial variables (Vyas & Kumaranayake 2006). For example, from a set of variable X_1 through to X_n;

$PC_1 = a_{11}X_1 + a_{12}X_2 + \ldots + a_{1n}X_n$
$PC_2 = a_{21}X_1 + a_{22}X_2 + \ldots + a_{2n}X_n$

$\cdot \qquad \cdot \qquad \cdot \qquad \cdot$

$\cdot \qquad \cdot \qquad \cdot \qquad \cdot$

$\cdot \qquad \cdot \qquad \cdot \qquad \cdot$

$PC_m = a_{m1}X_1 + a_{m2}X_2 + \ldots + a_{mn}X_n$ \hfill (3.1)

Where a_{mn} denotes the weight for the mth principal component and the nth variable.

The weights for each principal component are given by the eigenvectors of the covariance matrix if the original data are measured in similar units or comparable scales (un-standardized X_s), or the correlation matrix if the variables have different units or scales (Vyas & Kumaranayake, 2006). The principal components are ordered so that the first component (PC_1) captures the largest possible variance in the original data set, subject to the condition that:

$a_{11}{}^2 + a_{12}{}^2 + \ldots + a_{1n}{}^2 = 1$ \hfill (3.2)

The second principal component (PC$_2$) is orthogonal to PC$_1$, and accounts for the second largest variance, subject to the same condition. Subsequent principal components are uncorrelated with preceding components, thus, each component captures an extra dimension in the data set, while explaining smaller and smaller percentages of the variation of the original variables. The higher the degree of correlation between the original variables, the fewer the principal components needed to capture common information (Vyas & Kumaranayake 2006).

PCA has been used by several researchers to compute various indices (e.g., Filmer & Pritchett, 2001; Fotso & Kuate-Defo, 2005; Manyong *et al.*, 2006; Vyas & Kumaranayake, 2006; Van der Merwe & De Swardt, 2008; Achia *et al.*, 2010; Muchara *et al.*, 2014). Entrepreneurship is usually measured using an index (Lichtenstein & Lyons, 2001; Acs & Szerb, 2009; Marcotte, 2013) both at the national and individual level. Following the same logic, PCA was applied in this study to generate the on-farm entrepreneurial spirit indices (Knudson *et al.*, 2004; McElwee & Bosworth, 2010; Sinyolo *et al.*, 2017a) which were, in turn, used as dependent variables in the Tobit regression model to evaluate the impact of social grant dependence on on-farm entrepreneurial spirit (Chapter 5). PCA was also used to generate the PsyCap indices (Luthans & Youssef 2004; Luthans *et al.*, 2006; Luthans *et al.*, 2007) which were, in turn, used as independent variables. The Kaiser criterion was used to determine how many components should be retained for analysis, thus the components with eigenvalues less than one were dropped. The scree plot was also used as a visual aid for evaluating the number of components that should be retained by graphing the eigenvalue against the component number (Phakathi & Wale, 2018). In this study, two PsyCap components representing optimism were merged into one PC using linear recombination of principal components or combined PC method (Manyong *et al.*, 2006; Aschard *et al.*, 2014).

Bartlett's test of sphericity was applied to check if the observed correlation matrix diverges significantly from the identified matrix. Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also applied, a value above 0.5 implying PCA could be performed. To better interpret the meaning of estimated components, the varimax rotation method was used. This method does not change the outcome, but it aims to make fewer variables have relatively larger factor loadings that can be easier to interpret. In this study, only factor loadings greater than 0.40 were included in the results interpretation.

3.6.3 Tobit Regression Model

A censored Tobit regression model was applied to estimate the impact of social grant dependence on on-farm entrepreneurial spirit among smallholder farmers following past studies (e.g., Wang *et al*., 1997; Manyong *et al*., 2006; Muchara *et al*., 2014; Alhusseini, 2016) which estimated Tobit regression to deal with PCA generated indices. Other traditional regression methods such as ordinary least squares (OLS) would have generated biased and inconsistent estimated coefficients because they are not suitable for censored data (Wooldridge, 2002; Greene, 2003). The two-limit Tobit model was also found statistically consistent (i.e. appropriate over OLS regression) after performing the Jarque-Bera test for normality of the residuals. Given the right- and left-censoring at minimum (σ_{min}) and maximum (σ_{max}) score, respectively, the two-limit Tobit model (Wang *et al*., 1997; Muchara *et al*., 2014) is presented as follows:

$$\sigma_i^* = \beta'(Z_i) + \varepsilon_i \tag{3.3}$$

Where, σ_i^* is an unobservable latent dependent variable, Z_i is an observable vector of independent variables, β is a vector of parameters to be estimated, and ε_i is a vector of independently and normally distributed residuals with a common variance θ. Then the actual model can be represented as follows:

$$\sigma_i = \sigma_{min} \text{if } \sigma_i^* \leq \sigma_{min}$$
$$= \beta'(Z_i) + \varepsilon_i \text{ if } \sigma_{min} \leq \sigma_i^* \leq \sigma_{max}$$
$$= \sigma_{max} \text{if } \sigma_i^* \geq \sigma_{max} \tag{3.4}$$

With this specification, the parameters can be estimated by maximizing the following corresponding log-likelihood function (Maddala, 1983):

$$L(\beta, \theta) = \prod_{\sigma_I = \sigma_{min}} \Phi\left(\frac{\sigma_{min} - \beta' Z_i}{\theta}\right) \prod_{\sigma_i = \sigma_i^*} \frac{1}{\theta}\phi\left(\frac{\sigma_i - \beta' Z_i}{\theta}\right) \times \prod_{\sigma_i = \sigma_{max}} \left[1 - \Phi\left(\frac{\sigma_{max} - \beta' Z_i}{\theta}\right)\right] \tag{3.5}$$

Where, Φ and $\emptyset$ are the standard normal density and distribution functions, respectively. Furthermore, the Durbin-Wu-Hausman test (Hausman, 1978) was performed to test for potential endogeneity of social grant dependence (proportion of annual household income from grants) in the regression model.

Table 3.2 summarises the variables that were included in the two-limit Tobit model and their hypothesised effect on on-farm entrepreneurial spirit of smallholders. In this model the impact

of grants was captured using two variables: a proportion variable showing the contribution of social grants to total annual household income (GRANT_PROP); and a continuous variable capturing the number of years a household has been receiving social grants (GRANT_YEARS). These variables were expected to have a negative impact on smallholder entrepreneurship because of "dependency syndrome" as noted before.

Table 3.2 Description of variables used in the Two-limit Tobit model

Variable code	Variable description			
Dependent variables				
Proactive	Innovative	Competitive	Risk taking	
Independent variables				Hypothesised effect
X_1 = GRANT_PROP	Proportion of income from social grants			-
X_2 = GRANT_YEARS	Number of years farmer receiving grant (years)			-
X_3 = AGE	Farmer age (years)			+
X_4 = AGESQUARE	Farmer age square (years)			-
X_5 = ADULT_EQUIV	Household size in adult equivalents (numbers)			+
X_6 = GENDER	Farmer gender (1=Male)			+
X_7 = EDUCAT	Farmer education level (years of schooling)			+
X_8 = EXTENSION	Access to extension services (1=Yes)			+
X_9 = TRAINING	Access to agricultural training (1=Yes)			+
X_{10} = LANDSZE	Land size household has access to (ha)			+
X_{11} = SOILQUAL	Perceived soil quality (1=Good)			+
X_{12} = FARMER_TYPE	Scheme irrigator (1=Yes)			+
X_{13} = TLU	Livestock size in Tropical Livestock Units (TLUs)			+
X_{14} = ACC_TRACTOR	Access to tractor (1=Yes)			+
X_{15} = HOPE_RESIL	Value of physical assets (R)			+
X_{16} = GROUP_MEMB	Farmer membership to groups (1=Yes)			+
X_{17} = FARM_INC_PROP	Proportion of income from agricultural activities			+
X_{18} = HOPE_RESIL	Psychological capital indices			+
X_{19} = CONFIDENT				+
X_{20} = OPTIMISM				+

The proportion variable was included to capture the level of farm household dependence on social grants. To generate GRANT_PROP, the annual household income from social grants was divided by the total annual household income. Total household income included the incomes received from various sources, which comprised of remittances, arts and craft, employment, social grants, farming, and small businesses.

Other variables that were hypothesised to influence on-farm entrepreneurial spirit were also included. These comprised of farmer demographics (captured by age, squared term of age and

gender), human capital (captured by education level), natural capital (captured by land size and water accessibility), financial capital (captured by proportion of income from agricultural activities), physical capital (captured by livestock size, value of assets), social capital (captured by farmer group membership) and PsyCap (captured by hope, resilience, self-confidence and optimism). Both age and the squared term of age were included in the model to test whether the relationship between age and on-farm entrepreneurship is linearly. The variables were expected to have imperfect multicollinearity. Farmer support services (captured by access to extension, agricultural training and tractor) and the perceptions of soil quality were also included in the model.

3.6.4 Fractional Logit Model

As the explained variable is a fractional response, ordinary least squares (OLS) is not appropriate since the approximated values from the model are not definite to lie in the unit interval (Papke & Wooldridge, 1996). Therefore, the Fractional Logit model was adopted in this study to analyse the relationship between unearned income and the proportion of operated land following the past studies (e.g., Baum, 2008; Ramalho & Ramalho, 2009; Gallani *et al.*, 2015). The Fractional Logit model is used when the fractional response dependent variable is not normally distributed (Davidson & MacKinnon, 1982) which was the case in this study.

Table 3.3. lists the variables that were used in the Fractional Logit model to analyse the impact of unearned income on smallholders' ability to utilize their resources at their full capacity. The extent to which smallholder farmers utilise their resources at their full capacity was captured by the proportion of land operated by a farm household in the previous year, before the survey.

Table 3.3 Description of variables used in the Fractional Logit model

Variable code	Variable description	
Dependent variable		
LAND_OPER_PROP	Proportion of land operated	
Independent variables		**Hypothesised effect**
X_1= UNEARNED_PROP	Proportion of unearned income	-
X_2= GRANT_USE_PROP	Proportion of social grant money used for agricultural activities	+
X_3= AGE	Farmer age (years)	+
X_4= AGE^2	Farmer age square (years)	-
X_5= FARMING_EXP	Farmer farming experience (Years)	+
X_6= ADULT_EQUIV	Household size in adult equivalents (numbers)	+
X_7= GENDER	Farmer gender (1=Male)	+
X_8= MARRIED	Farmer marital status (1=Married)	+
X_9= EDUCAT	Farmer education level (years of schooling)	+
X_{10}= EXTENSION	Access to extension services (1=Yes)	+
X_{11}= TRAINING	Access to agricultural training (1=Yes)	+
X_{12}= LANDSZE	Land size household has access to (ha)	+
X_{13}= SOILQUAL	Perceived soil quality (1=Good)	+
X_{14}= TENURE	Secured land tenure (1=Yes)	+
X_{15}= FARMER_TYPE	Scheme irrigator (1=Yes)	+
X_{16}= TLU	Livestock size in Tropical Livestock Units (TLUs)	+
X_{17}= ACC_TRACTOR	Access to tractor (1=Yes)	+
X_{18}= ASSETS	Value of physical assets (R)	+
X_{19}= ACC_CREDIT	Access to credit (1=Yes)	+
X_{20}= BUSINESS_OWN	Small off-farm business ownership (1=Yes)	-
X_{21}= GROUP_MEMB	Farmer membership to groups (1=Yes)	+
X_{22}= UMKHANYA_DISTR	Umkhanyakude district (1=Yes)	-

To generate proportion of operated land (LAND_OPER_PROP), the land that was operated in the previous season was divided by the total farm size that the household had access to, either through inheritance, lease, borrowing, etc. The impact of unearned income was captured by two variables: a fractional variable showing the contribution of pooled unearned income to total annual household income (UNEARNED_PROP), and a proportion variable capturing the amount of social grant income spent in farming activities (AGRIC_GRANT_PROP). The latter was included to assess whether the proportion of unearned income invested in agricultural activities has an impact on LAND_OPER_PROP. The AGRIC_GRANT_PROP variable was expected to have a positive impact on the proportion of land operated because it captures investment in agriculture using grant money. According to Covarrubias *et al.* (2012),

agricultural investments resulting from the SCT schemes were detected in terms of increased ownership of agricultural tools and livestock. The Variance Inflation Factor (VIF) was used to test if UNEARNED_PROP and AGRIC_GRANT_PROP are correlated before including both of them in the regression model.

To generate proportion of unearned income, the sum of annual household income from remittances and social grants was divided by total annual household income. The model also included off-farm commitments (captured by off-farm business ownership), farming experience, marital status, land tenure, and access to credit. A District dummy variable (UMKHANYA_DISTR) captured the social, political and agroclimatic differenced in the two study areas. Other explanatory variables described in section 3.6.3 were also used in this model.

3.7   Summary

The study was conducted in two irrigation schemes (Tugela Ferry and Bululwane) in the KwaZulu-Natal province, South Africa. This chapter has provided background information about these study areas and justified their selection. The data were collected from 175 small-scale farmers using a combination of purposive and stratified random sampling techniques. The data were gathered using a pre-tested and structured questionnaire. The questions utilized to collect data were guided by the conceptual framework designed for this study to ensure that all the required information were obtained. The data was analysed using descriptive statistics, PCA, two-limit Tobit and Fractional logit regression models. The next two chapters present the empirical results and discussions for this study.

CHAPTER 4. DESCRIPTIVE ANALYSIS RESULTS AND DISCUSSIONS

4.1   Introduction

This chapter shows the results of the descriptive analysis among different types of farmers. The analysis of descriptive statistics is used to summarize the data set and to understand the characteristics of sampled households. Data are analysed based on the asset endowments for sampled smallholder farmers in the two study areas. As mentioned in Section 3.6.1, some of these variables were then later used as dependent and independent variables in the econometric models. The analysis includes the use of frequencies, means, percentages, F-tests, t-tests, Chi-square test, P-values and one-way ANOVA. These statistics compare differences between farmer typologies including the household demographics and socio-economic characteristics. The empirical findings are examined in comparison to the results from previous studies.

4.2   Descriptive analysis: results and discussions

4.2.1   Typologies of smallholder farmers

The sample comprises of different typologies of smallholder farmers in Msinga and Nongoma. Four categories of farmers were scheme irrigators, homestead gardeners, community gardeners and non-irrigators. Table 4.1 shows the frequency and percentage of farmers by category.

Table 4.1 Typologies of smallholder farmers in Msinga and Nongoma (N=175)

Types of smallholder farmers	Frequency	Percent
Scheme irrigators	104	59.4
Homestead gardeners	32	18.3
Community gardeners	23	13.1
Non-irrigators	16	9.1
Total	**175**	**100.0**

Source: Survey data (April 2018)

The scheme irrigators included 60 farmers from the Tugela Ferry and 44 from the Bululwane irrigation schemes. Only 18.3, 13.1 and 9.1 percent were homestead gardeners, community gardeners and non-irrigators, respectively. The farmers practiced different forms of farming, namely individual scheme irrigators, cooperative scheme irrigators, homestead food gardeners, dry land farmers and cooperative food gardeners. The reason for classifying farmers into different types was to compare their levels of on-farm entrepreneurial spirit using the revealed

preference method. During the data collection, there were no independent irrigators identified in both study areas. The small-scale farmer characteristics were examined using both continuous and categorical variables. The results of the descriptive statistics of these variables constitute the rest of the chapter.

4.2.2 Household demographics and socio-economic characteristics

Table 4.2 and Table 4.3 show the demographics and socio-economic characteristics of the sampled households. Table 4.2 shows the continuous variables while Table 4.3 shows the categorical variables results. A one-way ANOVA was used to determine whether there were statistically significant variances between the mean values among farmer typologies and between irrigation schemes. Furthermore, the Tukey's HSD post hoc test was conducted to indicate which of the specific farmer typologies differed from each other. Table 4.2 shows that the average age of smallholder farmers was 55.99 years, indicating that the farmers are relatively aged individuals. The average age of farmers above 50 is consistent with the figures reported by other studies in KZN (Muchara *et al.*, 2014; Ndoro *et al.*, 2014; Sinyolo *et al.*, 2017a; 2017b; Sinyolo & Mudhara, 2018). This shows a relatively low involvement of young people in agriculture which might have a negative effect on the future of small-scale farming in terms of ensuring continuity and succession planning.

Farmers' entrepreneurial development is also influenced by education (Díaz-Pichardo *et al.*, 2012; Singh, 2013). The findings indicate that the sampled farmers had low levels of education, as shown by a small average year of schooling, with the highest level being grade 6 at primary level, indicating low levels of skills. There were statistically significant differences across the different types of small-scale farmers. The Tukey test indicates a significant (at 1%) difference in education levels between scheme irrigators (grade 6) and non-irrigators (grade 2). Concerning age and education level, several studies (e.g. Carter, 2003; McElwee & Bosworth, 2010) found that young and well-trained farmers are more entrepreneurial.

The average household size was 6.67. On average, farmers in Bululwane had a significantly higher household size of 7.38 compared to famers in Tugela Ferry with a household size of 6.16. These figures are higher than average sizes reported for Nongoma (5.6) and Msinga (4.6) local Municipalities in the 2011 KZN Municipal Census Report (Stats SA, 2012). This increment can, among other factors, be attributed to the child support grant which increases the rate of teenage or youth pregnancy (see Table 4.9 in section 4.2.3.).

Table 4.2 Description of continuous household demographics (N=175)

	Type of farmer								F-test	Irrigation scheme				F-test	Total (N=175)	
	Scheme irrigators (n=104)		Homestead gardeners (n=32)		Community gardeners (n=23)		Non-irrigators (n=16)			Tugela Ferry (n=101)		Bululwane (n=74)				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD
Household head age (years)	56.64	12.55	58.34	11.89	52.70	10.91	51.75	9.70	1.76	55.34	12.87	56.88	10.94	3.85*	55.99	12.08
Household head education level (years of schooling)	2.53	3.65	4.19	4.61	4.04	4.31	6.38	4.53	5.18***	2.74	4.05	4.26	4.16	1.25	3.38	4.15
Household size (numbers)	6.55	2.74	6.41	2.43	7.04	2.36	7.50	3.14	0.88	6.16	2.19	7.38	2.97	6.33**	6.67	2.62
Distance to the nearest all-weather road (minutes)	13.30	8.72	5.66	3.92	12.04	10.17	12	14.62	5.94***	11.55	10.52	11.70	7.56	5.75**	11.62	9.36
Distance to the nearest town (min)	50.84	19.85	32.03	17.41	60	18.09	57.50	27.99	11.16***	43.93	23.22	56.42	17.31	9.87***	49.21	21.77
Household head farming experience (years)	23.51	15.71	14.81	11.55	15.04	6.36	10.50	13.69	7.08***	19.20	14.13	20.19	15.40	0.41	19.62	14.65
Number of days working on farm per week	5.55	1.33	4.88	1.85	4.78	1.31	4.13	2.25	5.47***	5.05	1.81	5.39	1.20	11.62***	5.19	1.59

Notes: ***, ** and * indicate level of significance at 1%, 5% and 10% levels, respectively. SD refers to standard deviation

Source: Survey data (April 2018)

The sampled farmers have been engaged in crop farming for over 18 years, on average, indicating a good wealth of farming experience. According to the Tukey post hoc test, there was a significant difference between scheme irrigators and non-irrigators in terms of the number of days they work on farm per week. This does make economic sense because scheme irrigators spend most of their days in farming activities since they irrigate the crops.

The results in Table 4.3 indicate that there was a statistically significant gender and marital status difference across the irrigation schemes. Most females were involved in farming and constituted 84.6% of the total sample. This is in line with Aliber & Hart (2009) who reported that most female-headed households are involved in farming compared to male-headed households in South Africa. In rural areas, males usually migrate to cities in search of employment opportunities or take care of livestock which makes them less involved in smallholder farming. The results further indicate that 53.1% of the sampled farmers in the study were married while the rest were either single or widowed. A significant proportion of the sampled respondents were full-time farmers, indicating that the majority of the farmers consider agriculture as a means of survival. Compared to other types of farmers, non-irrigators had the lowest percentage of full-time farmers and the highest percentage of employed farmers. This corresponds with the nature of farmers involved in rain-fed farming as they normally farm during rainy seasons, thus, they do not necessarily require to be full-time farmers.

Table 4.3 Description of categorical household demographics (%) (N=175)

Variables	Description	Scheme irrigators (n=104)	Homestead gardeners (n=32)	Community gardeners (n=23)	Non-irrigators (n=16)	Total (N=175)	χ^2-test	Tugela Ferry (n=101)	Bululwane (n=74)	χ^2-test
Gender of farmer	Male	17.3	6.3	8.7	31.3	15.4	6.22	9.9	23	5.59**
	Female	82.7	93.8	91.3	68.8	84.6		90.1	77	
Farmer's marital status	Single	25	21.9	26.1	56.3	27.4	9.47	37.6	13.5	12.60***
	Married	52.9	65.6	52.2	31.3	53.1		46.5	62.2	
	Widowed	22.1	12.5	21.7	12.5	19.4		15.8	24.3	
Farmer's main occupation	Full-time farmer	99	93.8	95.7	87.5	96.6	21.82**	95	98.6	5.09
	Regular salaried job	1	0	0	6.3	1.1		2	0	
	Temporary job	0	3.1	0	6.3	1.1		2	0	
	Self-employed	0	3.1	0	0	0.6		1	0	
	Unemployed	0	0	4.3	0	0.6		0	1.4	
Farmer's formal schooling level	Never attended	53.8	40.6	30.4	6.3	44	18.60***	52.5	32.4	7.38**
	Dropped out at primary level	41.3	46.9	56.5	68.8	46.9		38.6	58.1	
	Grade 12	4.8	12.5	13	25	9.1		8.9	9.5	

Note: ***, ** and * indicate level of significance at 1%, 5% and 10% levels, respectively.

Source: Survey data (April 2018)

4.2.3 Sources of income

Table 4.4 below shows the sampled households' different sources of income. On-farm income constitutes crop and livestock sales while non-farm income is earned from social grants, remittances from relatives and migrants, arts and crafts and employment (permanent, temporary and self-employment). The results show that, on average, social grants contribute 66% of household income which is almost six times the 12% contribution of farming. The findings are consistent with what has been presented by other studies (Tshuma, 2012; Sinyolo *et al*., 2017a; 2017c) that welfare grants have become the major source of income for smallholder farmers, having surpassed farming contribution. About 77% of farmers ranked social grants income as a primary source of household income. It can be concluded from the results that social grants are a primary source of income for sampled farm households in the Tugela Ferry and Bululwane irrigation schemes. On average, a farm household receives a guaranteed monthly unearned income of about R2 000 from social grants, with an average of about R1 500 primarily received by smallholder farmers per month.

Urban migration is one of livelihood strategies that rural communities employ to diversify their income sources. As a result, remittances play an important role in improving the livelihoods of rural households (Mohammed & Tolossa, 2016). The results indicate that, on average, remittances contribute 5% to the household income. Amongst the sampled smallholders, there were farmers who owned non-farm small businesses such as arts and craft (e.g., handicrafts, weaving, etc.) and tuck shops. Community food gardeners earn the highest arts and craft income with an average income of R3 115 per annum followed by scheme irrigators and then non-irrigators. Products sold under arts and craft include traditional beaded jewellery and accessories, hand-crafted brooms and African grass mats. These results show a significant need to also consider arts and craft as a means of improving the livelihoods of small-scale farmers to enable them to cope with the shocks of crop failures. According to World Bank (2007), strategies to decrease rural poverty among farming households include increasing off-farm employment opportunities.

Table 4.4. The average estimated household income (Rands) of smallholder farmers per year

Sources of income	Scheme irrigators	Homestead gardeners	Community gardeners	Non-irrigators	P-value	Total	Proportion (%)
Social grants	25613.88	29000.00	28486.96	28045.71	0.67	26836.36	**66**
Remittances	7954.35	10125.00	7183.33	4000.00	0.45	8078.21	5
Arts and craft	2733.33	0.00	3115.00	1700.00	0.93	2749.29	1
Permanent employment	62953.85	105600.00	9900.00	36000.00	0.47	58800.00	7
Temporary employment	7466.82	7082.67	7800.00	4520.00	0.88	6964.97	3
Crop income	6704.42	862.73	631.79	5468.57	0.00***	5489.60	**12**
Livestock	4947.27	3554.38	4985.71	7740.00	0.65	4908.10	4
Self-employment	42000.00	78300.00	2400.00	0.00	0.27	57085.71	2
Total annual household income	**43837.88**	**55444**	**36258.04**	**36943.75**	**0.27**	**44333.61**	**100**

Note: *** indicates the level of significance at 1% level.

Source: Survey data (April 2018)

Livestock sales contributed 4% to household income per annum, on average. Income from crop sales made up 12% of the total household income, on average. This relatively low contribution may decrease on-farm entrepreneurial spirit, *ceteris paribus*. There was a statistically significant difference across the farmer typologies with scheme irrigators receiving the highest average income (R6 704.42) followed by non-irrigators. These results were expected because most of the scheme irrigators mainly farm for selling. Furthermore, the lower average crop income was also expected for homestead and community food gardeners because these farmers operated on relatively small plots, resulting in low crop production compared to other sampled farmer typologies. The low influence of farming on total household income among smallholders is due to poor access to assets, support services and marketing skills or information (Khapayi & Celliers, 2016).

4.2.4 Access to social grants

The results in Figure 4.1 indicate that most of the sampled farm households (94.3%) had access to social grants. Only 5.1% of the sampled farm households indicated that they earn all their

income. On the other hand, 8.6% of the smallholder farmers were totally dependent on unearned income from either remittances or social grants.
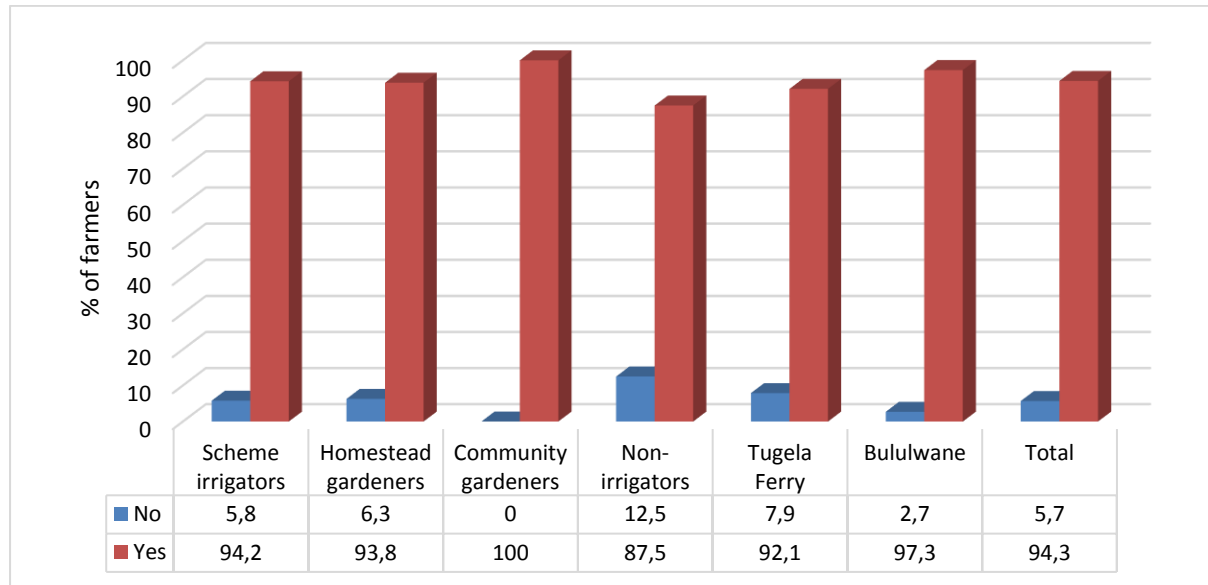
Figure 4.1 Percentage of farmers receiving social grants (N=175)
Source: Survey data (April 2018)

The t-test results (Table 4.5) indicate that the total number of social grants beneficiaries per household was significantly different across the irrigation schemes at the 1% significance level. On average, sampled households had 3.29 social grants beneficiaries, indicating the significant role of welfare grants among rural households, in view of an average household size of 6.67. That is, in each household about 49% of household members were grant beneficiaries. The breakdown of welfare grants suggests that, on average, the Child Support Grant (CSG) had a higher number of beneficiaries (2.53), followed by State Old Age Pension (SOAP), Disability Grant (DG) and then Foster Care Grant (FCG). This pattern is generally in line with national figures in South Africa. There were no Care Dependency Grant, Grant-in-Aid and War Veteran's Grant beneficiaries across the sampled population. DG had the higher average number of years that households were receiving social grants. These results make economic sense because most of the DG beneficiaries who receive this grant type are usually born with disabilities. Therefore, unlike other social grant types, DG generally has no age threshold.

Table 4.5 Average number of social grants beneficiaries and years receiving grants

Social grant type	Tugela Ferry	Bululwane	t-test	Total
Number of grant beneficiaries per household	2.88 (1.90)	3.84 (1.92)	3.28***	3.29 (1.96)
Number of years receiving social grants	13.03 (7.75)	14.72 (9.27)	1.28	46.33 (13.77)
Number of child support grant beneficiaries per household	2.19 (1.76)	2.99 (1.87)	2.87***	2.53 (1.85)
Number of years receiving child support grant	9.73 (3.61)	9.45 (3.11)	0.51	9.60 (3.38)
Number of old age pension beneficiaries per household	0.62 (0.73)	0.70 (0.79)	0.68	0.66 (0.76)
Number of years receiving old age pension	8.08 (6.55)	7.97 (7.30)	0.07	8.03 (6.85)
Number of disability grant beneficiaries per household	0.07 (0.29)	0.14 (0.38)	1.29	0.10 (0.33)
Number of years receiving disability grant	7.83 (2.31)	12.50 (11.35)	0.98	10.63 (9.00)
Number of foster care grant beneficiaries per household	0 (0.00)	0.01 (0.12)	1.17	0.01 (0.08)
Number of years receiving foster care grant household	0 (0.00)	13 (0.00)	-	13 (0.00)

Notes: *** indicates the level of significance at 1% level. ( ) in parenthesis are SDs

Source: Survey data (April 2018)

As mentioned in Section 1.2, this study ought to address the knowledge gap about the main recipients of social grants. Although most smallholder farmers reside in households with child grant beneficiaries who are either their children or grandchildren, some of the farmers were not major recipients. Among the sampled smallholders, 81.7% of farmers indicated that some of their household members were CSG beneficiaries. However, only 54.9% of sampled smallholder farmers were the main CSG recipients (Table 4.6). The reason is that for some beneficiaries (e.g., grandchildren) the grant is received by their parents. In the study areas selected, 83.5% of the respondents reported that the child grant recipients do send money back home. On average, R662 was sent back home by these recipients per month. It is important to note that, to examine the relationship between smallholder farmers' on-farm entrepreneurial spirit and social grant dependence, this study only included the proportion of household income from social grants received by individuals residing within the household. The CSG was the only grant that had recipients not living within the household. These results were expected because the child grant is usually received by youth who migrate to urban areas for job opportunities, thus, leaving their children with other household members.

The results show that old age pension was only received by farmers and individuals living within the household. These results were also expected because SOAP beneficiaries are older people who are unable to search for jobs outside rural areas. The results in Table 4.6 were obtained from a multiple response question, thus, it was possible for each sampled household to have different people receiving CSG, for example. As a result, the percentage cases were more than 100% summed together.

Table 4.6 Major social grants recipients and average amount sent back home

		Tugela Ferry	Bululwane	Total
Child social grant main recipient (%)	Farmer	61.5	47	54.9
	Someone else not living at home	20.5	30.3	25
	Someone else living at home	35.9	60.6	47.2
Money sent home (%)	No	18.8	15	16.7
	Yes	81.3	85	83.3
Average amount sent per month (R)		748.46	595.88	662
Old age pension main recipient (%)	Farmer	83.7	76.3	80.5
	Someone else not living at home	-	-	-
	Someone else living at home	38.8	47.4	42.5
Disability grant main recipient (%)	Farmer	50	77.8	66.7
	Someone else not living at home	-	-	-
	Someone else living at home	66.7	33.3	46.7
Foster child grant main recipient (%)	Farmer	-	100	100
	Someone else not living at home	-	-	-
	Someone else living at home	-	-	-

Source: Survey data (April 2018)

4.2.5   The use of social grants on agricultural activities

During the interview, the majority of smallholder famers (78.3%) indicated that they used social grants income on agricultural activities. The results presented in Figure 4.2 show that about 76.4% of farmers used social grants to buy agricultural inputs (such as seeds, fertilizer, herbicides and pesticides). The results are in line with what has been reported by several studies (e.g. Boone *et al*., 2013; FAO, 2014; Tirivayi *et al*., 2016) that smallholder farmers use social grants money to fund farming activities. This suggests that money from social grants somehow helps to ease the financial constraints faced by smallholders which enables them to access different agricultural inputs. A relatively low percentage of sampled farmers (1%) used social grants to lease land because most farmers owned their plots. The remainder either used money from social grants to either hire labour or a tractor.
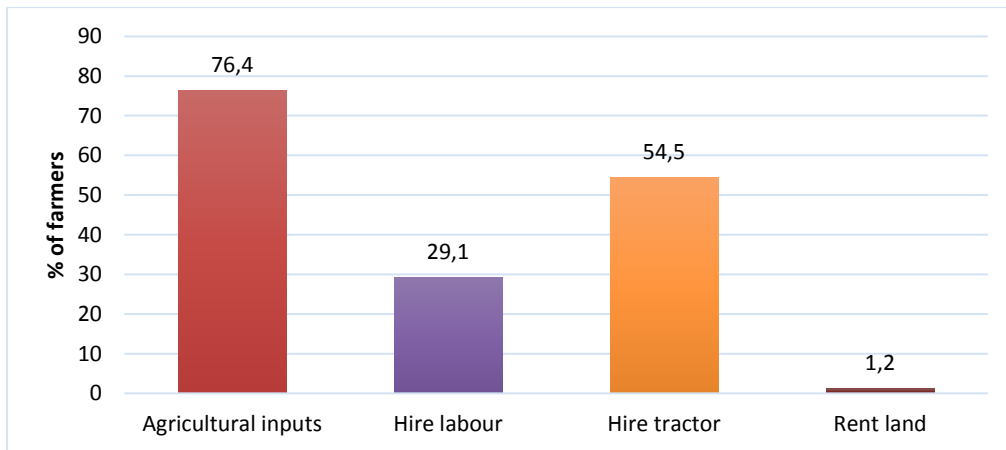
Figure 4.2 Smallholders spending social grant income on farming activities (%)

Source: Survey data (April 2018)

Figure 4.3 shows the proportion of social grant income spent on farming activities by smallholders. The results show that, on average, farmers spend approximately 33% of their social grant money on farming activities. Smallholders were also asked to explain why they use the specified proportion of social grants. The sampled farmers who do not use social grants on agricultural activities highlighted not having access to grants, cultivating small plots, receiving free inputs from government and using income from other sources as the major reasons. Other smallholders reported that they use social grants on farming activities because they believe they will make returns, indicating positive entrepreneurial behaviour in terms of investment. In addition, the most frequently cited use of the social grants on household expenditures was groceries expenditure (61.2%) followed by school related expenses and then saving the grants in the form of stokvel. This is in line with Khosa & Kaseke (2017) who found that households mostly use social grant to buy groceries.
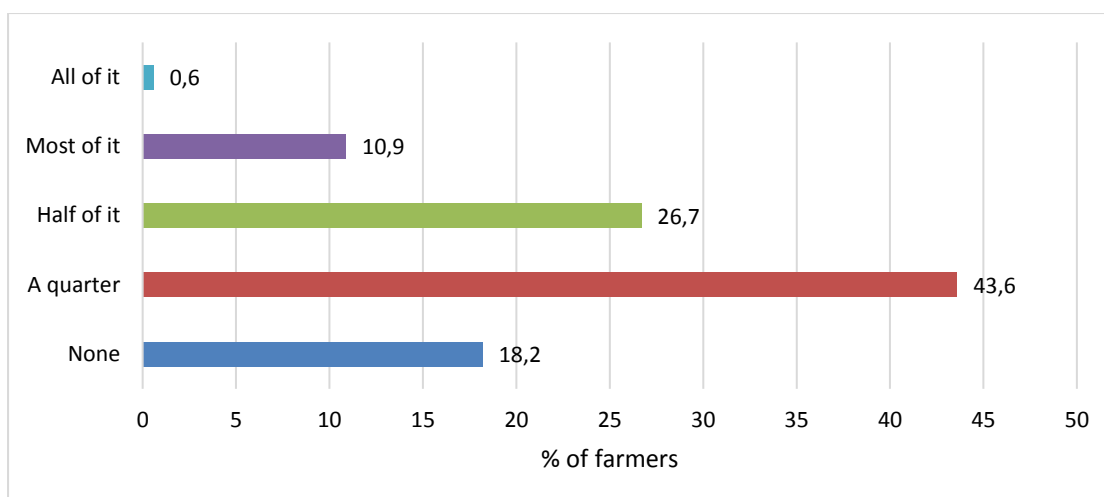
Figure 4.3 Proportion of social grant income spent on farming activities (%)

Source: Survey data (April 2018)

4.2.6 Perceptions on Child Support Grant

The results presented in Table 4.7 show smallholder farmers' perceptions of CSG. A high proportion of sampled farmers indicated that in the absence of CSG teenage pregnancy would be low. Farmers mentioned that teenage pregnancy has increased more rapidly in the presence of social grants compared to previously. This suggests a need to investigate the impact of CSG merely on the basis of entrepreneurial spirit of youth farmers to find out whether the grant is associated with low levels of youth participation in small-scale farming.

Table 4.7 Perceptions of smallholder farmers on child support grant

Perceptions	The extent of agreement (%)				
	Strongly disagree	Disagree	Neutral / Do not know	Agree	Strongly agree
Low teenage pregnancy in the absence of CSG	20.6	14.9	6.3	13.7	44.6
The CSG assists families to take their children to school	1.1	2.9	6.3	50.3	39.4
Most of the CSG recipients misuse the grants	6.3	10.9	9.7	30.9	42.3

Source: Survey data (April 2018)

The results show that many farmers agreed that CSG assists families to take their children to school (i.e. it provides educational support). A relatively high proportion of respondents

reported the misuse of child grant by recipients who are usually parents of the beneficiaries. On the perceptions of smallholders concerning the ways that recipients may misuse child grants, the key activities highlighted in this regard were purchase of alcohol, spending on hair, clothes and cell phones or airtime. Other studies (e.g., Surender *et al*., 2007; DSD *et al*., 2011; Potts, 2012; and Khosa & Kaseke, 2017) have also reported that some child grant recipients misuse it.

4.2.7   Access to credit and savings

According to World Bank (2005), farmers' accessibility to financial capital is measured by their participation in credit and savings organisations. Table 4.8 shows that a small percentage of farmers (24.6%) took a credit in the past 12 months before the survey was conducted, indicating poor access to credit among smallholders. Limited access to credit hinders improved land management and may limit smallholders' ability to invest in agricultural production (Fafchamps, 2000).

Table 4.8 Access, use and source of credit (%)

		Tugela Ferry	Bululwane	Total
Have taken credit in the past 12 months		20.8	29.7	24.6
Type of credit	Consumption	47.6	36.4	41.9
	Agricultural production	38.1	45.5	41.9
	Other investment credit	14.3	18.2	16.3
Source of credit	Relative or friend	14.3	0	7
	Money lender	23.8	22.7	23.3
	Savings club	33.3	50	41.9
	Input supplier	0	9.1	4.7
	Banks	9.5	9.1	9.3
	Government	4.8	4.5	4.7
	Microfinance institutions	9.5	0	4.7
	Clothing shop	4.8	0	2.3
	Hardware	0	4.5	2.3

Source: Survey data (April 2018)

Smallholder farmers take credit for different reasons other than financing agricultural activities. The descriptive results show that farmers mostly borrow to buy food (consumption credit) and agricultural inputs (agricultural production credit). The primary sources of credit were money lenders and savings clubs which are usually stokvels. Informal money lenders charge a high interest rate ranging between 20% and 30% per month and sometimes hold debtor's identity

documents and pension cards as collaterals. Although some farmers mentioned that government pension points charge relatively low interest rate, few farmers borrowed from such sources. Other sources of credit included relatives and friends, input suppliers, banks, etc. Additionally, most farmers reported that they do know about the production credit offered by organisations like Lima Rural Development Foundation. Other studies (such as Fenwick & Lyne, 1999) also reported that small-scale farmers find it difficult to access production credit. However, smallholders who did not know about such credit indicated that they would be interested in it. This suggests a need to inform small-scale farmers about available production credit to enhance access to inputs and boost on-farm entrepreneurial behaviour. The results also indicated a relatively low culture of savings among smallholders, implying that farmers require training to shift their savings culture and mind-set.

The highest proportion of small-scale farmers mentioned that they did not take credit because the interest rate is high and they do not want to be indebted, as indicated in Figure 4.4. The results showed that the average interest rate was about 23% per month.
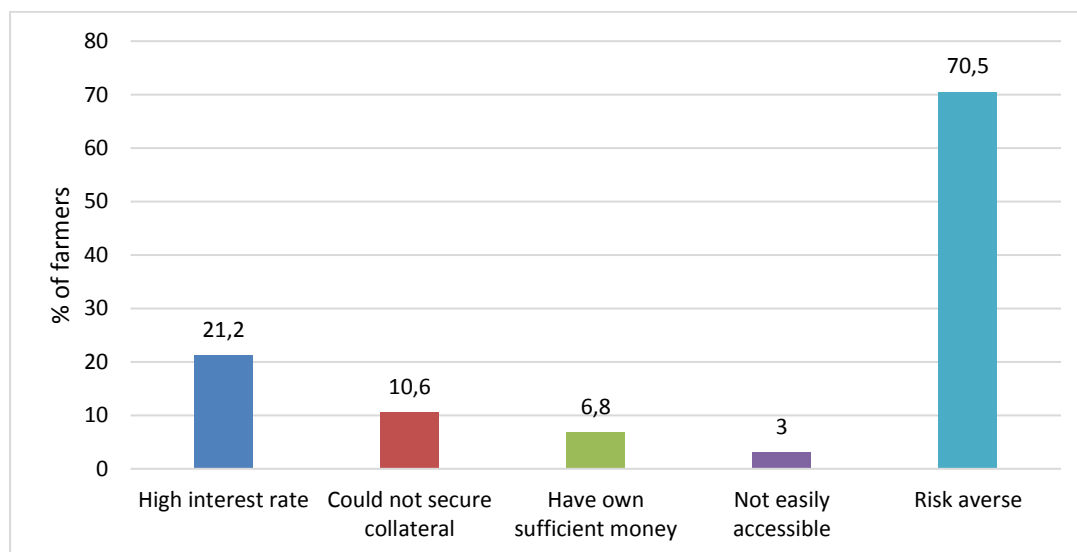
Figure 4.4 Smallholder farmers' reasons for not taking credit

Source: Survey data (April 2018)

4.2.8   Land holdings access

In this study, natural capital primarily denotes land and water accessibility. Table 4.9 below shows average land size allocated to and operated by smallholder farmers. The total land size included the land that was leased, borrowed, inherited, and allocated by the traditional leader. On average, the total land allocated and operated were relatively small (0.611 and 0.502,

respectively). It is important to note that operated land was below allocated land across all farmer typologies, indicating the under-utilization of land. This is in line with other studies in South Africa (e.g., Eastwood *et al*., 2006; Tshuma, 2012; Sinyolo *et al*., 2016b) which have reported the under-utilization of land by rural households. This indicates a negative entrepreneurial behaviour amongst the sampled farmers. The results further indicated that few farmers found it difficult to make long-term land use decisions because of their current land ownership system. This low proportion can be accredited to farmers who are renting or had borrowed land because they are uncertain of when the land owner might take their land back. Moreover, most of the sampled smallholders perceived their plots as fertile (*i.e*. of good quality).

Table 4.9 Smallholder farmers' average allocated and utilized land (ha)

	Scheme irrigators	**Homestead gardeners**	**Community gardeners**	**Non-irrigators**	**Total**	**P-value**
Total land allocated (all)	0.623	0.237	0.055	2.088	0.611	0.00***
Total irrigable land allocated	0.598	0.112	0.055	0	0.421	0.00***
Total land operated (per year)	0.509	0.059	0.048	1.994	0.502	0.00***

Note: *** indicates level of significance at 1% level.

Source: Survey data (April 2018)

4.2.9 Aspects of irrigation water use

The results in Table 4.10 show farmers' perceptions regarding water accessibility to their plot(s). There was a statistically significant difference in water accessibility across three types of farmers. Although water accessibility was relatively good for community food gardeners, most of them (78.3%) had inadequate equipment to draw water to their plots. As a result, most community food gardeners often use the bucket system to irrigate their plots. Adequate irrigation equipment is substantial for crop smallholder farmers since water is a necessity for vegetable farming (Khapayi & Celliers, 2016). Moreover, compared to scheme irrigators, most community food gardeners fetch water from the river if they do not receive water on their irrigation day. This demonstrates farmers who have a problem-solving attitude which is one of the significant entrepreneurship characteristics.

Table 4.10 Smallholder farmers' perceptions on water accessibility to their plots (%)

		Scheme irrigators	Homestead gardeners	Community gardeners	χ^2-test	Total
Good water accessibility to plot(s)		60.6	37.5	47.8	5.67*	54.1
Have adequate equipment to draw water to plot(s)		61.5	31.3	21.7	17.38***	49.7
Reaction to not receiving water on allocated irrigation day	Nothing	56.7	-	43.5	12.77***	54.3
	Report to the irrigation committee	36.5	-	26.1		34.6
	Talk to farmers upstream myself	4.8	-	13		6.3
	Fetch water from the river	1.9	-	17.4		4.7

Note: *** and * indicate level of significance at 1% and 10% levels, respectively.

Source: Survey data (April 2018)

Respecting the rules of collective management and irrigation water use is important to avoid water-related conflicts among smallholders. According to Muchara *et al.* (2014), the collective management of common pool resources (such irrigation schemes) is important because people involved in group activities are assumed to consistently make decisions based on self-interest, thus causing conflict. This assumption was evident in Tugela Ferry since a relatively low percentage (63.3%) of farmers indicated positive behaviour in collective irrigation management compared to farmers in Bululwane (97.7%). During the interview, most sampled farmers mentioned that some farmers irrigate on the days not allocated to them and do not want to pay money for maintenance of the scheme canal.

4.2.10 Communication and production assets ownership

Access to physical capital is expected to improve livelihoods of rural farming households. Figure 4.5 indicated that a low percentage of small-scale farmers own production assets that are significant in agriculture like trailer, planter and tractor. This is in line with Khapayi & Celliers (2016) who reported unavailability of tractors and hoes which negatively impacts small-scale farmers' productivity. In particular, the shortage of tractors results in delayed land cultivation which impacts on the value chain right at the beginning. During the interview, most farmers indicated that they have access to tractors through hiring which often is relatively expensive. Most farmers own cell phones with an average current market value of R262.42.

Farmers use cell phones to communicate with their customers which saves travelling time to markets and transport costs (Masuka *et al*., 2016). Moreover, the results indicate that a small percentage of the sampled population (8.2%) uses radio and television as a source of agricultural information. Motor vehicle ownership among smallholders was low. As a result, some farmers hire vehicles and are dependent on extension officers to transport their produce to the nearest markets.
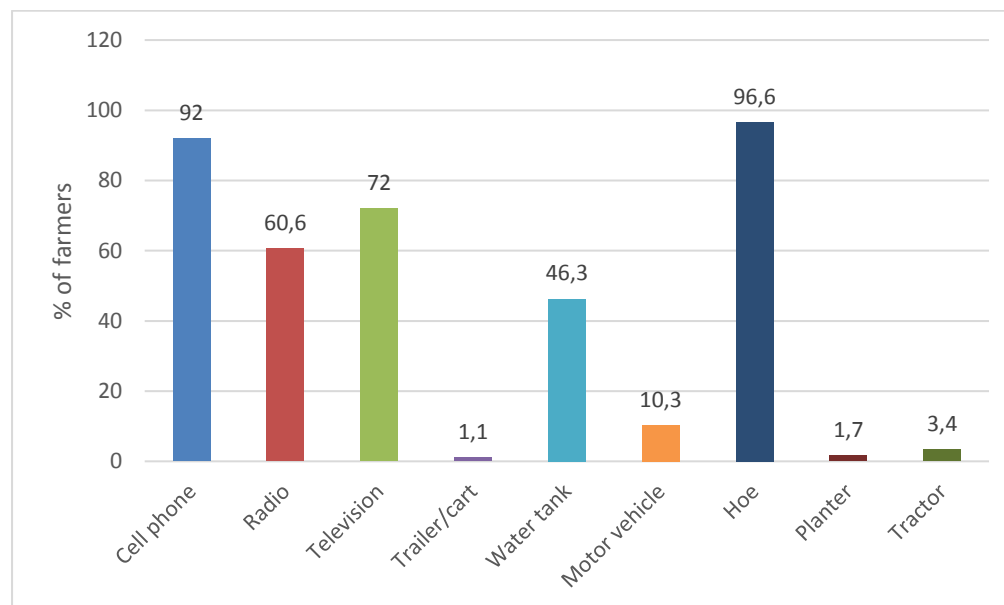
Figure 4.5 Percentage of farmers owning communication and production assets

Source: Survey data (April 2018)

4.2.11 Livestock ownership

Livestock ownership may improve the availability of manure to farm households which may substitute for purchased inorganic fertiliser (World Bank, 2005). In the selected study areas there were households which owned livestock. Table 4.11 below presents the average number of livestock owned and total livestock units. The results indicate that average total livestock units were relatively low. Domestic chickens and goats were the common livestock owned by sampled farmers because they can be easily converted to cash through livestock sales.

Table 4.11 Average number of livestock owned by smallholder farmers

Type of livestock	Average number of livestock owned	Average livestock in tropical livestock units
Goats	8.65	0.87
Cattle	2.45	1.71
Sheep	0.29	0.03
Domestic chickens	13.59	0.14
Domestic geese	0.07	0.0007
Pigs	0.01	0.01
Total		**2.76**

Source: Survey data (April 2018)

Smallholders keep livestock for various reasons, namely, household consumption, sales, wealth and cultural purposes. About 31.7% of the sampled farmers sell their livestock in emergencies to generate income. On average, famers would sell cows for approximately R8000 each; goats are sold for approximately R1 000 each while poultry is sold for about R70 each. These results show a potential opportunity to improve the livestock sector for small-scale farmers, particularly for poultry and goats which, in turn, will reduce their financial constraints. During the interview, some farmers in Bululwane mentioned that they own small poultry businesses.

4.2.12 Access to human and social capital

A major challenge for the agricultural sector is to create an enabling environment for small-scale farmers to develop entrepreneurial skills which requires a greater emphasis on training (McElwee & Bosworth, 2010). Relevant training enables entrepreneurial farmers to survive in farming business and allows them to grow. The results indicate that 68.6% of sampled farmers had access to training. Farmers located in Bululwane are well trained compared to farmers in Tugela Ferry. Most smallholder farmers indicated that they receive training from the extension officers from DARD and non-governmental organisations such as Lima Rural Development Foundation. Table 4.12 below shows the proportion of sampled population who received agricultural training for different farming activities. The results show that the lowest proportion of training received is on postharvest management sessions. The requirement for training in commodity marketing is reflected by a high number of farmgate sales in the selected study areas. Training in marketing strategies can help smallholders to access and secure marketing channels (Khapayi & Celliers, 2016). Findings by Sinyolo *et al.* (2017b) indicate that training

positively influences market participation decisions, signifying that focussed agricultural training may enhance smallholders' chances of partaking in markets.

Table 4.12 Agricultural training received by smallholder farmers (%)

Training received	Tugela Ferry	Bululwane	Total
Vegetable production	64.9	78.2	72.6
Land preparation	63.5	82.2	74.3
Fertilizer application	61.4	74.3	66.9
Herbicide Application	50	76.2	65.1
Business planning	3	14.9	8
Irrigation scheduling	47.3	70.3	60.6
Irrigation water management	54.5	78.4	64.6
Commodity marketing	2	2.7	2.3
Pricing of farm produce	2	17.6	8.6

Source: Survey data (April 2018)

Furthermore, a higher proportion of homestead food gardeners and non-irrigators indicated that it was difficult for them to obtain agricultural information compared to other farmer typologies. The reason may be that scheme irrigators and community food gardeners usually work as cooperatives which makes it easier for them to collectively access information. This shows that the government's strategy of organising smallholders into cooperatives for improved small-scale productivity ought to continue, as recommended by Sinyolo & Mudhara (2018).

Membership in farmer-based groups (e.g., farming cooperatives) allows farmers to learn from each other and improves their produce and livelihood outcomes (Mumuni & Oladele, 2016). Figure 4.6 indicates that most smallholder farmers (66.3%) had cooperative membership. Among these farmers were scheme irrigators, community food gardeners and non-irrigators. Membership to cooperatives can positively influence smallholder farmers' entrepreneurial spirit or behaviour provided that members are happy and trust each other. Only 5.1% of respondents had no membership to social groups. The main reasons for not being members to any group are that they are old, too busy for meetings, do not like talking and were not elected onto the water committee.
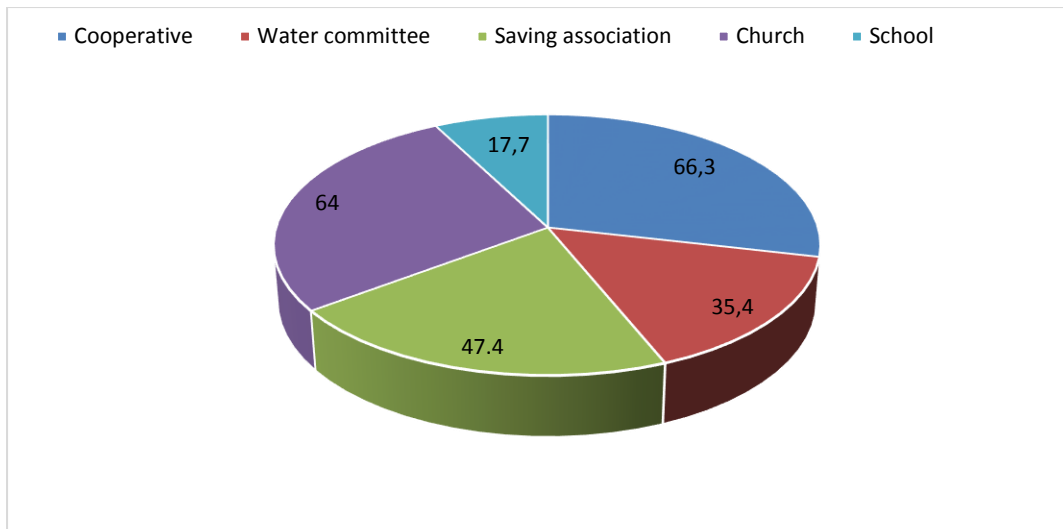
Figure 4.6 Smallholder farmers' group membership in the community (%)

Source: Survey data (April 2018)

4.3   Summary

The aim of this chapter was to present descriptive results of the study. By applying descriptive statistics, the study managed to analyse household demographics and socio-economic characteristics of sampled smallholders in the Tugela Ferry and Bululwane irrigation schemes. Descriptive analysis showed that most of the sampled farm households had access to social grants which contributed a higher proportion to household income compared to other income sources. The descriptive analysis also revealed that there were households where grant was received by someone else not living at home and did not send money back home to the care giver. Thus, there were farmers who lived with grant beneficiaries but had no access to grant money. This was the case in child support grants. The following chapter deals with the two empirical objectives of the dissertation.

CHAPTER 5. SOCIAL GRANT DEPENDENCE, ON-FARM ENTREPRENEURIAL SPIRIT, UNEARNED INCOME AND LAND UTILISATION: EMPIRICAL RESULTS AND DISCUSSION

5.1   Introduction

This chapter starts with addressing the first empirical objective of the study, which is to investigate the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders. As noted in Chapter 3, PCA was used to create on-farm entrepreneurial spirit and positive PsyCap indices for different farmer typologies in the selected study areas. A Tobit regression model was then used to further examine the impact of social grant dependence on on-farm entrepreneurial spirit. The chapter also addresses the second objective of the study, namely, to evaluate the impact of unearned income on smallholders' ability to utilize their resources at their full capacity. To achieve that, it presents the mean comparisons of the operated land area according to the level of dependence on unearned income. The analysis includes the use of means and t-tests to compare the two groups. The chapter also employs a Fractional Logit model to test the impact of unearned income on the proportion of land operated by smallholder farmers.

5.2   Positive psychological capital indices: PCA results

The Bartlett's test of sphericity in Table 5.1 was statistically significant at the 1% level of significance (χ^2=96.58, ρ=0.000), indicating that the variables do not have a zero correlation (*i.e.* they are inter-correlated). Furthermore, the KMO measure of sampling adequacy (0.52) was greater than 0.5 which indicated that a valid PCA can be performed to the dataset. According to Kaiser & Rice (1974), as a rule of thumb, KMO should be 0.50 or higher in order to proceed with PCA. The components of positive PsyCap that were used to extract PsyCap indices were eight and only four PCs were retained with eigen values greater than one as per Kaiser criterion. In addition, the scree plot was used as a visual aid for evaluating the number of PCs that can be extracted by graphing the Eigen value against the component number. Based on the scree plot, only PCs which are on the slope of the graph before the decrease in Eigen values start to level to the right of the plot can be extracted, which was the case in this study (See Appendix B). The four extracted PCs contributed 65.08% of the total variation in the data. The first component (hope and resilient) has relatively high positive loadings on three components. It represents smallholder farmers who are hopeful and resilient. Their hope and resilience enable them to continue farming despite the constraints they face. The second

component represents confident smallholder farmers. The third component represents farmers who would refuse to give up their land even when compensated with huge sums of money but lack resilience. The fourth component represents smallholder famers who would continue farming and see farming constraints as temporary. As noted in section 3.6, since both the third and fourth components represent optimism, they were combined into a single index using the linear recombination of principal components method. PC_1, PC_2 and combined PC (PC_3 and PC_4) were then used as independent variables in the regression model.

Table 5.1 Positive psychological capital dimensions for smallholders

Variables	Principal components			
	PC$_1$	PC$_2$	PC$_3$	PC$_4$
Have searched for market information	**0.641**	0.296	-0.049	-0.359
Have potential to resolve farming constraints	**0.792**	-0.242	-0.142	0.048
Raise money to buy effective pesticides	**0.604**	0.169	0.330	0.111
Could contribute to community water project	0.185	0.397	**-0.539**	0.068
Could be nominated by others as a leader	0.240	**0.736**	-0.064	-0.076
Oppose other people's opinions that are against my beliefs	-0.201	**0.769**	0.092	0.072
Continue farming and see farming constraints as temporary	0.003	0.034	-0.055	**0.957**
Refuse the compensation and keep the land	0.113	0.130	**0.815**	-0.021
Eigen value	1.76	1.32	1.12	1.01
% of variance	21.95	16.49	13.97	12.67
Cumulative % of variance	21.95	38.44	52.41	65.08
Keiser-Meyer-Olkin (KMO)	0.52			
Bartlett's Test of Sphericity	Chi-Square		df	Sig.
	96.58		28	0.000

Note: Only component loadings greater than |0.4| are included in the results interpretation.
Source: Survey data (April 2018)

5.3   Entrepreneurial spirit indices: PCA results

The significance of Bartlett's test (1%) in Table 5.2 suggests that variables do not have a zero correlation. Furthermore, the KMO measure of sampling adequacy (0.60) was greater than 0.5 which indicated that a valid PCA can be performed to the dataset. The components of on-farm entrepreneurial spirit that were used to extract entrepreneurial spirit indices were ten and only four PCs were retained with Eigen values greater than one. The four extracted PCs contributed 55.81% of the total variation in the data. The first component has relatively high positive loadings on three entrepreneurship characteristics (proactive, embrace change and visionary),

and a negative loading on farmers' internal locus of control. It represents smallholder farmers who are proactive, growth-oriented and visionary. Moreover, it represents farmers who lack self-reliance or motivation. This component was highly related to proactive farmers and was named "proactive". The second component has positive loadings on four entrepreneurship characteristics and represents farmers who have problem-solving attitude, independence, innovativeness and vision. It was highly related to innovative farmers and was named "innovate". The third component represents farmers who are at a competitive edge but lack identification of farming business opportunities and was named "competitive". The fourth component represents farmers who are risk taking and was named "risk taking".

Table 5.2 Entrepreneurial spirit dimensions for smallholders

Variables	Principal components			
	PC_{E1}- Proactive	PC_{E2}- Innovative	PC_{E3}- Competitive	PC_{E4}- Risk taking
RISK_TAKE	-0.197	0.034	-0.083	**0.837**
TAKE_OPP	-0.046	-0.005	**-0.654**	0.302
SOLVE_PROB	0.056	**0.481**	0.377	0.033
PROACTIVE	**0.787**	0.060	-0.098	-0.192
INDEPENDENT	-0.216	**0.670**	0.051	-0.077
INNOVATIVE	0.059	**0.785**	-0.177	0.066
COMPETITIVE	0.115	0.008	**0.760**	0.159
EMBRACE_CHANGE	**0.568**	-0.090	0.208	0.360
SELF -MOTIVATED	**-0.606**	0.105	-0.153	0.194
VISIONARY	**0.426**	**0.433**	0.285	0.309
Eigen value	1.92	1.56	1.06	1.03
% of variance	19.23	15.61	10.63	10.34
Cumulative % of variance	19.23	34.84	45.46	55.81
Keiser-Meyer-Olkin (KMO)	0.60			
Bartlett's Test of Sphericity		Chi-Square	df	Sig.
		126.24	45	0.000

Note: Only component loadings greater than |0.4| are included in the results interpretation.
Source: Survey data (April 2018)

5.4 Impact of social grant dependence on on-farm entrepreneurial spirit: Tobit model results and discussions

On-farm entrepreneurial spirit indices generated using PCA are used as dependent variables to estimate a two-limit Tobit regression and the results are presented in Table 5.3 below. To ensure that the Tobit model is correctly specified, post-estimation tests were conducted. Levene's Test result had statistically significant F-values of 5.24, 2.81, 4.53 and 3.57 at the 1% significance level for proactive, innovative, competitive and risk-taking characteristics, respectively. These results indicate that the Tobit model fits the data well. Multicollinearity was not a problem since the variance inflation factors (VIF) had an average of 7.25, which was below 10. The individual VIFs showed that age and the squared term of age had VIFs great than 10 because they are correlated. However, they have imperfect collinearity. The robust standard errors were also estimated to correct for heteroskedasticity. The Jarque-Bera test for normality of the residuals was also performed and was statistically significant. The Durbin-Wu-Hausman test found no evidence of endogeneity between social grant dependence (GRANT_PROP) and on-farm entrepreneurial spirit characteristics at the 10% significance level.

Proactive

The results show that the estimated coefficient of GENDER was significant at the 5% significance level and negatively related to proactiveness, *ceteris paribus*. Although contrary to expectations, these results were consistent with Sinyolo *et al*. (2017a) who found female smallholders to be more on-farm entrepreneurial compared to male farmers. This suggests the deficiency of off-farm opportunities for females in rural areas, implying that females are more committed to agriculture than males. That is, females make more effort to succeed in small-scale agriculture as they have few alternatives (Sinyolo *et al*., 2017a). Smallholder farmers with access to training (TRAINING) were more proactive compared to those without access, *ceteris paribus*. The possible reason for this is that relevant training enhances smallholders' entrepreneurship skills (Sinyolo *et al*., 2017a). These results are consistent with previous literature (Chandramouli *et al*., 2007; de Wolf & Schoorlemmer, 2007; Díaz-Pichardo *et al*., 2012; Sinyolo *et al*., 2017b) which reported the importance of access to agricultural training in developing on-farm entrepreneurship. This implies that investment in new knowledge and skills is necessary to improve smallholders' entrepreneurial spirit or behaviour.

Land size (LANDSZE) was positively related with proactiveness, *ceteris paribus*. This is in line with other studies (e.g., Chandramouli *et al*., 2007; Singh, 2013; Sinyolo *et al*., 2017a) which found a positive relationship between land size and entrepreneurship. The possible reason is that farmers with bigger land sizes are usually proactive because they have to work longer hours than those with smaller farms, indicating a positive entrepreneurial behaviour.

The results show that smallholders who perceived their soils to be of good quality (SOIL_QUAL) were found to be more proactive compared to those with infertile soils, *ceteris paribus*. Good soil quality implies low production costs (e.g., less fertiliser application) and better-quality yields for smallholder farmers. Thus, farmers with good quality soils expect better profits out of agricultural activities which enhances their entrepreneurial spirit or desire to work long hours than those with poor quality soils. Contrary to expectations, scheme irrigators (FARMER_TYPE) were found to be less proactive compared to other farmer typologies, *ceteris paribus*. This was unexpected and contrary, among others, to Chandramouli *et al*. (2007) who found that scheme irrigators had higher levels of entrepreneurial behaviour. The farmer typology signifies the characteristics of each group type such as the sources of water for irrigation, total land size operated and institutions governing them. Low levels of proactiveness among scheme irrigators may result from the poor performance of SIS in the previous years caused by water shortage and inadequate irrigation equipment. Furthermore, scheme irrigators operate bigger plots compared to other irrigating farmers, thus demanding more water for irrigation. Most scheme irrigators reported that they do nothing when they do not receive water on their allocated irrigation day which reduces their productivity and hinder entrepreneurship. Therefore, farmers' typology is associated with on-farm entrepreneurial spirit.

Table 5.3 The impact of social grant dependence on on-farm entrepreneurial spirit: Tobit model results

Variables	PROACTIVE		INNOVATIVE		COMPETITIVE		RISK_TAKING	
	Coef.	Rob Std. Err.	Coef.	Rob Std. Err.	Coef.	Rob Std. Err.	Coef.	Rob Std. Err.
GRANT_PROP	0.224	0.220	0.098	0.303	0.579*	0.310	0.027	0.377
GRANT_YEARS	-0.002	0.008	0.026**	0.011	0.003	0.010	0.015	0.010
AGE	0.027	0.034	0.084**	0.039	0.053	0.038	0.023	0.045
AGE_SQUARE	0.000	0.000	-0.001**	0.000	0.000	0.000	0.000	0.000
ADULT_EQUIV	-0.007	0.037	0.054	0.048	-0.009	0.046	-0.006	0.041
GENDER	-0.305*	0.171	-0.086	0.229	0.086	0.199	0.136	0.218
EDUCAT	0.015	0.018	0.042**	0.020	0.013	0.020	0.035*	0.020
EXTENSION	0.234	0.181	-0.122	0.242	0.433**	0.180	-0.248	0.226
TRAINING	0.626***	0.174	0.222	0.226	-0.072	0.175	0.170	0.200
LANDSZE	0.094***	0.034	-0.084	0.053	-0.069*	0.036	-0.044	0.045
SOILQUAL	0.669**	0.303	-0.343	0.252	0.200	0.238	-0.032	0.212
FARMER_TYPE	-0.674***	0.179	0.221	0.229	0.324	0.210	0.461**	0.185
TLU	-0.003	0.016	-0.001	0.021	0.004	0.016	0.027	0.017
ACC_TRACTOR	0.651***	0.186	-0.267	0.207	0.032	0.205	-0.081	0.154
ASSETS	-0.064	0.048	0.014	0.051	0.113*	0.060	0.045	0.046
GROUP_MEMB	-0.073	0.271	-0.020	0.347	-0.004	0.307	1.127***	0.231
FARM_INC_PROP	-0.028	0.162	-0.225	0.196	-0.076	0.194	-0.210	0.213
HOPE_RESIL	0.260***	0.067	0.115	0.076	0.256***	0.073	0.013	0.093
CONFIDENT	0.091	0.064	0.201**	0.082	-0.081	0.076	0.143*	0.073
OPTIMIST	0.070	0.068	0.115*	0.065	-0.146*	0.074	-0.110	0.077
_cons	-1.233	1.094	-2.421**	1.208	-3.338***	1.208	-2.204*	1.296
/sigma	0.630	0.084	0.831	0.083	0.766	0.072	0.811	0.111
Levene's Test	F= 5.24***		F= 2.81***		F= 4.53***		F= 3.57***	
Pseudo R^2	0.17		0.07		0.10		0.08	
Uncensored observations	173		173		173		173	
Left censored observations	1 (Min ≤ -3.71)		1 (Min ≤ -2.14)		1 (Min ≤ -2.11)		1 (Min ≤ -2.50)	
Right censored observations	1 (Max ≥ 1.48)		1 (Max ≥ 2.28)		1 (Max ≥ 2.22)		1 (Max ≥ 2.88)	
Multicollinearity Test	Mean VIF = 7.25							
Durbin-Wu-Hausman test	F = 2.01, p = 0.16		F = 0.43, p = 0.51		F = 0.05, p = 0.83		F = 1.73, p = 0.19	
Log pseudolikelihood	-207.68768		-232.32637		-225.19223		-230.63482	

Note: ***, ** and * indicate the level of significance at 1%, 5% and 10% levels, respectively.
Source: Survey data (April 2018)

As expected, smallholder farmers with access to tractors (ACC_TRACTOR) were more proactive compared to those without access, *ceteris paribus*. Access to tractors enables farmers to plant on time which, in turn, improves their productivity. The results show that relatively more hopeful and resilient (HOPE_RESIL) smallholder farmers were more proactive. This is in line with previous literature (e.g., Hsu *et al*., 2014; Hur *et al*., 2016; Zou *et al*., 2016) which reported that positive psychological capital enables entrepreneurs to proactively react to conflicts or challenges. Given the dominant constraints and accessible resource and skill endowments, smallholders who have hope and resilience will observe challenges as manageable and perceive setbacks as challenges and opportunities that can in due course lead to success (Luthans *et al*., 2007). The results showed the insignificant relationship between social grants and smallholders' proactiveness.

Innovative

The results show that the estimated coefficient of the number of years the farmer has been receiving social grants (GRANT_YEARS) was statistically significant and positively related with innovativeness. This suggests that as the number of years receiving social grants increases, smallholders become more innovate indicating a positive entrepreneurial behaviour. The possible reason for these results is that when smallholders have been receiving a guaranteed monthly income for years (through unearned income) they afford to finance new ideas that can yield them higher income, which, in turn, enhances entrepreneurship. The results show a significantly positive relationship between age of farmers (AGE) and innovativeness, *ceteris paribus*. However, the estimated coefficient of age square (AGE_SQUARE) was significant at the 5% significance level and negatively related with smallholder farmers' innovativeness, *ceteris paribus*. This indicates that the association between the age of farmer and entrepreneurship level is non-linear. These results are consistent with Radicic *et al*. (2017) who found a negative relationship between the square term of age and on-farm entrepreneurship and indicated that entrepreneurship first increases at younger ages then starts to decrease after an older age (say 65). The reduction at older ages suggests the effect of succession effects as relatively old farmers withdraw from farming. Younger smallholder farmers have may a strong drive to achieve goals and work long or irregular hours, and generally, entrepreneurs usually become less entrepreneurial as they get older. According to Rudmann (2008), younger farmers are more flexible, ambitious and open to new ideas than older farmers.

Innovativeness was positively influenced by smallholder farmers' education level (EDUCAT), *ceteris paribus*. The more educated a farmer is, the more innovative they are which enables them to cope with several challenges in farming. The results also show that smallholders' self-

confidence (CONFIDENT) was positively related with their level of innovativeness, *ceteris paribus*. Self-confident farmers are more likely to venture off into more entrepreneurial activities and extend efforts to fruitfully accomplish their goals. Farmers' optimism (OPTIMIST) was positively associated with innovativeness, *ceteris paribus*. These findings were consistent with other studies (e.g., Abbas & Raja, 2015; Ziyae *et al*., 2015; Yu & Liu, 2016; Dong *et al*., 2017; Sameer, 2018) which have found a positive relationship between positive psychological capital and innovative behaviour.

Competitive

The estimated coefficient of the proportion of income from social grants (GRANT_PROP) was statistically significant and positively related with competitiveness, *ceteris paribus*. These results were contrary to the expectations and findings of Sinyolo *et al*. (2017a) who found a negative relationship between the level of dependency on social grants (proportion of income from social grants) and on-farm entrepreneurship. However, the results were in line with previous literature (e.g., Samson *et al*., 2008; Todd *et al*., 2010; FAO, 2014) which have reported a positive relationship between social grants and farming activities in beneficiary households. During the survey, some smallholder farmers reported that they do not add value to their produce because it is costly or expensive. Since farmers use their grant income during cultivation (e.g., buying agricultural inputs), an increase in grant proportion enables them to also finance value adding activities and as a result, they become more competitive. Many studies in the past (e.g., Posel *et al*., 2006; Williams, 2007; Ardington *et al*., 2009; 2016; Azeem *et al.*, 2018) reported that extra income from social grants positively impacts economic activities by easing the household's financial constraints.

Smallholder farmers with access to extension services (EXTENSION) were more competitive compared to those without access, *ceteris paribus*. These results are in line with Sinyolo *et al*. (2017a) who found a positive relationship between access to extension services and on-farm entrepreneurship. Farmers with contact with extension officers gain access to information or training on agricultural commodity marketing, packaging and processing of fresh produce and pricing of produce which enables them to be more competitive. Contrary to expectation, bigger land size (LANDSZE) was associated with decreasing competitiveness, *ceteris paribus*. However, the possible explanation for these results is that smallholder farmers with bigger land areas incur higher production costs than those with smaller areas (Poulton *et al*., 2010). Thus, given low small-scale farming returns cultivating more land may hinder these farmers from packaging or processing produce because they struggle to cover their farming costs. The estimated coefficient of the value of assets (ASSETS) was significant and positively related

with competitiveness, *ceteris paribus*. These results are in line with Boughton *et al*. (2007) who mentioned the significance of assets in enabling farmers to produce a surplus essential for participating in markets as sellers. They also use information and communication technologies to communicate with potential clients. As the access to communication and working assets increases smallholders' competitiveness improves since farmers with these assets have better access to information and opportunities.

As expected, hopeful and resilient farmers (HOPE_RESIL) were more competitive, *ceteris paribus*. Even though farmers face market access constraints, they still bounce back and strive to add value to their produce to be at the competitive edge and as a result demonstrate positive entrepreneurial behaviour. As mention in Section 5.3, the third entrepreneurial spirit component represents farmers who are at a competitive edge but lack identification of farming business opportunities. As a result, the findings showed that the estimated coefficient of optimism (OPTIMIST) was negatively related with smallholder farmers' entrepreneurial behaviour, *ceteris paribus*. This implies that, although smallholders are competitive in their current farming activities, they lack ability to recognise opportunities. According to Baron (2006), optimism is positively associated with opportunity identification.

Risk taking

Willingness to take risk was positively influenced by smallholder farmers' education level (EDUCAT), *ceteris paribus*. These results are in line with Black *et al*. (2018) who found a positive effect of education on risk-taking behaviour. As expected, scheme irrigators (FARMER_TYPE) were willing to take risks compared to other farmer typologies, *ceteris paribus*. The possible reason for high risk taking of scheme irrigators might be due to the active involvement of extension officers in small-scale irrigation schemes and working in co-operatives which enhances famers' information seeking behaviour. The estimated coefficient of farmer group membership (GROUP_MEMB) was statistically significant and positively related with willingness to take risks, *ceteris paribus*. Through social relationships, farmers learn intuitively and may develop the capability to identify opportunities (Rae, 2006). Therefore, skilled and knowledgeable farmers do not get involved in risky situations unless there is a possibility of making returns because higher returns are usually linked with higher risks (Kahan, 2013). The results also show that smallholders' self-confidence (CONFIDENT) was positively related with their wiliness to take risk, *ceteris paribus*. These findings were consistent with other studies (e.g., Hmieleski & Corbett, 2008; Jensen, 2012; Zou *et al*., 2016) which have found a positive relationship between self-efficacy and positive entrepreneurial

behaviour. The following sub-section presents the descriptive analysis and empirical results for the second objective.

5.5   Impact of unearned income on the proportion of operated land

As noted in section 1.2, several studies have examined the impact of social grants (e.g., Sinyolo *et al*., 2016b) and remittances (e.g., Iheke & Chikezie, 2016) on land operated by farmers. However, none of these studies had pooled household unearned income to examine its impact on the proportion of operated land. By looking merely on social grants effect, the effect of remittances is missed (*vice versa*), thus may obtain misleading results as far as unearned income impact is concerned. Therefore, it important to evaluate the impact of pooled unearned income on operated land. This is based on macroeconomics theory, which hypothesizes that unearned income may discourage recipients from working (Barret, 2006). The theoretical explanation is that, as farm household unearned income increases, the additional benefit to the farm household from working for more income decreases, which in turn, lessens willingness to work (Binger & Hoffman, 1998). Thus, receiving unearned income can possibly hinder smallholders' ability to utilise resources at their full capacity, since they can maintain their utility level through the unearned income (Sinyolo *et al*., 2016b).

In section 3.6, it was discussed that the extent to which farmers utilise resources at their full capacity was captured by the proportion of land operated by a farm household in the previous year, before the survey. The proportion of land operated, rather than total agricultural production, was considered as a better indicator to comprehend smallholders' level of resource utilisation. This approach is preferred because farming production is influenced by natural factors and technical inputs, all of which cannot be controlled in a regression model (Sinyolo *et al*., 2016b; Sharaunga &Wale, 2013). Livestock size was included as one of the dependent variables to capture livestock farming.

5.5.1   Average operated land comparisons according to the level of dependence on unearned income

The concern is not on the issuing of social grants for the needy and those unable to help themselves since there is some empirical evidence that they have contributed in rural household income. However, there is a need to face the fact that although the social grants programme in South Africa provides unearned income for needy households, this income can and does alter the household members' behaviour (Woolard & Leibbrandt, 2010). This is especially the case in the long-term. However, the result of the study conducted by Sinyolo *et al*. (2017c) indicated that the impact of social-grant dependence on rural households' incentives to take part in agricultural activities differs at different levels of dependence.

The results in Table 5.4 present the average comparison between farm households at two levels of unearned income contribution to household income. "Low income from unearned income sources" represents farming households who had less than 50% of total household income from unearned income sources in the year 2017, while "high income from unearned income sources" denotes farming households with 50% or more of their total income from unearned income sources. The results show that 79.4 % of the total sample derived high income from unearned income sources. The results further indicate that, although there was no significant difference between the total land size of two groups, farm households who were most dependent on unearned income had access to larger land size than those less dependent. The possible reason is that unearned income recipients may use their money to lease additional plots.

Table 5.4 Average land comparisons according to the level of unearned income dependence

Variables	Low income from unearned income sources (n=36)		High income from unearned income sources (n=139)		t-test
	Mean	SD	Mean	SD	
LANDSZE (ha)	0.50	0.49	0.64	1.39	-0.58
LAND_OPER (ha)	0.39	0.43	0.53	1.34	-0.62
LAND_OPER_PROP (%)	0.84	0.25	0.88	0.25	-0.88

Source: Survey data (April 2018)

Farmers who were most dependent on unearned income also operated most of their land compared to the other group. Therefore, contrary to expectations, unearned income was positively related to the proportion of operated land. The reason could be that unearned income relaxes the financial constraints among smallholders, enabling them to finance agricultural activities, as mentioned previously. However, these descriptive results should not be accepted yet for two reasons. Firstly, the level of dependence on unearned income had an insignificant impact on operated land size. Secondly, the other factors that may impact on the proportion of land operated were not included. The next section presents the results on the impact of unearned income on the proportion of land operated by smallholder farmers.

5.5.2 Linking the extent to which farmers utilise their resources at their full capacity with the proportion of unearned income: Fractional Logit Model

A fractional logit model was estimated to link the extent to which farmers utilise their resources at their full capacity with the proportion of unearned income. The dependent variable was the

proportion of land utilised by smallholder farmers. Table 5.5 shows the fractional logit model results. To ensure that the fractional logit model is correctly specified, postestimation tests were conducted, Wald χ^2 test results were statistically significant at the 1% significance level, indicating that the fractional logit model fits the data well. Multicollinearity was not the problem since the variance inflation factors (VIF) had an average of 5.8, which was below 10. The robust standard errors were also estimated to correct for heteroskedasticity. The Jarque-Bera test for normality of the residuals was also performed and was statistically significant. In addition, the normal quantile-quantile (Q-Q) plot also shows non-linearity in the curve, indicating that the dependent variable was not normally distributed (see appendix C). The Durbin-Wu-Hausman test found no evidence of endogeneity for the level of dependence on unearned income and the proportion of land utilised by smallholders.

The results showed that the estimated coefficient of the proportion of unearned income (UNEARNED_PROP) was statistically significant at the 10% significance level and negatively related with the proportion of utilised land, *ceteris paribus*. These results were consistent with the descriptive evidence from other studies in South Africa (e.g., White *et al*., 2001; Aliber & Hart 2009; Aliber & Hall, 2012) that have reported that smallholders under-utilise their land because they receive unearned income. Under-utilisation of land can potentially lead to decreased yields and farm income, thus increasing reliance on unearned income. The proportion of social grant income used for agricultural activities (GRANT_USE_PROP) was positively related with the proportion of land operated, *ceteris paribus*. This implies that, in line with other studies (e.g. Williams, 2007; Neves *et al*., 2009; Sinyolo *et al*., 2016a), social grants do relax the liquidity constraints faced by smallholder farmers with an incentive to farm. These findings were also in line with the scatter plot line of best fit (see Appendix D) which shows that the predicted relationship between the proportion of unearned income and proportion of land operated land was slightly positive. This is because some farmers believe that the more grant money they invest in farming activities (i.e. more proportion of land operated), the more farm returns they will incur holding all other factors constant.

Table 5.5 The impact of unearned income on the proportion of land operated

Variable	Fractional Logit model	
	Coefficient	**Robust Standard Error**
UNEARNED_PROP	-1.544*	0.904
GRANT_USE_PROP	2.105**	0.823
AGE	-0.145	0.113
AGE^2	0.001	0.001
FARMING_EXP	0.037**	0.017

ADULT_EQUIV	0.265	0.178
GENDER	1.104*	0.656
MARRIED	0.168	0.348
EDUCAT	-0.009	0.065
EXTENSION	-0.212	0.570
TRAINING	0.048	0.526
LANDSZE	-0.298**	0.143
SOILQUAL	-0.755	1.026
TENURE	1.039**	0.522
FARMER_TYPE	-2.062**	0.900
TLU	-0.072*	0.039
ACC_TRACTOR	0.366	0.628
ASSETS	0.147*	0.077
ACC_CREDIT	-0.463	0.368
BUSINESS_OWN	-2.170***	0.510
GROUP_MEMB	0.911	0.769
UMKHANYA_DISTR	-1.646***	0.560
CONSTANT	6.309	3.962
Pseudo R^2	0.18	
Number of observations	165	
Wald χ^2	68.10***	
Multicollinearity Test	Mean VIF = 5.83	
Durbin-Wu-Hausman Test	F = 2.25, p = 0.14	
Log pseudolikelihood	-49.180546	

Note: ***, ** and * indicate level of significance at 1%, 5% and 10% levels, respectively.
Source: Survey data (April 2018)

The results indicated a positive relationship between the years of farming experience (FARMING_EXP) and proportion of operated land, *ceteris paribus*. This is in line with Sinyolo *et al*. (2016b) who found a positive association between farming experience and the proportion of land cultivated. This is because more experienced farmers have knowledge and skills to effectively manage bigger land sizes and may have acquired more land over time. The positive estimated coefficient of GENDER implies that male farmers put more land under cultivation than female farmers, *ceteris paribus*. This was expected, as conventional theory points towards males having better access to physical and financial capital (Kieran *et al*., 2015; Johnson *et al*., 2016) that should increase their ability to cultivate more land. The other reason is that female farmers are also responsible for maintaining the household (child care and household chores), and thus "activity burdened" (Fuwa, 2000; Mallick & Rafi, 2010).

The results further indicated a significantly negative relationship between land size (LANDSZE) and proportion of land operated, *ceteris paribus*. These results were consistent with Sinyolo *et al*. (2016b) who reported that rural households with less land are better able to

manage it by securing adequate inputs to cultivate it because the greater the land, the more challenging it is to cultivate most of it. Perceived land tenure security (TENURE) was positively related with the proportion of operated land, *ceteris paribus*. This is in line with the previous literature (e.g. Iheke & Chikezie, 2016) which reported that secure land tenure increases the level of activity on the land since secure land access enables farmers to make long-term land use decisions.

Contrary to expectations, scheme irrigators (FARMER_TYPE) cultivated less land than other farmer typologies, *ceteris paribus*. This negative relationship might be a result of under-performance or failure of smallholder irrigation schemes in South Africa. The results showed a significantly positive relationship between values of assets (ASSETS) and proportion of operated land, *ceteris paribus*. This is partially because wealthier households usually afford to cultivate bigger land and may be better able to finance production costs. Livestock size (TLU) was negatively related with the proportion of land operated, *ceteris paribus*. This indicates low levels of crop-livestock integration among sampled smallholder farmers. The results showed that the estimated coefficient of non-farm business ownership (BUSINESS_OWN) was negatively related with the proportion of land operated, *ceteris paribus*. These results were consistent with Sinyolo *et al.* (2016b) who reported that the two possible reasons for a negative relationship could be divided attention and less dependence on agriculture because of income earned from off-farm economic activities. The other possible reason is that, since small-scale farming usually generates less returns compared to off-farm ventures, off-farm business owners would prioritise more profitable ventures. Smallholder farmers who own off-farm businesses may have less time and resources to invest in agricultural activities than to non-business owners (Sinyolo *et al.*, 2016b). The results further showed that smallholders in the Umzinyathi district (UMZINYAT_DISTR) utilised a smaller proportion of land compared to those in Zululand district, *ceteris paribus*. This is line with Sinyolo *et al.* (2016b) who reported that rural households in the Umzinyathi district cultivate a smaller proportion of their land. As indicated in Chapter 4, smallholder farmers in the Zululand district were relatively well trained, had high quality soils and are active scheme committees compared to those in the Umzinyathi district which may give them the incentive to utilise more land.

5.6   Summary

The aim of this chapter was to investigate the impact of social grant dependence on the on-farm entrepreneurial spirit of smallholders, and impact of unearned income on smallholders' ability to utilize their resources at their full capacity. PCA was used to categorise psychological capital

and on-farm entrepreneurial spirit into indices. Psychological capital indices comprised of hopeful, resilient, self-confident and optimist smallholders. On the other hand, on-farm entrepreneurial spirit indices comprised of proactive, innovative, competitive and risk-taking smallholders. The empirical results showed that the proportion of income from social grants, number of years of receiving social grants, age, squared term of age, gender, education level, access to extension services, access to training, land size, soil quality, farmer type, access to tractors, value of assets, group membership, hope and resilience, self-confidence and optimism significantly determine on-farm entrepreneurial spirit of smallholders. The proportion of income from social grants had a positive impact on on-farm entrepreneurial spirit. Thus, the chapter concludes that social grants, particularly in rural farming households where they are more important, reduce financial constraints which enhances farmers' on-farm entrepreneurial spirit.

This chapter further evaluated the impact of unearned income on the proportion of land operated. The utilization of resources at their full capacity was captured using the proportion of land size operated by smallholder farmers. Factors that were found to have a statistically significant effect on the proportion of cultivated land were proportion of unearned income, proportion of social grant income used for agricultural activities, farming experience, gender, land size, secured land tenure, farmer type, livestock size, value of assets, off-farm business ownership and district dummy. While the proportion of unearned income has a negative impact on the proportion of land operated, the use of this income as an investment in agricultural activities is positive. Therefore, in this study, the impact of the proportion of unearned income on the proportion of land operated has a positive net effect. In addition, the findings show low levels of crop-livestock integration in small-scale farming. The next chapter presents the conclusions, recommendations and areas of future research based on the empirical results of the study.

CHAPTER 6.   CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

6.1   Recapping the purpose of the research

The government, in its efforts to alleviate poverty to the disadvantaged and vulnerable segments of communities, introduced several poverty reduction strategies such as social grants. However, programs do not always work out that way despite having the best aims but can frequently form unintended disincentives such as path dependence. The unintended consequences of social grants are commonly taken under the catch-all label "dependency". With social grants becoming the main source of income for most rural households in South Africa, there is a concern that poor rural households are turning away from small-scale agriculture as a result of their dependence on social grants. Although the literature exploring multidimensionality of the effect of social grants is available, there is insufficient empirical research examining the possible effects of social grants on the on-farm entrepreneurial spirit of smallholders. Hence, the general objective of this study was to examine the impact of social grant dependence on smallholder agriculture in and around two irrigation schemes. The specific objectives of this study, which focused on the Tugela Ferry and Bululwane irrigation schemes in KwaZulu-Natal province, have been to: (i) investigate the impact of social grant dependence on on-farm entrepreneurial spirit of smallholders; and (ii) evaluate the impact of unearned income on smallholders' ability to utilize their resources at their full capacity.

While other previous studies have constructed entrepreneurship and PsyCap indices following the stated preference (SP) method, this study adopted the revealed preference (RP) method to construct entrepreneurial spirit and PsyCap indices using a behavioural approach. In this study, the RP was contrasted with the SP approach which has the major weaknesses, namely, the hypothetical nature of the question and the fact that the approach does not observe the actual behaviour. The study was also unique compared to other studies evaluating the impact of unearned income on utilising agricultural resources at their full capacity by farmers. Most studies in the past analyse the impact of social grants and remittances on agriculture separately. Thus, pooling social grants and remittances to analyse the impact of unearned income on the proportion of land operated makes this study different compared to other studies in the past. Overall, these were the contributions of the study to the existing body of knowledge.

6.2 Conclusions and recommendations

The study found a positive relationship between social grants and on-farm entrepreneurial spirit. Though the level of packaging and processing fresh produce is generally low among small-scale farmers, it improves as the proportion of income from social grants increases. This implies that the lack of entrepreneurship among smallholders is caused by other factors. For example, results indicated low levels of education among smallholders making it difficult for them to search for information. Scheme irrigators were also found to be less entrepreneurial compared to other farmer typologies which can be attributed to failure of irrigation schemes. It is recommended that the policy makers revisit the idea of rehabilitation of schemes in the rural areas to revive entrepreneurial spirit among smallholders.

The findings show that, while the proportion of unearned income has a negative impact on the proportion of land operated, the use of social grants as an investment in agricultural activities is positive. This implies that when social grants are used as an investment in agricultural activities, they indirectly meet the object of poverty reduction. More operated land means more agricultural production, more income, which in turn, reduces poverty or food insecurity among beneficiary households, *ceteris paribus*. However, when the grants are not invested in agriculture, this policy acts as a disincentive to agricultural production. In their design, social grants were never meant for use in agricultural production but they were expected to provide temporary relief to overburdened individuals or households so that they can meet their immediate needs. Thus, the policy itself as it stands, before considering the practice by rural households to invest the money in agriculture, does not encourage beneficiaries to work for themselves. The government and its strategic partners should review the policy and ensure that the unintended negative consequences on labour productivity in agriculture are minimized.

Male farmers put more land under cultivation compared to females. This indicated partial absence of women empowerment in the rural areas which is caused by current customary laws. It is recommended that strategies and interventions for empowering women farmers should be developed and implemented not only in irrigation schemes but in the broader smallholder agricultural sector. Women are the majority of smallholder farmers in irrigation and hence the future of smallholder agriculture cannot be certain without empowered women. Areas for empowerment include access to and control over resources, especially those that are critical in agricultural production such as equipment, education and training and entrepreneurial skills.

Given the positive impact of social grants on rural households' farming activities, this study recommends that the social cash transfers policy should continue. However, the fact that smallholder farmers are using social grants for agricultural purposes implies that there is a gap

in terms of agricultural support. This means there are other farming and institutional factors which hinder smallholder farmers' entrepreneurial spirit. Addressing these farming constraints (e.g. limited access to credit, inadequate farming assets, water insecurity, lack of farming inputs, etc.) and improving institutional support (e.g., access to credit, training, other extension services) will positively contribute to enhanced on-farm entrepreneurial spirit and utilisation of farm resources.

6.3   Areas for further research

Due to resources and logistical limitations, the research was a one-time cross-sectional study conducted on a two irrigation schemes. Future similar research should try and expand the study to include other provinces. This will produce more comprehensive results comparable across the different irrigation communities in South Africa. Resources permitting, future similar studies should also seek to compare two-time or three-time periods. This panel data approach will allow for more accurate predictions and inferences of the model parameter estimates and will better capture the issue of heterogeneity among small farmers.

Future research should also seek further investigation into the use of social grants as an investment in agriculture. This study did not go deeper to understand how exactly the social grants are used in agriculture and to what extent. Furthermore, it would be useful to investigate the impact of CSG on youth's willingness to participate in small-scale farming. Such an analysis is required to broaden the understanding of the role of social grants in the smallholder agricultural sector.

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APPENDICES

Appendix A – Questionnaire used for data collection

University of KwaZulu- Natal

The information to be captured in this questionnaire is strictly confidential and will be used for research purposes by staff and a post-graduate student at the University of KwaZulu-Natal. It is meant to address an MSc study entitled "**Social grant dependence, irrigation water use and on-farm entrepreneurial spirit: A behavioural explanation for smallholders in KwaZulu-Natal**". There are no wrong or right answers to these questions. You are free to be or not part of this survey. However, your cooperation is greatly appreciated.

Date		Respondent name	
Enumerator		Farmer ID/age	
Village name		Type of farmer*	
Irrigation scheme		Block No.	
Questionnaire No.		Cell No.	
Ward No.			

Farmer type: *1 -scheme irrigator   2-independent irrigator   3-homestead gardener   4- community gardener 5- Non-irrigator*

A. HOUSEHOLD DEMOGRAPHICS

1. What is the total number of your household members? (*Please include only those who stay in the household for* ***3 or more days per week and eat together***) _____

Please complete table below (*Record household head* details in the first row*).

a. Household member	**b.** Relationship to household head[1]	**c.** Age	**d.** Gender[2]	**e.** Marital status[3]	**f.** Main occupation[4]	**g.** Education level completed (Specify, e.g. Grade 7)	**h.** No. of days working on farm per week
	1						

Key

Relation to household head[1]	**Gender[2]**	**Marital status[3]**	**Main occupation[4]**
1=Household head*	1=Male	1=Single	1=Fulltime farmer
2=Spouse	0=Female	2=Married	2=Regular salaried job
3=Son		3=Divorced	3=Temporary job [e.g. public works (Zibambele), domestic worker, etc.]
4=Daughter		4=Widowed	4=Self-employed
5=Grand son			5=Student
6=Grand daughter			6=Retired
7=Other (specify e.g., in-law)			7=Unemployed

B. HUMAN CAPITAL

B1. What form of farming do you practice?*1= Individual scheme irrigator 2= Independent irrigator 3= Cooperative scheme irrigator 4= Homestead food gardening 5= Rain-fed farming 6= Cooperative food gardening 7= Other (please specify) _____* (**multiple answers possible**)

B2. How many years of experience in farming do you have? _____

B3. Have you ever received agricultural/ farming related training? 1=Yes 0=No

If yes, please complete the table for at most 3 important trainings received.

	B4. Training 1	**B5.** Training 2	**B6.** Training 3
a. Name of the training received (**Code A**)			
b. Who offered the training? (**Code B**)			
For each training received to what extent do you agree with the following statement (Code C)			
c. I attended all the training sessions held in the scheme			
d. I fully understood the content of the training			
e. I was able to put into practice all the advice I received from the training			
f. The training received was relevant			

Code A: 1= General crop/vegetable production 2= Land preparation 3= Fertilizer application 4= Herbicide application 5= Business planning 6= Irrigation scheduling 7= Irrigation water management 8= Agricultural commodity marketing 9= Packaging of fresh produce 10= Processing of farm produce 11= Pricing of products 12= If other (please specify) _____
Code B: 1= Extension officer 2= Fellow farmers 3= Private company 4= NGO 5= Parents/relative knowledge 6= self-taught 7= Other (please specify) _____
Code C: 1= Strongly disagree 2= Disagree 3= Neutral 4= Agree 5 = Strongly agree

B7. How difficult is it to access agricultural information? *1 = Very easy 2 = Easy 3 = Neutral 4 = Difficult 5 = Very difficult*

C. PSYCHOLOGICAL CAPITAL AND ENTREPRENEURIAL CHARACTERISTICS

C1. What are your main reasons for farming?
1 = Have sufficient food to feed my family 2 = Earn an income from sale of crops 3 = Create employment for myself and family members 4 = Create employment for people in the community 5 = Leisure 6 = Other (specify) _____ (**multiple answers possible**)

C2. Do you separate your farming operations from family operations? *1 = Always 2 = Often 3 = Sometimes 4 = Rarely 5 = Not at all*

C3. If your answer to **C2** is **4** or **5,** why?
_____
_____
___

C4. Do you keep records of your farming activities? *1 = Always 2 = Often 3 = Sometimes 4 = Rarely 5 = Not at all*

C5. If your answer to **C4** is **4** or **5,** why?
_____

C6. Do you consider your farm as a business? *1 = Yes 0 =No*

C7. If No to **C6,** why?
_____

C8. Do you aim to maximize farm profit? *1 = Yes 0 =No*

C9. If No to **C8,** why?
_____

C10. How do you measure success in farming?
_____

Complete the following questions regarding interest to expand irrigation farming operations

C11. Given your current condition (s), would you be interested or willing in further expanding your farming operations, i.e. moving into small-scale irrigation (including increasing plots in the irrigation schemes) *1 = Yes 0 = No*

C12. If Yes to **C11**, why are you not expanding your farming operations? _____
_____
___

C13. If No to **C11**, what are the reasons for lack of interest to expand your farming operations?
_____
_____

C14. What have you done to increase your area under production or to produce more?
_____
_____

Entrepreneurship characteristics

C15. *Risk-taking, tolerance for failure*
Financial constraint is one of the major challenges facing smallholder farmers. Suppose there is an investment introduced to you with two options.

To what extent are you most likely to:	Response*
a. choose an investment with 50% chance of losing everything and 50% chance that your money will be doubled	
b. choose an investment with 100% guarantee that your money will generate a 15% return	

*1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s)
_____
_____

C16 *Seizing an opportunity,*
Smallholder farmers have been advised to grow crops such as strawberries which can raise the value of the farmers' output, improve market access and increase farm income. Switching to higher-value crops requires access to better inputs and information search. If such opportunity occurs,

To what extent you are you most likely to:	Response*
a. switch to other crops	
b. continue with traditional crops	

*1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s)
_____
_____

C17 *Being determined and persistent, problem solving attitude*
The financial constraint remains the major challenge for most smallholders because they do not meet the commercial banks' credit requirements. If you face this challenge,

To what extent are you most likely to:	Response*
a. source finance from Lima, microfinance organizations, cooperatives, stokvels	
b. is there anything else you are likely to do? (please specify)	

*1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s) _____
_____

C18 *Proactive, curious, strong drive to achieve,*
During harvest season it is possible to receive many contracts from buyers on the same week. Suppose you have more contracts than usual, need to attend a compulsory meeting and have some family commitments this coming week.

To what extent would you:	Response*
a. work longer hours than usual including weekends or hire someone to get the job done	
b. cancel some contracts to minimise work load	

1=Very unlikely   2=Unlikely   3=Neutral   4=Likely   5=Very likely

Please justify your response(s) _____
_____

C19 *Independent*
Government extension officers and non-government institutions (e.g. Lima) provide support to smallholder farmers in the form of training, inputs, technical knowledge, etc. If such assistance were to be discontinued,

To what extent are you most likely to:	Response*
a. successfully continue with farming activities	
b. struggle with farming business in the absence of external support	

1=Very unlikely   2=Unlikely   3=Neutral   4=Likely   5=Very likely

Please justify your response(s) _____
_____
___

C20 *Innovation or creativity*
Some smallholder farmers use their indigenous knowledge to cope with several challenges in farming such as pest. If the commercial pesticides have failed to control pests affecting crops,

To what extent do you:	Response*
a. use your indigenous knowledge to cope with pests and other farming challenges	
b. consider a different or effective pesticide	
If '**a**' please give example of your indigenous knowledge application:	

1=Very unlikely   2=Unlikely   3=Neutral   4=Likely   5=Very likely

Please justify your response(s)
_____
_____

C21 *Value addition, efficiency, and profitability – to be at a competitive edge*
Value adding activities such as processing and packaging of farm produce enable farmers to be competitive and can increase farm incomes.

To what extent do you:	Response*
a. process or package some of your sold produce [e.g. maize malt "(umthombo)", roasted groundnuts]	
b. only sell your farm produce as raw products	

1=Very unlikely   2=Unlikely   3=Neutral   4=Likely   5=Very likely

Please justify your response(s)
_____
_____

What are the key constraints to do "a"
_____
_____

C22 *Embracing change/growth,*

Smallholder farmers are introduced to new farming methods that are different from their traditional methods. For example, they are introduced to yield improving methods of planting potatoes [e.g. spacing, earthing up (ukugqibela)] and fertiliser application by extension officers.

To what extent do you:	Response*
a. prefer modern technology farming methods	
b. prefer traditional farming methods	

1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s) _____
_____
___

C23 *Internal locus of control, self-reliance and motivation,*
The farmer's success or failure comes from his/her own abilities and external factors. To be ranked with successful smallholders in your area,

To what extent are you most likely to:	Response*
a. not need much assistance from government or other actors to accelerate your success	
b. need increased assistance from government or other actors can accelerate your success	

1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s)
_____
_____

C24 *Visionary and goal oriented, knowing where the farm is destined*
Planning and setting goals helps farmers to stay productive and focused. Business plan also enables banks and other investors to take you seriously when applying for business funding.

To what extent do you:	Response*
a. do business planning (umhlahlandlela webhizinisi) for your farming	
b. do farming without a business plan	

1=Very unlikely 2=Unlikely 3=Neutral 4=Likely 5=Very likely

Please justify your response(s)
_____
_____

Dimensions of psychological capital
HOPE

C25 One of the major challenges you are facing is the shortage or unavailability of markets. As a result, you often end up selling at a lower price or in extreme cases the product gets wasted or rotten.

To deal with this challenge, you:	Response*
a. have searched for information on marketing strategies and understanding market prices	
b. are still waiting for training on marketing	
c. hope that government will assist with transport to sell in high value markets in nearby cities	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)
_____
_____

C26 As smallholder farmers, you often face challenges with poverty, food insecurity, financial instability, water availability, market access constraints, etc.

Given the possibility of any of these constraints existing, to what extent do you believe that:	Response*
a. there is no possibility of resolving these constraints	
b. you still have the potential to turn things around	
c. the government or a relative can address the issues	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please   justify   your   response(s)
_____
_____
___

RESILIENCE

C27 Suppose your crop(s) are affected by a pest this season and you harvest almost nothing.

In the next season, to what extent are you most likely to:	Response*
a. raise money to buy effective pesticides or pest resistant crops	
b. consult other smallholder farmers who were not affected by the pest to find out what have they done	
c. change the composition of crop enterprises	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)
_____
_____

C28 Drought seems to be a common challenge that affects production, productivity and farm incomes in your area.

What are you most likely going to do in the next season?	Response*
a. buy your own JoJo tank	
b. contribute to a community project that will drill water or build a dam	
c. plant drought resistant crops	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)
_____
_____

SELF-EFFICACY / SELF-CONFIDENCE

C29 Suppose you are a member of an organisation within the community and you need to elect the leader or chairperson.

To what extent are you most likely to:	Response*
a. nominate yourself	
b. nominated by others	
c. nominate someone else	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)

_____
_____

C30 Every organisation holds meetings to discuss the future. As smallholder farmers you also have such meetings in your area. In these meetings it is likely that you do not agree with some of the decisions taken.

You are in a meeting and wish to oppose some ideas raised by the leaders, to what extent are you mostly likely to:	**Response***
a. oppose other people's opinions that are not aligned with your beliefs	
b. agree with the organisation's leaders to avoid conflict Nominated by others	
c. agree with the leader to show respect for their position	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)

_____
_____

OPTIMISM

C31 You have been farming for a certain period of time and you are familiar with the responsibilities of the farming business. Lately, however, you have been facing low yields, struggling to accomplish basic tasks and to make profit.

To what extent are you most likely to:	**Response***
a. invest less of your time on farming and seek off-farm opportunities	
b. continue farming and see these failures and setbacks as temporary	
c. quit farming and find something else to do	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)

_____
_____

C32. Suppose you are a scheme member who has use rights to some land in the scheme and the government introduces a new land consolidation programme. Farmers who give up their land in the scheme to this programme will be compensated with huge sums of money.

Given this scenario or situation, what will you most likely do in the future?	**Response***
a. give up all of the land	
b. give up part of the land	
c. refuse the compensation and keep the land	
d. Any other (please specify)	

1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Please justify your response(s)

_____
_____

D. NATURAL CAPITAL

D1. Indicate total irrigated land that you have access to? _____

D2. Indicate total rain-fed land that you have access to? _____

D3. Means of ownership	**D4.** Of the irrigated land how much is… **(ha)**?	**D5.** Of the rain fed how much is … **(ha)**?	**D6.** Plot quality **(Code D)**
a. Owned			
b. Leasing or renting			
c. Borrowed			
d. Received from the chief on a temporary basis			
e. Any other (please specify			

Code D: *1= Very bad 2= Bad 3=neutral 4= Good 5= Very good*

D7. If means of ownership is leasing or renting, how much do you pay per ha per year?_____

D8. Do you find it difficult to make long-term land use decisions due to the current land ownership system?

1= Yes 0= No

D9. If Yes to **D8**, what have you done to deal with this difficulty? _____
_____

	Questions	**Response**
D10	How far away is your household to the irrigation scheme? (Walking minutes)	
D11	How do you rate water accessibility to your plot(s)? 1 = Very bad 2 = Bad 3 = Neutral 4 = Good 5 = Very good	
D12	I have adequate access to equipment that draws water to my plot. 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree	
D13	What do you do if you don't receive water on your irrigating day? 1 = Nothing 2 = Report to the irrigation committee 3 = Talk to farmers upstream 4 = other(specify)	
D14	Do most farmers respect the rules of collective management and use of irrigation water? 1 = Yes 0 = No	
D15	If No to **D14**, why?	
D16	Can the scheme committee enforce the rules or by-laws agreed by the members? 1 = Yes 0 = No	
D17	If No to **D16**, why?	
D18	When rules are violated, does the committee take timely action(s)? 1 = Yes 0 = No	
D19	If No to **D18**, why?	
D20	Do you participate in the maintenance of the canals in the scheme? 1 = Yes 0 = No	
D21	If Yes to **D20**, how do you contribute? 1= management 2=labour 3= funds contribution	
D22	If No to **D20**, Why? _____	

D23. What do you often do when the farming equipment is broken? *1= Do nothing   2= Wait for government to assist 3= Wait for irrigation management to assist 4= Pay from my pocket for repairs*

D24. Explain your answer to **D23,**
_____
_____

D25. How often do disputes (conflicts) occur among farmers or between blocks on water issues?
1 = Never   2 = Occasionally   3= I don't know   4 = Often   5 = Very Often

D26. If your answer to **D25** is **4** or **5**, what are the main reasons for water-related disputes?
_____
_____

D27. How often do disputes (conflicts) occur among farmers or between blocks on land issues? _____
1 = Never   2 = Occasionally   3= I don't know   4 = Often   5 = Very Often

D28. If your answer to **D27** is **4** or **5**, what are the main reasons for land-related disputes?
_____
_____

D29. What do you do when these disputes occur?
_____
_____

D30. What does the committee do when these disputes occur?
_____
_____

E. FINANCIAL CAPITAL

Complete table below on sources of household income

Source of household income	E1. Source of income 1=Yes 0= No	E2. Number of times you received this income in year 2017? **E.g.** once, 2 or 3 times/year, monthly, bi-monthly	E3. Average income each time (**Rands**)	E4. Rank of source of income
a. Remittances				
b. Arts and craft				
c. Permanent employment				
d. Temporary employment				
e. Social grants				
f. Crop income				
g. Livestock				
k. Other (please specify)				

E5. Major uses of remittances: 1 = Food and groceries **2** = Agricultural inputs **3** = School fees and supplies **4** = Health-related expenses **5** = Transport **6** = Other (specify) _____(*multiple answers possible*)

If you have social grants as a source of income, please complete the table below:

Name of person	E6. Number of years receiving grant	E7. Who receives the grant? (**Code E**)	E8. If **E7** = 2, do they send money home? 1=Yes 0= No	E9. If **E8** =1, how much do they send?
Child grant				
Old persons grant				
Disability grant				
Foster child grant**				
Care dependency grant				

Code E*:* 1= Respondent/farmers 2= Someone else not living in the household 3= Someone else living at home

***Foster grant is support given to a family that is looking after a child not theirs, in their home.**

E10. Do you use some of your grant money to buy agricultural inputs? 1 = Yes 0 = No	
E11. If Yes, for what input(s)?	
E12. If Yes to **E11**, how often do you do that? 1 = Sometimes 2 = Often 3 = Always	
E13. Do you use some of your grant money to hire casual labour? 1 = Yes 0 = No	
E14. If Yes to **E13**, how often do you do that? 1 = Sometimes 2 = Often 3 = Always	
E15. Do you use some of your grant money to hire farming equipment (e.g. tractor)? 1 = Yes 0 = No	
E16. If Yes to **E15**, how often do you do that? 1 = Sometimes 2 = Often 3 = Always	
E17. Do you use some of your grant money to lease or rent land? 1 = Yes 0 = No	
E18. If Yes to **E17**, how often do you do that? 1 = Sometimes 2 = Often 3 = Always	
E19. Roughly, what proportion of your social grant do you use for **E10-E17** above? 1= None 2= A quarter 3= Half of it 4= Most of it 5= All of it	
E20. Please explain your answer to **E19**:	
E21. Do you consider the social grant as a means of survival to meet basic needs? 1 = Yes 2 = Somewhat 3 = No	
E22. Do you consider the social grant as your primary source of income? 1 = Yes 2 = Somewhat 3 = No	
E23. Do you consider the social grant as a supplement to your household income? 1 = Yes 2 = Somewhat 3 = No	
E24. Do you consider the social grant adequate for maintaining the individual concerned? 1 = Yes 2 = Somewhat 3 = No	
E25. Do you consider the social grant has improved your household welfare? 1 = Yes 2 = Somewhat 3 = No	
E26. Do you consider the social grant has supported personal and family needs? 1 = Yes 2 = Somewhat 3 = No	

E27. Complete the table below and indicate the extent to which you agree with the following statements?

Perceptions on social grants	Response*
a. In the absence of **child support grant** the rate of teenage pregnancy would not be so high.	
b. The **child support grant** is helping families to take their children to school.	
c. Most of the **child support grant** recipients misuse the grants (e.g. purchase alcohol, gambling, etc.)	

1= Strongly disagree 2= Disagree 3= Neutral 4= Agree 5 = Strongly agree

Savings and access to credit

E28. Do you have any form of savings? 1 = Yes 0 = No

E29. If Yes to **E28** above, which type of savings? 1 = Formal 2 = informal (i.e. stokvel) 3 = both

E30. If Yes to **E28**, how much (Rands)? _____

E31. Have you ever taken credit or used any loan facility in the past 12 months? 1=Yes 0=No

If Yes, complete the table below

	E32. Credit 1	**E33.** Credit 2	**E.34** Credit 3
a. Type of credit (**Code F**)			
b. Indicate source of credit (**Code G**)			
c. How much did you receive from each source?			
d. Interest rate (%)	_____/ month _____/ years	_____/ month _____/ year	_____/ month _____/ year
e. Were you able to pay back the loan/credit in time? 1=Yes 0=No			

Code F: 1 = Consumption (food, clothes, etc.) 2 = Agricultural production (inputs, agricultural equipment, livestock, etc.) 3 = Other investment credit (building materials, etc.))

Code G: 1 = Relative or friend 2 = Money lender 3 = Savings club (e.g. stokvel or internal savings and lending schemes) 4 = Input supplier 5 = Output buyer 6 = Banks 7 = Government 8 = Microfinance institutions 9 = Others (please specify)

E37. If No to **E31,** please specify the reason(s) for not taking and/or using credit (***multiple answers possible***)
1 = The interest rate is high   2 = I couldn't secure the collateral *(isibambiso)*   3 = I have got my own sufficient money   4 = It isn't easily accessible   5 = I do not want to be indebted   6 = Other (please specify)_____

E35. Complete the table below and indicate the extent to which you agree with the following statements?

Perceptions on access to credit	Response*
a. Consumption credit (e.g. clothes cards) is easy to access but expensive (interest rate is too high)	
b. Production credit (e.g. Lima) is difficult to access (huge transaction cots/ bureaucracy and collateral requirements)	
c. Informal credit (e.g. village money lenders) is easy to access but expensive (interest rate is too high)	
d. Formal credit (e.g. banks, credit & saving associations) is difficult to access but affordable	

1= Strongly disagree   2= Disagree   3= Neutral / Do not know   4= Agree   5 = Strongly agree

Complete table for crops grown in 2017 (Please indicate units of produce for each crop)

Crop grown	E36. How many time did you harvest?	E37. Area under production (ha)	E38. Quantity harvested (units/ha)	E39. Total quantity sold	E40. Quantity consumed	E41. How many times did you sell?	E42. Unit of sale	E43. Price sold per unit	E44. Market outlet (Code H)	E45. Market distance from farm

Code H: 1= Farm gate   2 = Hawkers   3= Local shops   4 = Shops in town   5= Van traders   6= Roadside 7= Other (please specify)

Complete the following table on how much you spend on the following food products per month

Products	E46. Unit (kg, etc.)	E47. Quantity/Number	E48. Cost per unit (R)	E49. Total cost (R)
Crop products				
a. Maize meal				
b. Potatoes				
c. Cabbages				
d. Tomatoes				
e. Onions				
f. Carrots				
g. Other (please specify)				
Livestock products				
h. Meat beef				
i. Meat chicken				
j. Milk				
k. Polony				
l. Cheese				
m. Eggs				
n. Other (please specify)				

E50. Do you sell some of your produce as a group?   *1=Yes   0=No*

E51. If No to **E50**, despite the well-known economies of scale advantages, why not?
_____
_____

E52. What is the walking distance to the nearest (a) **road** (minutes) _____ (b) **town** (minutes)_____

Complete the following table for production inputs used for each crop in 2017

Crop	Inputs	Unit (kg, etc.)	E53. Quantity/Number	E54. Cost per unit (R)	E55. Total Cost (R)
	a. Seeds				
	b. Basal fertilizer				
	c. Top fertilizer				
	d. Manure (umquba)				
	e. Herbicides (ukhula)				
	f. Pesticides				
	g. Tractor / ox				
	h. Transport cost				
	i. Hired labor costs				
	a. Seeds				
	b. Basal fertilizer				
	c. Top fertilizer				
	d. Manure				
	e. Herbicides				
	f. Pesticides				
	g. Tractor / ox				
	h. Transport cost				
	i. Hired labor costs				
	a. Seeds				
	b. Basal fertilizer				
	c. Top fertilizer				
	d. Manure				
	e. Herbicides				
	f. Pesticides				

Crop	Inputs	Unit (kg, etc.)	E53. Quantity/Number	E54. Cost per unit (R)	E55. Total Cost (R)
	g. Tractor / ox				
	h. Transport cost				
	i. Hired labor costs				
	a. Seeds				
	b. Basal fertilizer				
	c. Top fertilizer				
	d. Manure				
	e. Herbicides				
	f. Pesticides				
	g. Tractor / ox				
	h. Transport cost				
	i. Hired labor costs				

E56. What are the most important constraints regarding farming as a smallholder (e.g. related to access to inputs, land, water, markets, packaging, processing finance etc.)?

_____

_____

F. PHYSICAL CAPITAL

Complete the following table on ownership and access to assets

Assets	F1. Number of assets	F2. Current market value per unit (s) (Rand)	F3. Which ones do you own as a group?	F4. Are the production assets adequate for your agricultural activities? 1= Yes 0=No
a. Cell phone				
b. Radio				
c. Television				
d. Trailer/cart				
e. Water tank				
f. Motor vehicle in running order				
g. Hoe (igeja)				
h. Planter, harrow or cultivator				
i. Tractor				
j. Other (specify)				

Complete table below on livestock ownership

Type of livestock	F5. Number owned	F6. Number sold in the previous six months	F7. Current value per unit (Rand)	F8. Main market livestock sold (Code I)
a. Goats				
b. Cattle				
c. Sheep				
d. Domestic chickens				
g. Other (specify)				

Code I: 1=Local butchery   2=Supermarket 3=Neighbours   4=Hawkers 5=Other (specify)_____

F9. What is your main purpose of keeping livestock 1=Sales (income) 2=Consumption 3=Wealth 4=Draught power (ukulima) 5=Cultural reasons 6=Other (please specify) _____(*multiple answers possible*)	

G. SOCIAL CAPITAL

G1. Are you a member of any group (s) in the community?

Group	1= Yes 0= No

a. Cooperative	
If No to 'a', Why Not?	
If Yes to 'a', are you happy with the governance and management of the cooperative?	
If Not happy, what are the issues?	
Do you have trust in the cooperative leadership?	
If No, what are the reasons for your lack of trust?	
b. Water committee governing irrigation use or water user association	
If No to 'b', Why Not?	
If Yes to 'b', are you happy with the governance and management of the cooperative?	
If Not happy, what are the issues?	
Do you have trust in the water committee?	
If No, what are the reasons for your lack of trust?	
c. Credit and saving associations	
If No, Why Not?	
d. Church	
e. School	
f. Other (specify):	

G2. If No to all of the above groups, Why Not? -
_____
_____

G4. Have you used sources of information relevant to your farming activities? 1= Yes 2= No

If Yes, please complete the table for at most 3 information sources used in the past.

	G5. Source 1	**G6.** Source 2	**G7.** Source 3
a. Information source **(Code J)**			
b. rank information source **(Code K)**			

Code J: 1= Extension officers 2= Fellow farmers 3= Irrigation / Scheme committees 4= Cooperative leaders 5= Traditional leaders 6= Non-governmental organizations (NGOs) 7= Media (newspapers, radio, TV) 8= Community meetings 9= Phone (sms, text) 10= Other (please specify) _____
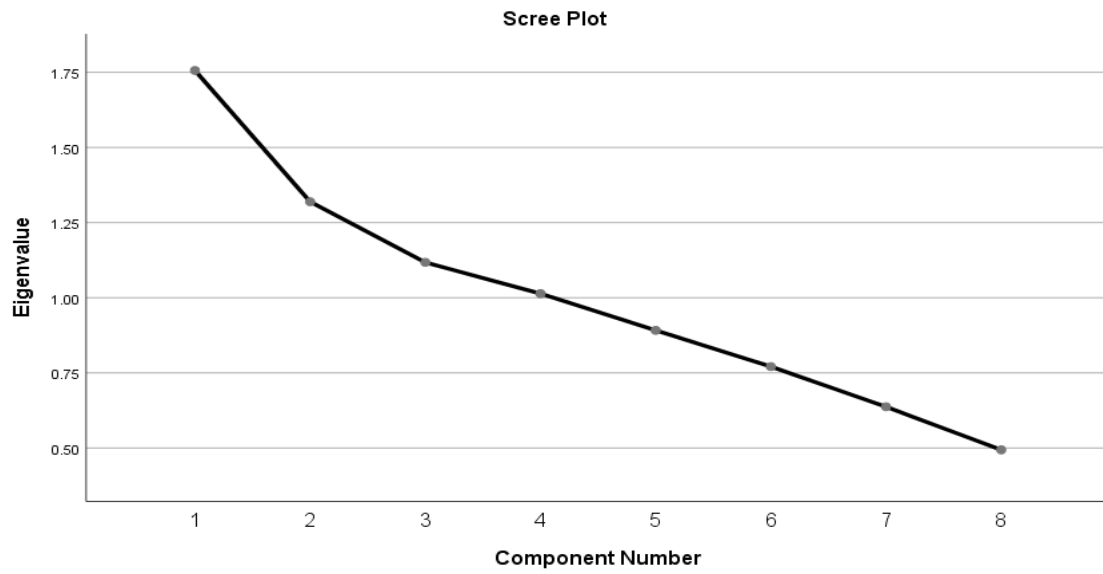**Code K:** 1= Very unimportant 2= Unimportant 3= Neutral 4= Important 5= Very important
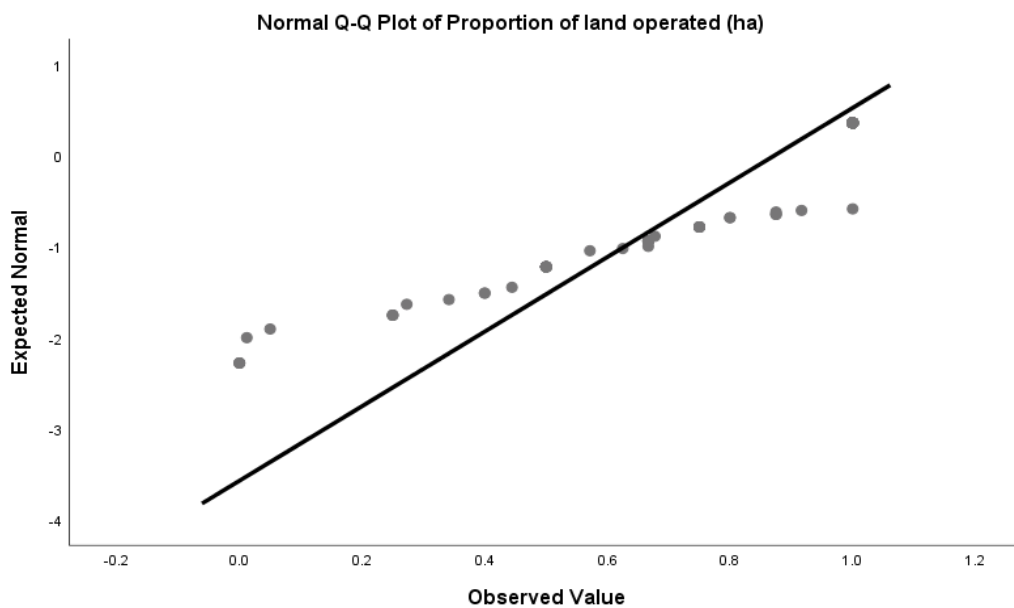
_____
___

H. Concluding remarks

There might be some other issues in your area or comments you would like to raise/make that we have not raised above. If there are any, please share that information with us. _____ _____ _____ _____

SIYABONGA / THANK YOU

Appendix B - Positive psychological capital indices scree plot

Appendix C – Normal quantile-quantile plot of proportion of land operated

Appendix D - Relationship between unearned income and land operated proportions

UNRND_PROP Line Fit Plot